

ANNEX 3.1.1
TOPOGRAPHIC SURVEY

**THE STUDY ON WATER SUPPLY SYSTEM
FOR SIEM REAP REGION IN CAMBODIA**

**FINAL REPORT
Vol. III SUPPORTING REPORT**

ANNEX 3.1.1 TOPOGRAPHIC SURVEY

Table of Contents

	<u>Page</u>
1. Longitudinal and Cross Sectional Survey for Siem Reap River, Moat, Canal and West Baray	A3.1.1-1
2. Leveling of Survey for Existing Wells and Exploratory Wells	A3.1.1-1
3. Additional Topographic Survey for Feasibility Study	A3.3.1-3
3.1 Introduction	A3.3.1-3
3.2 Description of Work Items	A3.3.1-3
3.3 Equipment and Methodology	A3.3.1-7
3.4 Outcome.....	A3.3.1-7

List of Tables

	<u>Page</u>
Table 3.2.1 List of Point Leveling (20 points)	A3.3.1-5
Table 3.2.2 List of New Benchmarks	A3.3.1-6

List of Figures

	<u>Page</u>
Figure 1.1 Location Map of Topographic Survey	A3.3.1-2
Figure 3.2.1 Location Map of Additional Topographic Survey	A3.3.1-4

Attachment

Attachment-1	Field Report of the Topographic Survey
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ANNEX 3.1.1 TOPOGRAPHIC SURVEY

1. Longitudinal and Cross Sectional Survey for Siem Reap River, Moat, Canal and West Baray

The topographic survey was carried out for Siem Reap River of 27 km by longitudinal and cross section, Moat and Canal of 7 km from French Weir to the West Baray along the Angkor Thom by longitudinal and cross section, West Baray by cross section. The location of the topographic survey work is shown in Figure 1.1, and the abstract of the Report by the Contractor (PISNOKA) is attached in Attachment-1.

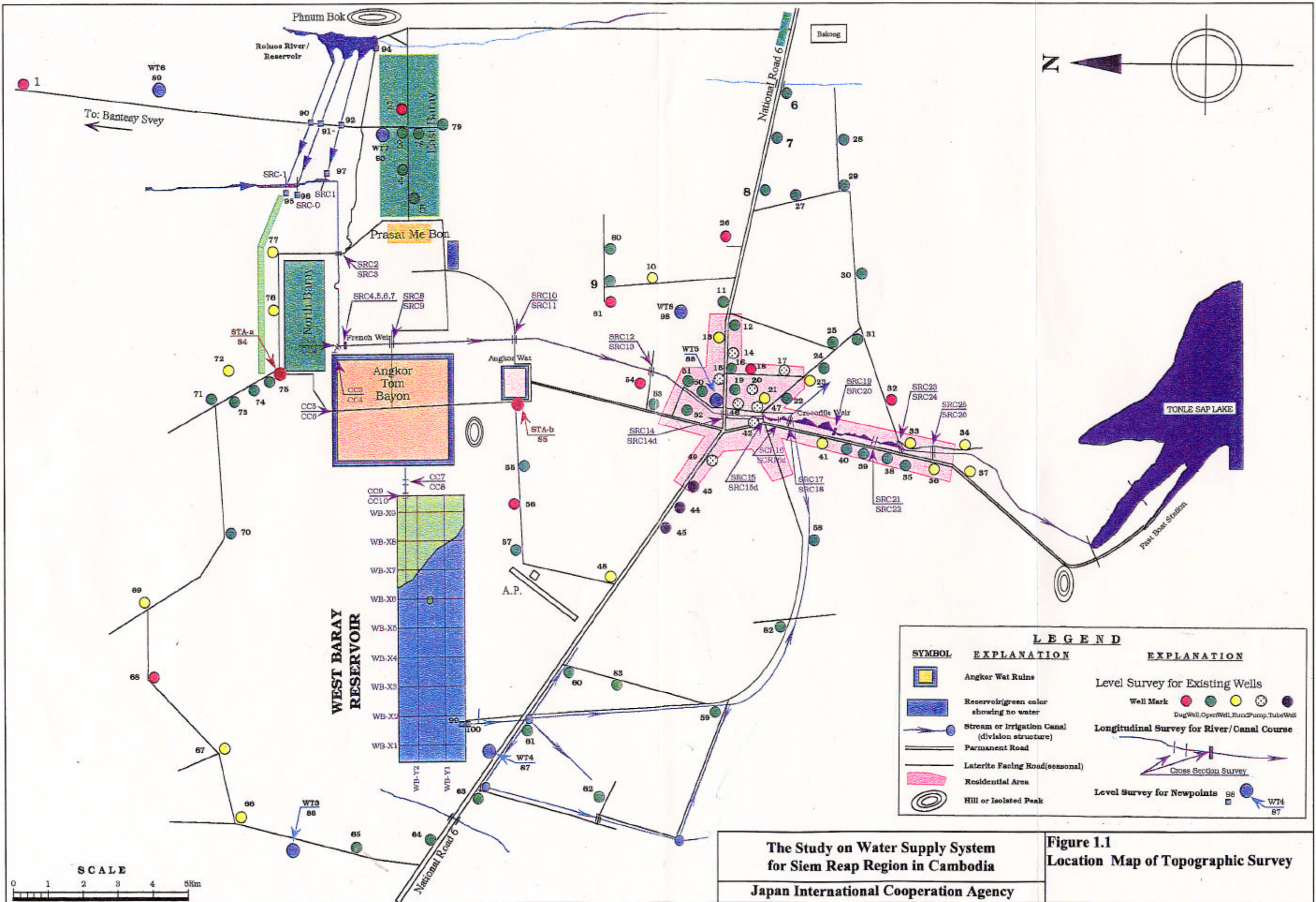
The following is the results of the survey work.

- 1) Elevation of the Lake Tonle Sap water level in May 1997, which is probably the lowest water level in the year. Elevation of the Siem Reap Town ranges from 10 to 18 m in most places.
- 2) Average gradient of the Siem Reap river is 1/900 from the Kring Kroch bridge to UNTAC bridge for first 5.5 km section, 1/1,850 from the UNTAC bridge to the Crocodile Weir for 7.5 km long, and 1/2,550 from the Crocodile Weir to the estuary (Tonle Sap lake) for 14 km long.
- 3) Average river width of the Siem Reap River is 15 meters at the first 5.5 km long, 20 to 40 meters in Siem Reap Town, and 20 to 30 meters for the downstream near the Lake Tonle Sap.
- 4) The artificial moat and canal of total 7 km long from the French Weir to the West Baray has the width of 10 meters in average. The head between the French Weir to the entrance of the reservoir is 1.5 meters with the gradient of 1/4,700.

2. Leveling of Survey for Existing Wells and Exploratory Wells

The leveling survey was carried out for 83 existing wells, 8 new drilling spots, and 19 hydrometric points.

The results of leveling survey are effectively used for preparation of the maps such as Contour Map of Ground water Level, Geological Profiles, Contour Maps Showing Hydrogeological Boundaries, and Geological Map of Bed Rocks.



The Study on Water Supply System for Siem Reap Region in Cambodia
 Japan International Cooperation Agency

Figure 1.1
 Location Map of Topographic Survey

3. Additional Topographic Survey for Feasibility Study

3.1 Introduction

A topographic survey was carried out in the proposed distribution trunk main route, distribution center and other related locations. This will contribute preliminary designing of the water supply facilities. The work was completed by using local contractors.

3.2 Description of Work Items

The location of the survey work is shown in Figure 3.2.1. The work consists of the following items.

(1) Route Survey

The route survey was carried out to prepare longitudinal profile and cross sections. The route survey consisted of three lines named as A, B and C. The length of line A is 11.8 km along the National Road No. 6. The start of line A is a point 1.8 km northwest from the intersection of National Road No. 6 and road to West Baray. Line B is 1.8 km long along the road to West Baray. The starting point is 1.8 km from the intersection of National Road No. 6 and road to West Baray. Length of line C is 1.4 km in the direction of the Lake Tonle Sap from the crossroads in the town area (near Spean Thmor Bridge). The total length of route survey is 15 km. In all cases, a 40-m cross-section was taken at 200 m interval. Drawings are made at scale of 1/1,000 horizontal and 1/100 vertical for longitudinal profile and at scale of 1/100 horizontal and 1/20 vertical for cross section.

(2) Topographic Mapping Survey

The topographic mapping survey was carried out in 3 places, namely, around proposed distribution center, Spean Thmor Bridge and Spean Wat Damnak Bridge. The area covered by topographic survey is around 15,000 m². Drawings are made at a scale of 1/500.

(3) Leveling Survey

The leveling survey was carried out for 20 points. The list is given in Table 3.2.1 along with respective elevation surveyed.

(4) Establishing Benchmarks

Using the two existing benchmarks, 8 new benchmarks were established. The list is given in Table 3.2.2 along with elevation found.

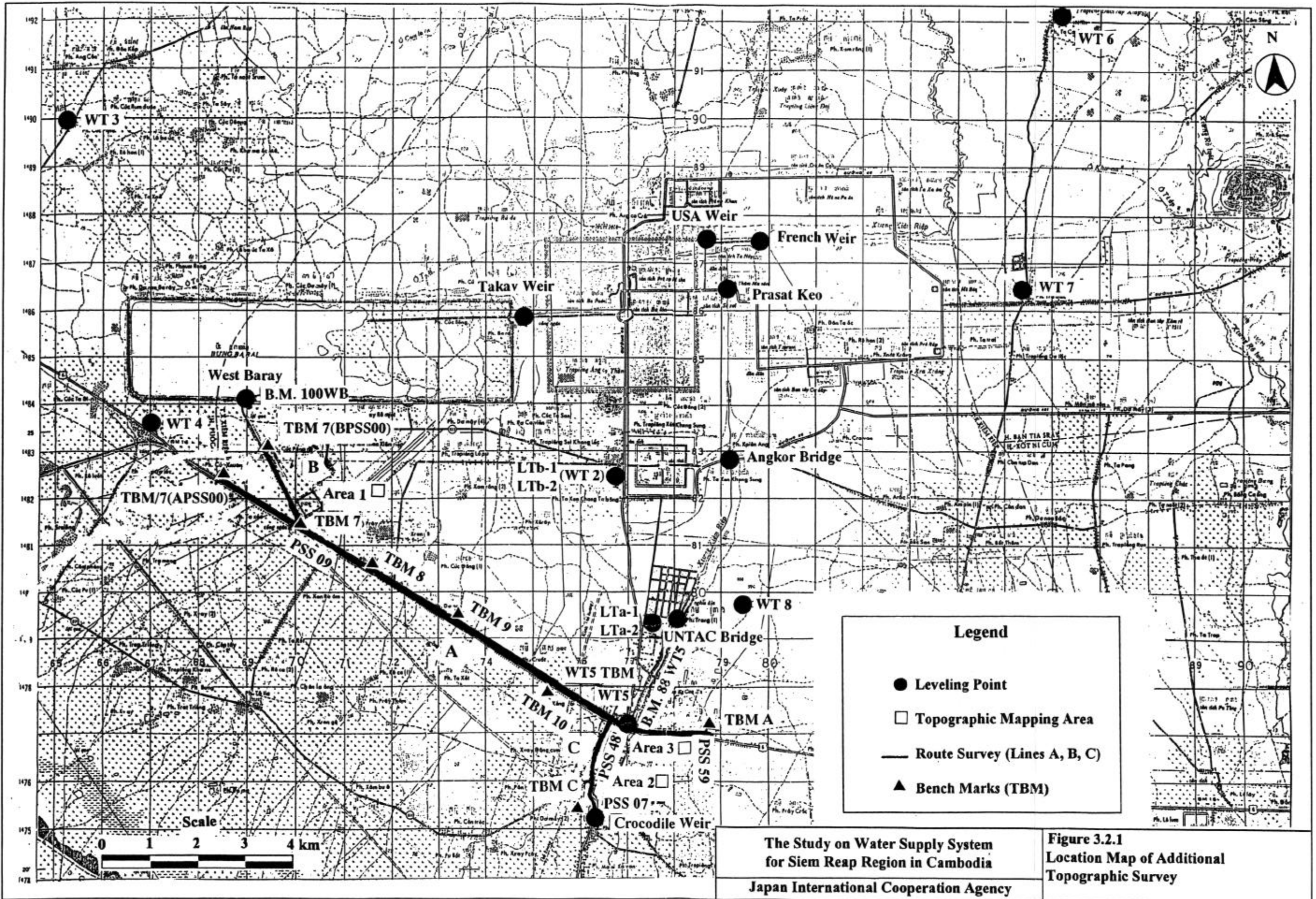


Table 3.2.1 List of Point Leveling (20 points)

No.	Name	Elevation	Remarks
1	LTa	17.430 m	+ marking point
2	LTb (WT 2)	21.317 m	+ marking point
3	WT 3	16.445 m	Top of rivet
4	WT 4	13.656 m	Top of rivet
5	WT 5	15.836 m	Top of drilling pipe
6	WT 6	32.862 m	Top of rivet
7	WT 7	26.030 m	Top of rivet
8	WT 8	17.074 m	Top of rivet
9	WT 5 TBM	15.240 m	Leg of water tank (water supply office)
10	French Weir	26.407 m	Top of structure
11	French Weir	21.987 m	0.0m of SG (left side of structure)
12	USA Weir	26.822 m	Top of structure
13	Takav Weir	21.801 m	Top of structure
14	Prasat Keo	14.857 m	0.0m of SG (top of SG – 7 m)
15	Angkor Bridge	21.670 m	+ marking point (downstream of bridge)
16	UNTAC Bridge	11.238 m	0.0m of SG (top of SG – 5 m)
17	West Baray	19.420 m	+ marking point -1
18	West Baray	26.558 m	+ marking point - 2
19	West Baray	16.476 m	+ marking point - 3
20	Crocodile Weir	15.255 m	Top of structure

Table 3.2.2 List of New Benchmarks

No.	Name	Elevation	Remarks
1	TBM 7 (APSS00)	13.776 M	Top of nail concrete (Line A)
2	TBM 7	14.895 M	Top of structure (Line A) Tuk Vel Bridge
3	TBM 8	15.026 M	Top of culvert (Line A)
4	TBM 9	15.440 M	Top of culvert (Line A)
5	TBM 10	15.210 M	Top of nail concrete (Line A)
6	TBM A	15.213 M	Top of footing electric pole (Line A)
7	TBM 7 (BPSS00)	15.457 M	Top of nail concrete (Line B) to Baray
8	TBM C	13.469 M	Top of footing electric pole (Line C)

3.3 Equipment and Methodology

The main equipment used was total station and automatic level.

Work was carried out according to the following specification:

- Difference of double running error for leveling should be less than $6 \text{ cm s}^{1/2}$ (s in km)
- Loop closer error should be less than $6 \text{ cm s}^{1/2}$ (s in km)
- Closure error between existing and new bench marks should be less than $6 \text{ cm} + 6 \text{ cm s}^{1/2}$ (s in km)

3.4 Outcome

The results of work item 3 and 4 are shown in Table 3.2.1 and Table 3.2.2. All drawings for work item 1 and 2 will be fully utilized for the preliminary design work. Location map is shown in Figure 3.2.1.