

Appendix-3

Reconnaissance Survey of Klongs

- 1) **Klong Bangkok Noi / Klong Chak Pra / Klong Mon / Klong Bongkok Yai**
- 2) **Klong Bang Chuerk Nang**
- 3) **Klong Lard Prao**
- 4) **Klong Saen Saep**
- 5) **Klong Tan**
- 6) **Klong Pra Kanong**
- 7) **Klong Phadung Krunkasem**

Reconnaissance survey of klongs in the Study Area by a small craft was carried out twice on April 12 (Thon Buri area) and on April 20, 2010 (Bangkok area). The klongs for the field survey were selected from main klongs considering land use in the klong basins. The surveyed klongs are shown in Table A3.1, and Figures A3.1 through A3.4.

Acquired knowledge obtained from the field survey is described below.

Table A3.1 List of Selected Klongs for the Field Survey

Date of Field Survey	Name of Klong	Land Use and Name of District (Section of Field Survey)
12 Apr. 2010	1) Klong Bangkok Noi	Land Use: C Bangkok Noi, Bang Phlat
	1) Klong Chak Pra	Land Use: A and C Taling Chan, Bangkok Noi
	1) Klong Mon	Land Use: C Bangkok Noi, Bangkok Yai
	1) Klong Bongkok Yai	Land Use: B and C Bangkok Yai, Thon Buri
	2) Klong Bang Chuerk Nang	Land Use: B, G and H Taling Chan, Phasi Charoen, Thawi Watthana, Bang Khae
20 Apr. 2010	3) Klong Lard Prao	Land Use: A and B Huai Khwang, Wang Thonglang
	4) Klong Saen Saep	Land Use: A and B Huai Khwang, Wang Thonglang, Wang Suan Luang
	5) Klong Tan	Land Use: B and C Watthana, Suan Luang
	6) Klong Pra Kanong	Land Use: A and B Watthana, Suan Luang, Phra Khanong
	7) Klong Phadung Krunkasem	Land Use: D and I Phra Nakhon, Dusit, Pom Prap Sattru Phai, Pathum Wan

Note: Land Use Category; A: Low Density Residential Area, B: Medium Density Residential Area, C: High Density Residential Area, D: Commercial Area, E: Industrial Area, F: Warehouse Area, G: Agricultural Conservation Area, H: Agricultural Area, I: Thai Culture and Art Conservation Area, J: Institutional, Public and Infrastructure Area



Figure A3.1 Location of Selected Klongs for the Field Survey

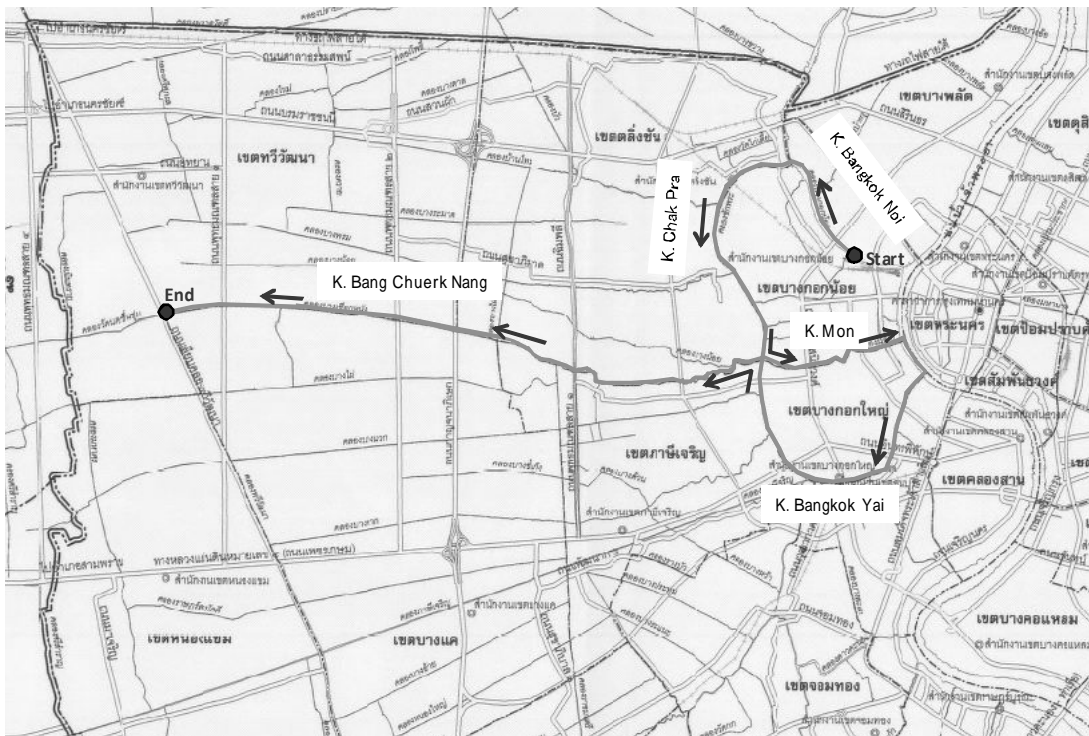


Figure A3.2 Route of Field Survey (April 12, 2010, No. 1)

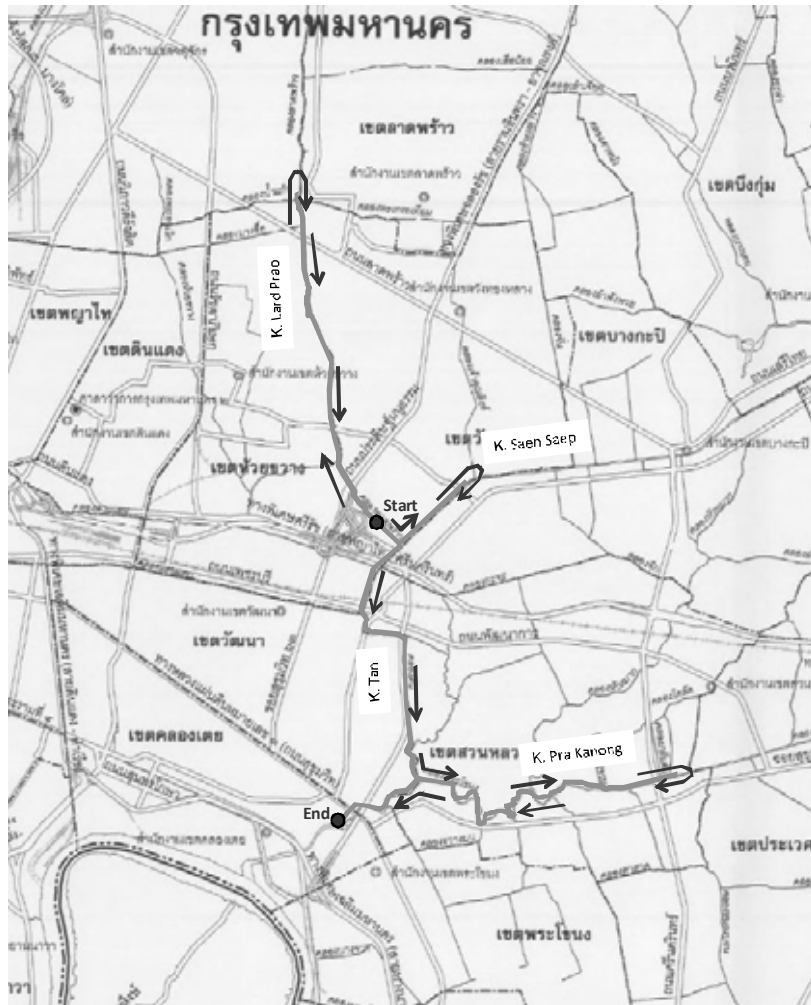


Figure A3.3 Route of Field Survey (April 20, 2010, No. 2)



Figure A3.4 Route of Field Survey (April 20, 2010, No. 3)

1) Klong Bangkok Noi / Klong Chak Pra / Klong Mon / Klong Bongkok Yai

These four klongs are flowing through in Thon Buri side area along the Chao Phraya River, and land use of the surrounding area is high-density residential area.

In only a tiny section of Klong Bongkok Yai, a treatment area (interceptor sewerage system) exists (Nong Khaem WWTP), and there exists no treatment area in the tributary areas. Therefore, almost all the wastewater from surrounding area is discharged into these klongs without treatment. These klongs are strongly influenced by the tidal effect of Chao Phraya River, and it is thought that the water in the Klongs is replaced always by river water of the Chao Phraya River. As a result,

according to the water quality monitoring results by DDS, BOD concentrations at all the monitoring points of klongs are below 10 mg/l (as the average BOD value of 2009), and DO concentrations are also as good as 1.5 - 3.4 mg/l (as the average value of 2009). In these water bodies, many boats for the sightseeing tour around klongs are cruising (Photo A3.1). Moreover, many residences with terrace which face the klong and people enjoying cool air were able to be seen (Photo A3.2). Thus, the klong was seemed to be used as a part of life of residents and the tourist industry utilizes klongs as an important resource. There is also little quantity of the garbage (solid waste) which is floating on the surface, although the surrounding areas have been highly urbanized. The reason for this is probably because such use is performed. The field survey using a boat has also enabled us to locate the pollution sources of partially polluted water bodies easily. These are drainage pipes and small tributary klongs from which wastewater (black-gray water) is flowing. Since the water pollution situation of these klongs is alleviated by the influence of Chao Phraya River as mentioned above, sewage smell and putrid odor were not felt.

On the other hand, probably because it is influenced by the tidal effects of Chao Phraya River, the water level of klong is high, and the margin (freeboard) to the ground level is not large. As a result, the bottom of the drainage pipe was located under the water surface in many cases (Photo A3.3).



Photo A3.1 Sightseeing Boat



Photo A.3.2 Terrace on Klong



Photo A3.3 Drain Culvert

2) **Klong Bang Chuerk Nang**

The basin area of this Klong is mainly agricultural conservation areas partially with medium density residential areas and agricultural areas. It is only one klong that is flowing through rural area in the field survey. This klong is flowing into the above-mentioned klong network of 1), and the basin area of this klong is outside of the treatment area (interceptor sewerage system). Moreover, since the klong is not covered by water quality monitoring system, there are no water quality data.

There are no signs of water pollution from the result of the field survey, and the water quality situation is very good. This klong is deeply related to the life of people in neighborhood, which can be seen in various scenes, such as transportation, goods conveyance, a peddler, bathing, a children's playground, and fishery (fishing net) (Photo A3.4). Thus, it seemed that klongs linking directly to the life is maintained by people in neighborhood in good conditions, and there was almost no floating dust which was dumped. Moreover, the motion of many fishes, aquatic bird and the aquatic plant (including submerged plant) of varieties were seen, and it became clear that the biodiversity of ecosystem was also preserved soundly (Photo A.3.5).



Photo A3.4 Fishing Net



Photo A3.5 Aquatic Plant

3) **Klong Lard Prao**

This klong is flowing through the boundary of low- and medium-density residential areas. The basin area of this klong is outside of treatment area. Therefore, almost all the wastewater discharged from the basin is flowing into the klong without treatment.

The water level of Klong Lard Prao at the time of the field survey was high, and flow direction could not be confirmed, and klong water seemed to be stagnated. At that time, Pra Khanong pumping station was not in operation, flap gates were pushed open by difference of water level at the pumping station, and the klong water discharged to the Chao Phraya River. As a result, bottoms of the drainage pipes were seen located under the water surface in many cases. Moreover, since the downstream part of this klong has stagnated, green algae propagate, and river water was looked green. The bad smell was felt clearly in some sections of the klong.

(Photos A3.6 and A3.7).



Photo A.3.6 Drainage Pipe



Photo A3.7 Green Algae

In some klong reaches, the boundary of klong section is ambiguous (a part of inside of the klong is occupied by houses), and facilities like a septic tank were seen under the floor of some houses. It seems that the wastewater from a house is discharged into klong through this facility.(Photo A3.8).

The oxidization pond with surface aeration equipment for the purification of klong water in the downstream area of Klong Lard Prao is operating. The treated water is discharged in the junction with Klong Saen Saep.

Boat navigation in Klong Lard Prao was difficult because mainly plastic garbage such as shopping bag abandoned in the klong coils around a screw and the boat stops frequently to clear the screw. This shows that not only wastewater but also solid wastes are abandoned into klongs frequently. Although traps which catch the floating garbage were seen in the klong. It is thought that many solid wastes have been deposited on the klong bottom since capture by such a trap is difficult for the sunken garbage (Photo A3.9).



Photo A3.8 Septic Tank



Photo A3.9 Garbage Trap

4) Klong Saen Saep

Klong Saen Saep is the longest klong in BMA, and about 3 km section was traveled by the boat in the field survey. Land use of the basin area of this section is low- and medium-density residential areas. In the upper part of this klong, there is wide area of agricultural conservation

area and agricultural area, and water quality of the klong water is good. In the rainy season the gates of King's Dike are closed for the purpose of flood prevention, and water from the upper stream stops flowing into the klong. Water buses operate around this klong frequently as public traffic, and shore protection of the klong is being fixed. Furthermore, construction of the bicycle track and the sidewalk is progressing on both sides of banks (Photos A.3.10 and A3.11). The Klong is easily accessible to all residents and can be seen from a water bus. Positive preservation of the Klong has been advanced. All of these facts indicate that residents' concern and conscious are very high.



Photo A3.10 Water Bus

Photo A3.11 Sidewalk

5) **Klong Tan**

This klong is short and connects Klong Saen Saep and Klong Pra Kanong. The klong is flowing through the boundary of low- and medium-density residential areas, and the basin of the klong is outside of the treatment area.

Pra Kanong Pumping Station which was constructed for flood protection is located in the downstream of Klong Pra Kanong. When pumps are operated, water from such klongs as Klong San Seap, Klong Sam Sen, Klong Pra Kanong, and other small klongs flow into the pump station, and is pumped to the Chao Phraya River.

However, since capacity of this klong is not enough to convey accumulated flow from the upstream klongs, an intake facility was built near the junction of Klong Lard Prao and Klong San Seap, and an underground bypass drainage canal from this facility and a new pumping station was built. The capacity of the new pumping station is 30 m³/sec.

This klong has mainly received water of Klong San Seap, therefore the water pollution situation is not getting worse.

6) **Klong Pra Kanong**

This klong is flowing through low density residential area, and the section in which field survey was carried out is in parallel with Skhumvit Road Soi 77. There are many good houses in the

surrounding areas, and living standard of the residents can be judged from house type to be higher than those in the surrounding areas of Klong Lard Prao.

Moreover, there are many temples and mosques along with the klong. Since feeding fish is regarded as "Buddhist's Good Action", and they are protected, many fish can be seen in the water in front of a temple. Surface of the water near a mosque is also kept clean probably because people carefully maintain cleanliness of surrounding area for the similar religious reason.

In the section where the sidewalk is built on both banks of klongs, garbage bin is put on the sidewalk. It is presumed that the ship/boat is performing garbage collection for households which do not have access by car (Photo A3.12). Moreover, although it is not so frequent as in Klong San Saep, water buses operate also in this klong.

The klong is easily accessible to all residents and can be seen from a water bus. Positive preservation of the klong has been advanced. All of these facts indicate that residents' concern and conscious are very high as in case of Klong Saen Saep (Photo A3.13)



Photo A3.12 Garbage Bin

Photo A3.13 Sidewalk

7) Klong Phadung Krunkasem

This klong is flowing through the boundary of commercial area and Thai Culture and Art Conservation area in the central area of Bangkok, and in addition, this Klong forms a boundary of two treatment areas i.e Din Daeng and Sipraya .

The upstream and downstream ends of this klong are connected with the Chao Phraya River, and the klong intersects Klong Mahanak at the middle point. There are five DDS's water quality monitoring points in the klong. At all the points, 2009 annual average value of BOD concentrations are below 10 mg/l, and the range of DO concentrations (annual average) is 1.1 - 2.4 mg/l.

Field survey of the klong by a boat revealed that wastewater (black-gray color) is flowing into the klong at many places. From observation, it is presumed that intercepting of wastewater is not fully performed (Photo A3.14). In addition to this, many garbage (solid wastes) is seen

floating on the klong where markets are located along the klong (Photo A3.15).



Photo A3.14 Interceptor

Photo A3.15 Market

Flow direction in the klong was from north to south at the time of the field survey, and stagnation of klong water was not seen. In addition, although this klong is one of the klongs where purification water from the Chao Phraya River is introduced, it was not known whether introduction of purification water was carried out at the time of the field survey.

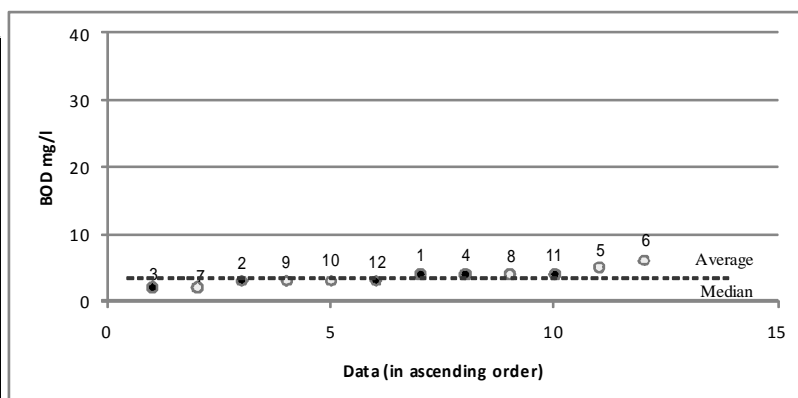
Since this klong is located in the central area of Bangkok as mentioned above, the direct relation with residents' daily life activities is weak. Prevention of wastewater intrusion is important thinking the function of this klong, since King's palace and temples are located nearby and many tourists visit the surrounding areas.

Appendix-4
Variation of BOD Concentrations in
Klongs (2009)

Variation of BOD Concentrations in Klongs (2009)

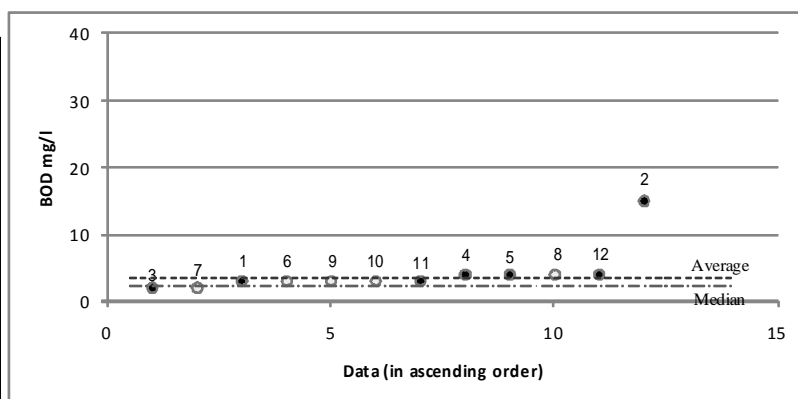
Point No.:99 (Klong Saen Saep)

Date	Ranking	BOD mg/l
10-03-2009	1	2
17-07-2009	2	2
6-02-2009	3	3
3-09-2009	4	3
9-10-2009	5	3
4/12/2009	6	3
9-01-2009	7	4
21-04-2009	8	4
6-08-2009	9	4
10-11-2009	10	4
21-05-2009	11	5
9-06-2009	12	6
Average		4
Median		4



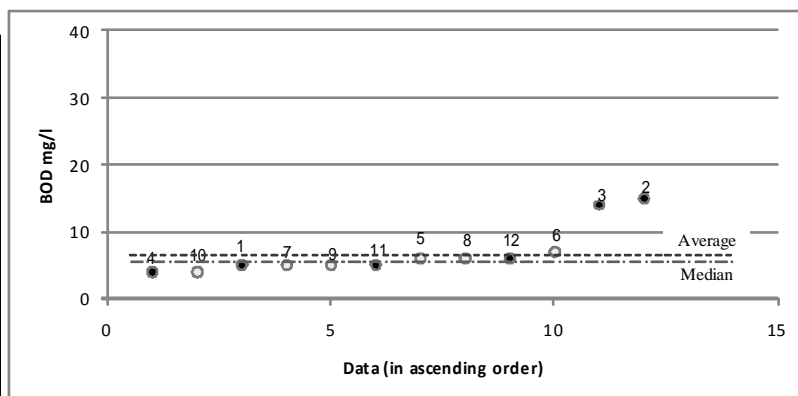
Point No.:97 (Klong Saen Saep)

Date	Ranking	BOD mg/l
10-03-2009	1	2
17-07-2009	2	2
9-01-2009	3	3
9-06-2009	4	3
3-09-2009	5	3
9-10-2009	6	3
10-11-2009	7	3
21-04-2009	8	4
21-05-2009	9	4
6-08-2009	10	4
4/12/2009	11	4
6-02-2009	12	15
Average		4
Median		3



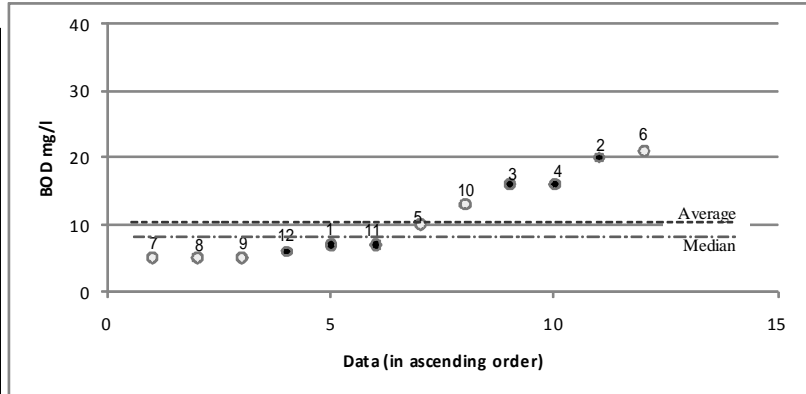
Point No.:95 (Klong Saen Saep)

Date	Ranking	BOD mg/l
21-04-2009	1	4
9-10-2009	2	4
9-01-2009	3	5
17-07-2009	4	5
3-09-2009	5	5
10-11-2009	6	5
21-05-2009	7	6
6-08-2009	8	6
4/12/2009	9	6
9-06-2009	10	7
10-03-2009	11	14
6-02-2009	12	15
Average		7
Median		6



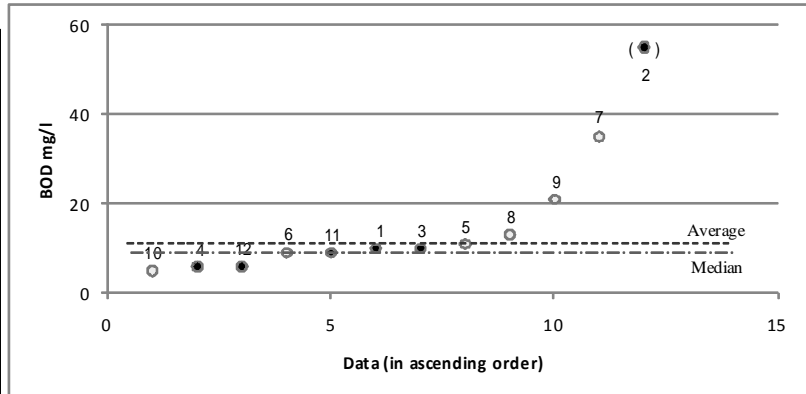
Point No.: 94 (Klong Saen Saep)

Date	Ranking	BOD mg/l
13-07-2009	1	5
5-08-2009	2	5
3-09-2009	3	5
1-12-2009	4	6
6-01-2009	5	7
4-11-2009	6	7
21-05-2009	7	10
5-10-2009	8	13
4-03-2009	9	16
3-04-2009	10	16
3-02-2009	11	20
3-06-2009	12	21
Average		11
Median		9



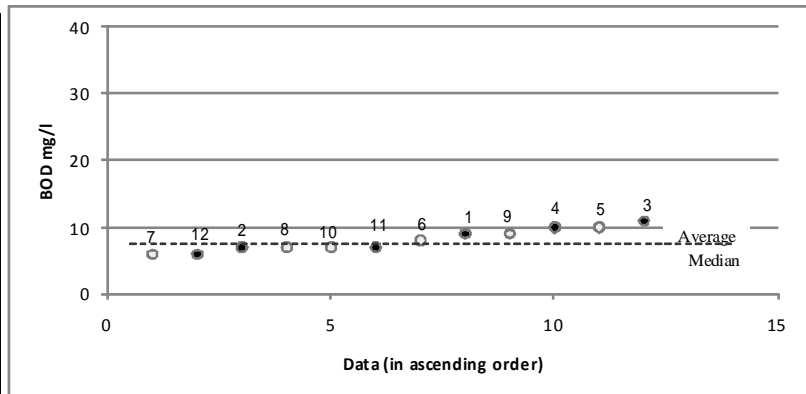
Point No.: 101 (Klong Tan)

Date	Ranking	BOD mg/l
6-10-2009	1	5
2-04-2009	2	6
2-12-2009	3	6
3-06-2009	4	9
3-11-2009	5	9
5-01-2009	6	10
3-03-2009	7	10
1-05-2009	8	11
19-08-2009	9	13
2-09-2009	10	21
28-07-2009	11	35
2-02-2009	12	(55)
Average		12
Median		10



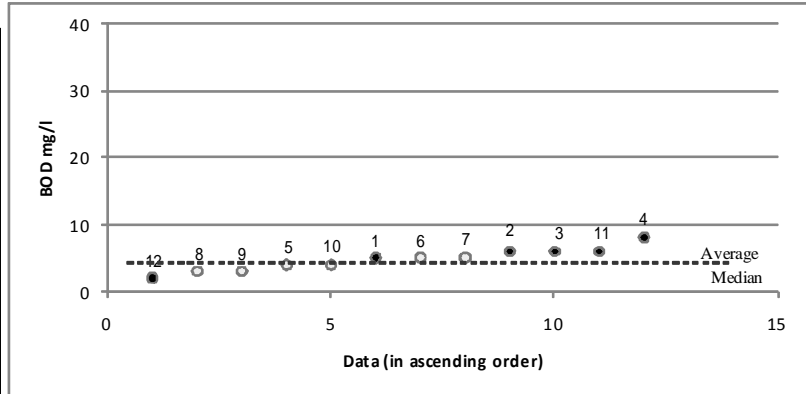
Point No.: 271 (K. Phra Khanong)

Date	Ranking	BOD mg/l
28-07-2009	1	6
2-12-2009	2	6
2-02-2009	3	7
19-08-2009	4	7
6-10-2009	5	7
3-11-2009	6	7
3-06-2009	7	8
5-01-2009	8	9
2-09-2009	9	9
2-04-2009	10	10
1-05-2009	11	10
3-03-2009	12	11
Average		8
Average		8
Median		8



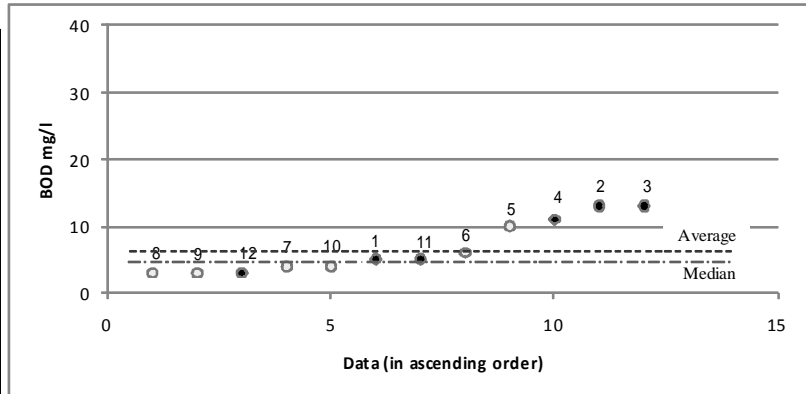
Point No.: 462 (K. Prawetburirom)

Date	Ranking	BOD mg/l
2-12-2009	1	2
19-08-2009	2	3
2-09-2009	3	3
1-05-2009	4	4
6-10-2009	5	4
5-01-2009	6	5
3-06-2009	7	5
28-07-2009	8	5
2-02-2009	9	6
3-03-2009	10	6
3-11-2009	11	6
2-04-2009	12	8
Average		5
Median		5



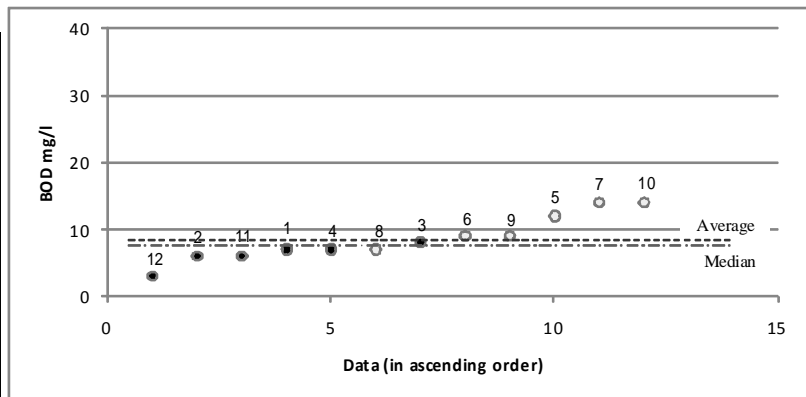
Point No.: 461 (K. Prawetburirom)

Date	Ranking	BOD mg/l
19-08-2009	1	3
2-09-2009	2	3
2-12-2009	3	3
28-07-2009	4	4
6-10-2009	5	4
5-01-2009	6	5
3-11-2009	7	5
3-06-2009	8	6
1-05-2009	9	10
2-04-2009	10	11
2-02-2009	11	13
3-03-2009	12	13
Average		7
Median		5



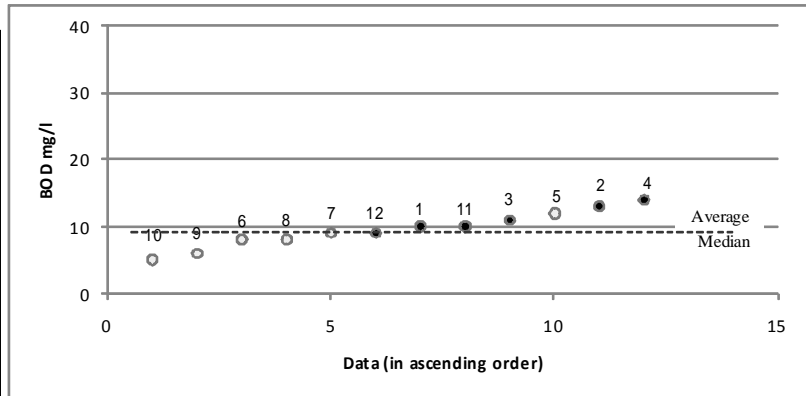
Point No.: 92 (Klong Saen Saep)

Date	Ranking	BOD mg/l
1-12-2009	1	3
3-02-2009	2	6
4-11-2009	3	6
6-01-2009	4	7
3-04-2009	5	7
5-08-2009	6	7
4-03-2009	7	8
3-06-2009	8	9
3-09-2009	9	9
21-05-2009	10	12
13-07-2009	11	14
5-10-2009	12	14
Average		9
Median		8



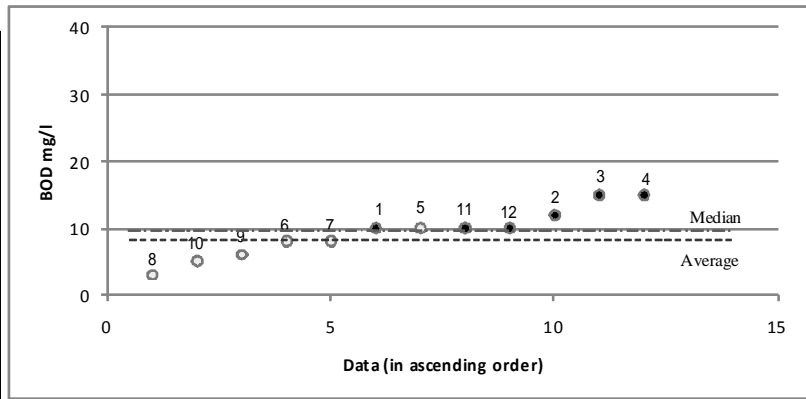
Point No.: 514 (Klong Bang Khen)

Date	Ranking	BOD mg/l
6-10-2009	1	5
21-09-2009	2	6
4-06-2009	3	8
6-08-2009	4	8
14-07-2009	5	9
11-12-2009	6	9
13-01-2009	7	10
5-11-2009	8	10
23-03-2009	9	11
6-05-2009	10	12
11-02-2009	11	13
22-04-2009	12	14
Average		10
Median		10



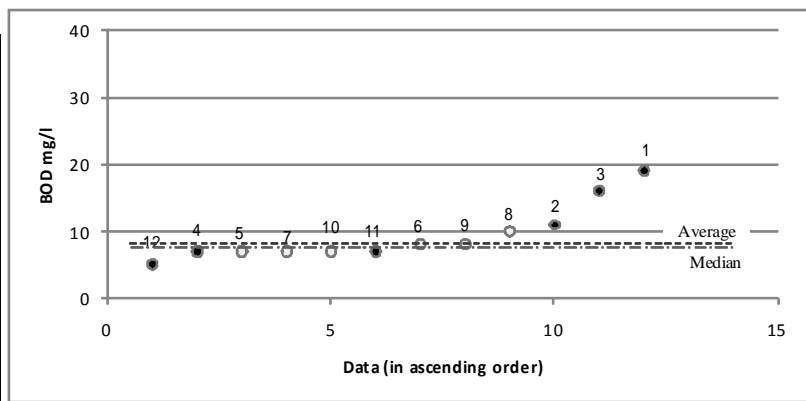
Point No.: 515 (Klong Bang Khen)

Date	Ranking	BOD mg/l
6-08-2009	1	3
6-10-2009	2	5
21-09-2009	3	6
4-06-2009	4	8
14-07-2009	5	8
13-01-2009	6	10
6-05-2009	7	10
5-11-2009	8	10
11-12-2009	9	10
11-02-2009	10	12
23-03-2009	11	15
22-04-2009	12	15
Average		9
Median		10



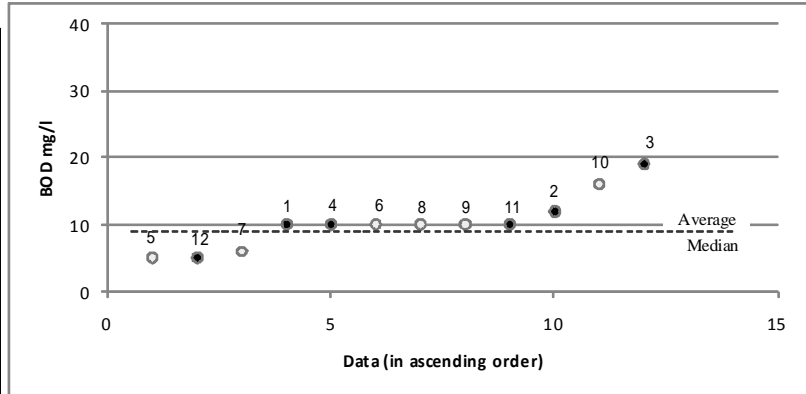
Point No.: 184 (Klong Lad Phrao)

Date	Ranking	BOD mg/l
1-12-2009	1	5
20-04-2009	2	7
4-05-2009	3	7
13-07-2009	4	7
5-10-2009	5	7
4-11-2009	6	7
12-06-2009	7	8
8-09-2009	8	8
11-08-2009	9	10
11-02-2009	10	11
4-03-2009	11	16
13-01-2009	12	19
Average		9
Median		8



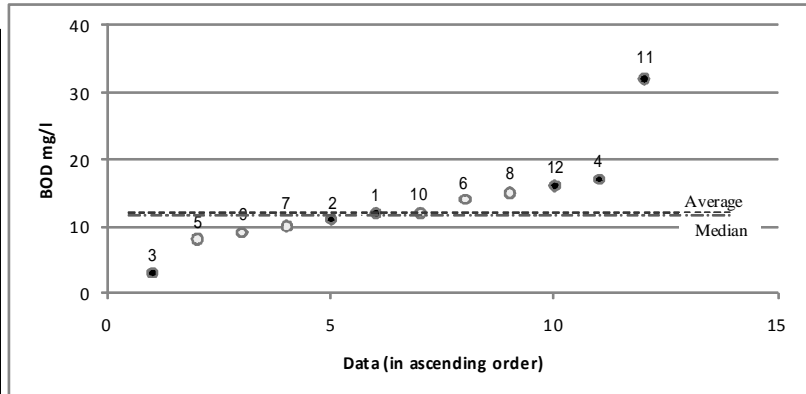
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Date	Ranking	BOD mg/l
4-05-2009	1	5
1-12-2009	2	5
13-07-2009	3	6
13-01-2009	4	10
20-04-2009	5	10
12-06-2009	6	10
11-08-2009	7	10
8-09-2009	8	10
4-11-2009	9	10
11-02-2009	10	12
5-10-2009	11	16
4-03-2009	12	19
Average		10
Median		10



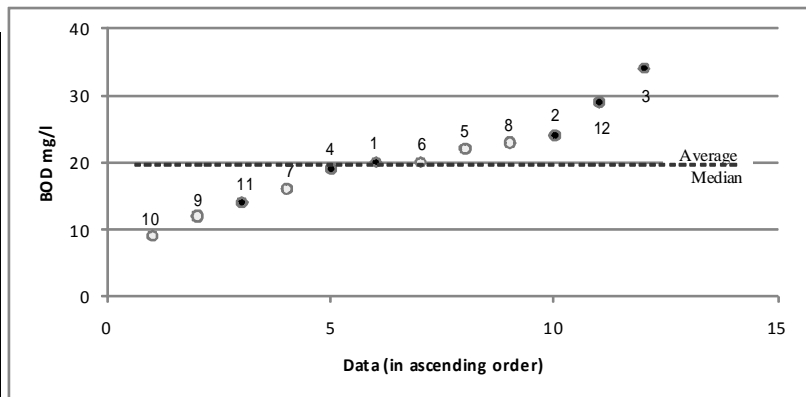
Point No.: 118 (K. Pram Prachakom)

Date	Ranking	BOD mg/l
12-03-2009	1	3
14-05-2009	2	8
11-09-2009	3	9
21-07-2009	4	10
10-02-2009	5	11
12-01-2009	6	12
14-10-2009	7	12
11-06-2009	8	14
14-08-2009	9	15
15-12-2009	10	16
23-04-2009	11	17
12-11-2009	12	32
Average		13
Median		12



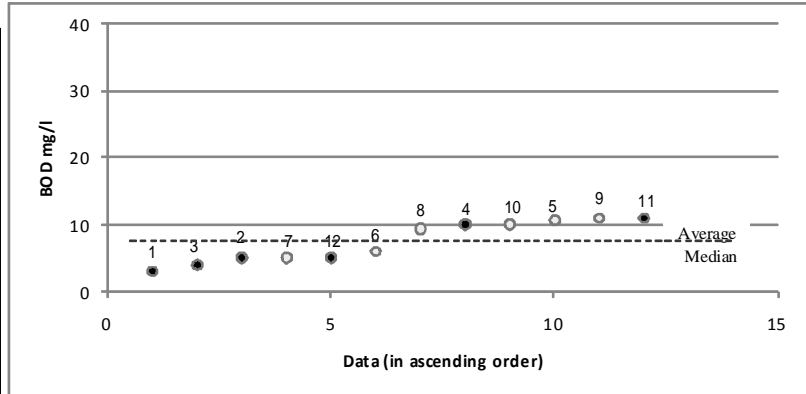
Point No.: 281 (Klong Bang Na)

Date	Ranking	BOD mg/l
12-10-2009	1	9
1-09-2009	2	12
2-11-2009	3	14
28-07-2009	4	16
1-04-2009	5	19
5-01-2009	6	20
1-06-2009	7	20
1-05-2009	8	22
5-08-2009	9	23
2-02-2009	10	24
3-12-2009	11	29
3-03-2009	12	34
Average		20
Median		20



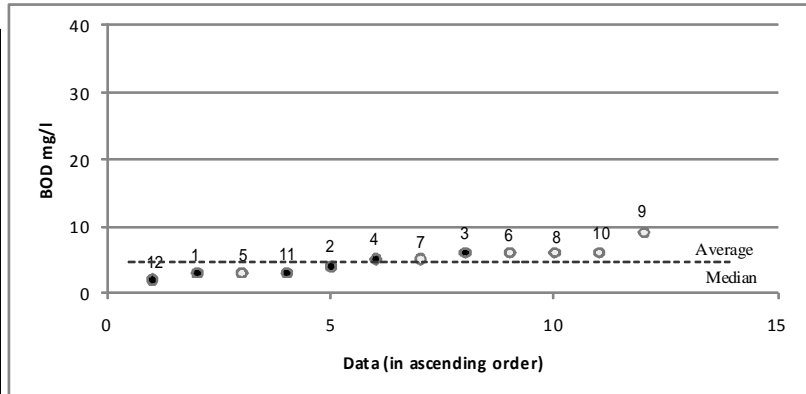
Point No.: 261 (Klong Bangkok Noi)

Date	Ranking	BOD mg/l
19-01-2009	1	3
2-03-2009	2	4
17-02-2009	3	5
17-07-2009	4	5
28-12-2009	5	5
11-06-2009	6	6
25-08-2009	7	9
29-04-2009	8	10
14-10-2009	9	10
19-05-2009	10	11
15-09-2009	11	11
6-11-2009	12	11
Average		8
Median		8



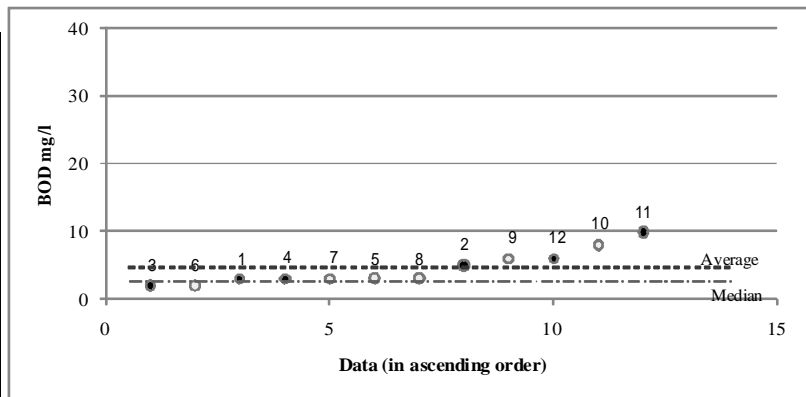
Point No.: 393 (K. Bangkok Yai)

Date	Ranking	BOD mg/l
22-12-2009	1	2
19-01-2009	2	3
22-05-2009	3	3
20-11-2009	4	3
17-02-2009	5	4
20-04-2009	6	5
29-07-2009	7	5
20-03-2009	8	6
19-06-2009	9	6
24-08-2009	10	6
21-10-2009	11	6
21-09-2009	12	9
Average		5
Median		5



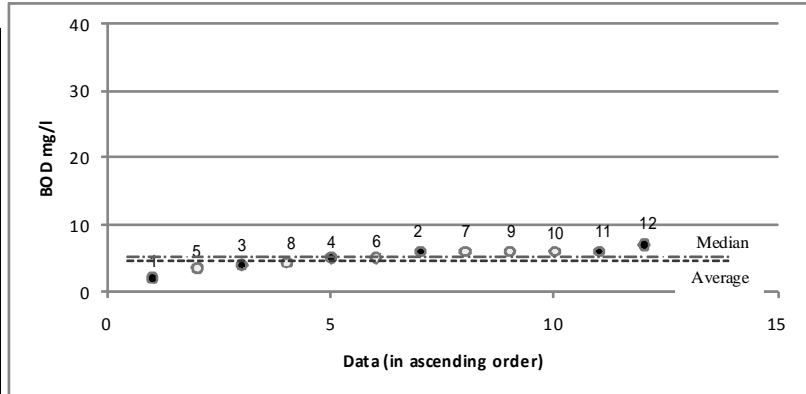
Point No.: 671 (Klong Dan)

Date	Ranking	BOD mg/l
20-03-2009	1	2
5-06-2009	2	2
22-01-2009	3	3
9-04-2009	4	3
16-07-2009	5	3
21-05-2009	6	3
18-08-2009	7	3
19-02-2009	8	5
14-09-2009	9	6
22/12/2009	10	6
13-10-2009	11	8
9-11-2009	12	10
Average		5
Median		3



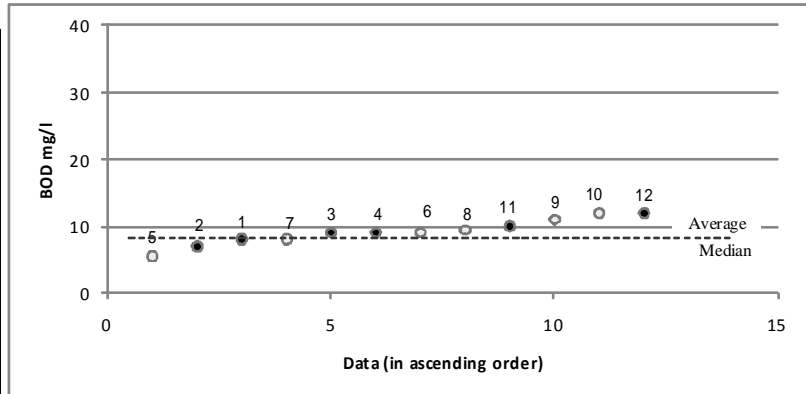
Point No.: 431 (Klong Sanamchai)

Date	Ranking	BOD mg/l
21-01-2009	1	2
25-05-2009	2	4
20-03-2009	3	4
18-08-2009	4	4
9-04-2009	5	5
5-06-2009	6	5
19-02-2009	7	6
20-07-2009	8	6
14-09-2009	9	6
14-10-2009	10	6
9-11-2009	11	6
23-12-2009	12	7
Average		5
Median		6



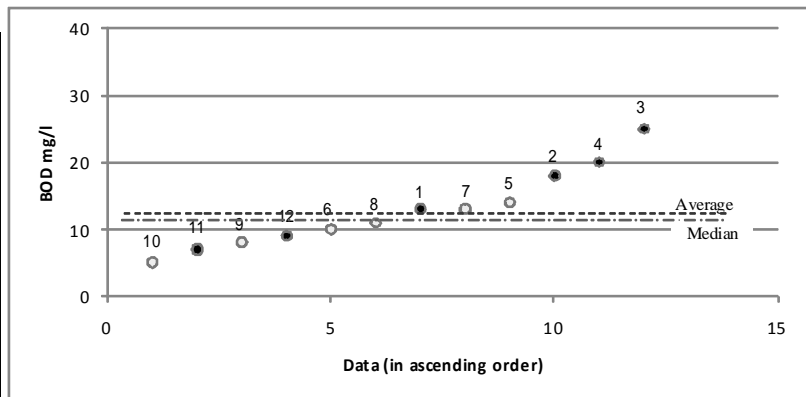
Point No.: 433 (Klong Sanamchai)

Date	Ranking	BOD mg/l
25-05-2009	1	6
19-02-2009	2	7
21-01-2009	3	8
20-07-2009	4	8
20-03-2009	5	9
9-04-2009	6	9
5-06-2009	7	9
18-08-2009	8	10
9-11-2009	9	10
14-09-2009	10	11
14-10-2009	11	12
23-12-2009	12	12
Average		9
Median		9



Point No.: 282 (Klong Bang Na)

Date	Ranking	BOD mg/l
12-10-2009	1	5
2-11-2009	2	7
1-09-2009	3	8
3-12-2009	4	9
1-06-2009	5	10
5-08-2009	6	11
5-01-2009	7	13
28-07-2009	8	13
1-05-2009	9	14
2-02-2009	10	18
1-04-2009	11	20
3-03-2009	12	25
Average		13
Median		12



Point No.: 281 (Klong Bang Na)

Date	Ranking	BOD mg/l
12-10-2009	1	9
1-09-2009	2	12
2-11-2009	3	14
28-07-2009	4	16
1-04-2009	5	19
5-01-2009	6	20
1-06-2009	7	20
1-05-2009	8	22
5-08-2009	9	23
2-02-2009	10	24
3-12-2009	11	29
3-03-2009	12	34
Average		20
Median		20

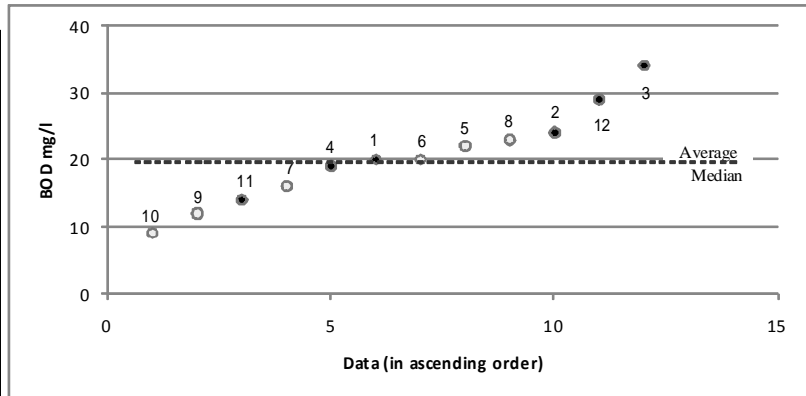


Figure A4.1 Variation of BOD Concentrations in Klongs (2009)

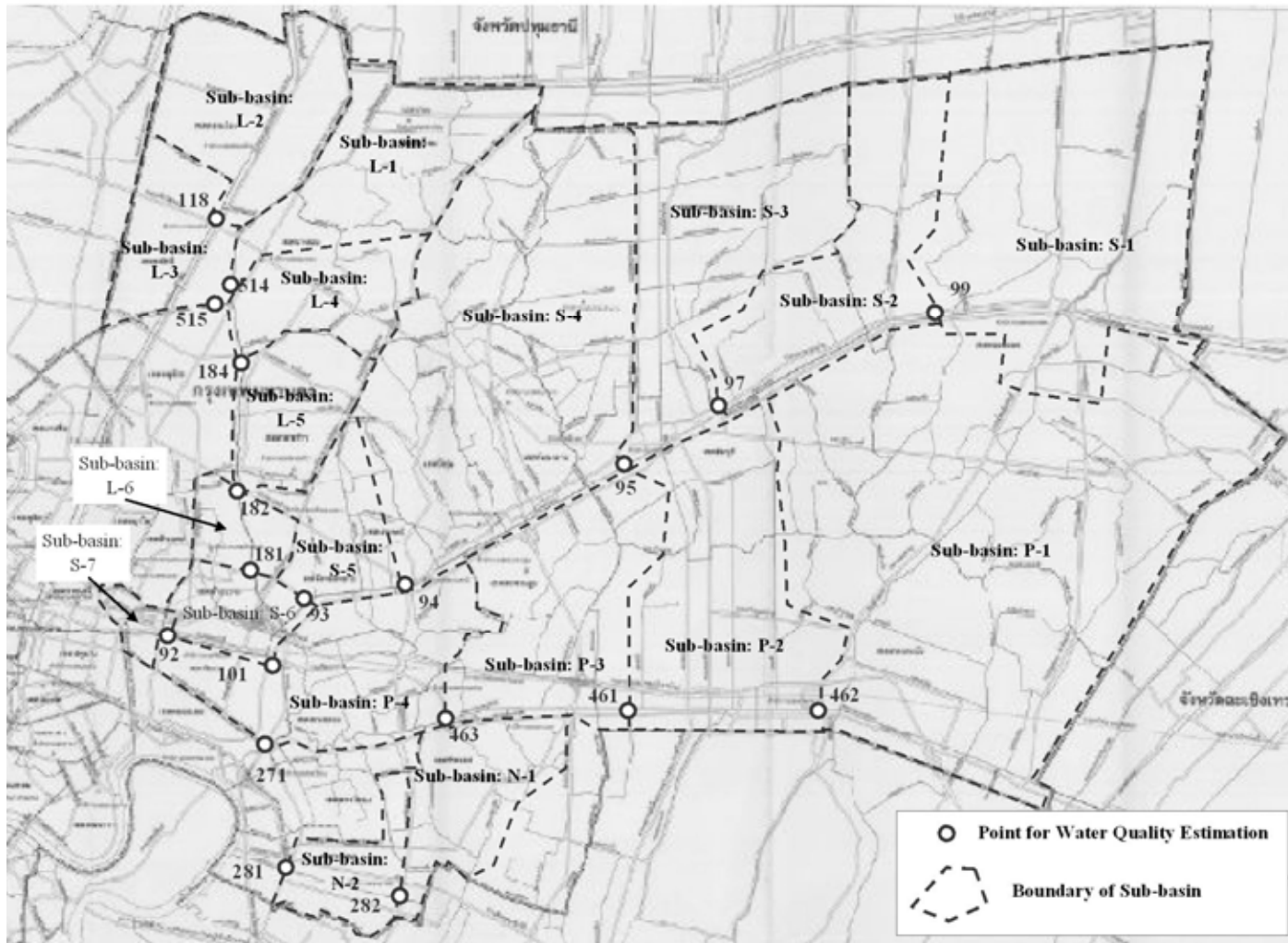


Figure A4.2 Location Map of Sub-basins for the Simple Analysis of Water Pollution (Klongs on the East Bank)

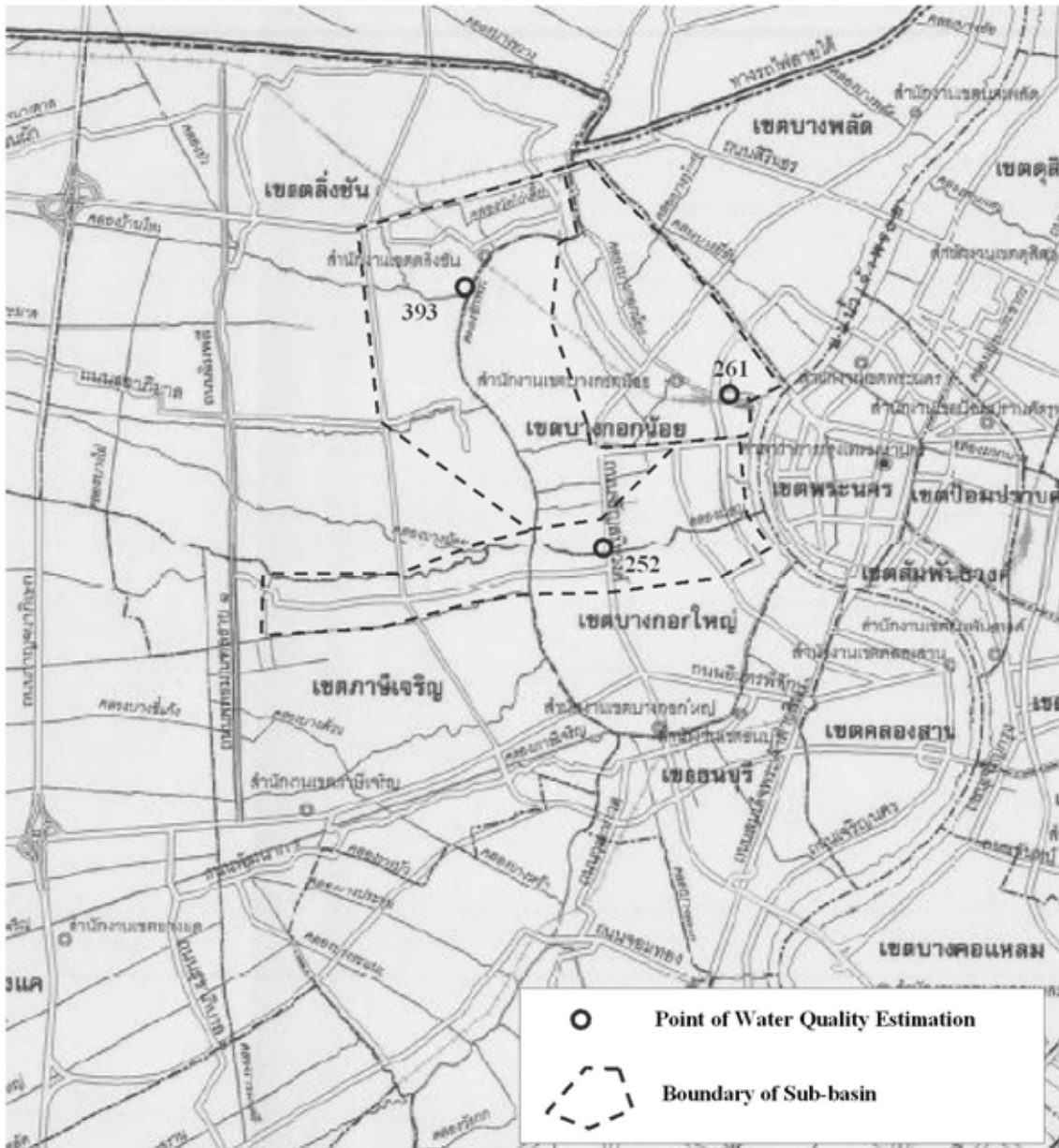


Figure A4.3 Location Map of Sub-basins for the Simple Analysis of Water Pollution (Klongs on the West Bank -1)

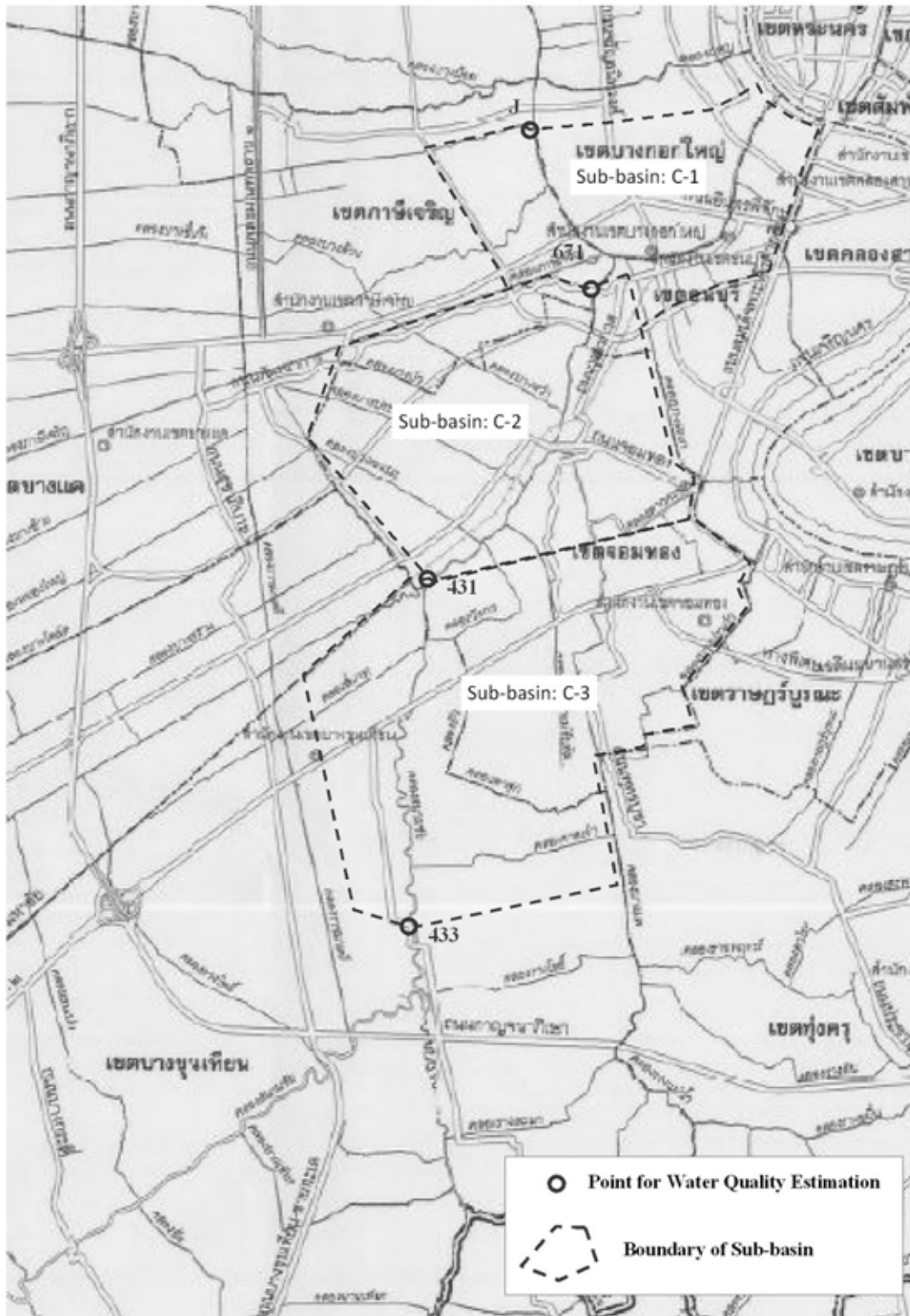


Figure A4.4 Location Map of Sub-basins for the Simple Analysis of Water Pollution (Klongs on the West Bank -2)

Appendix-5
Examination of Existing
Interceptor Chamber

Examination of Existing Interceptor Chamber

Water level of the existing interceptor chamber is calculated to examine whether overflow in dry weather occurs or not.

Interceptor chamber No.1

Treatment area: Din Daen

Manhole No.: IPC50B

Drawing:

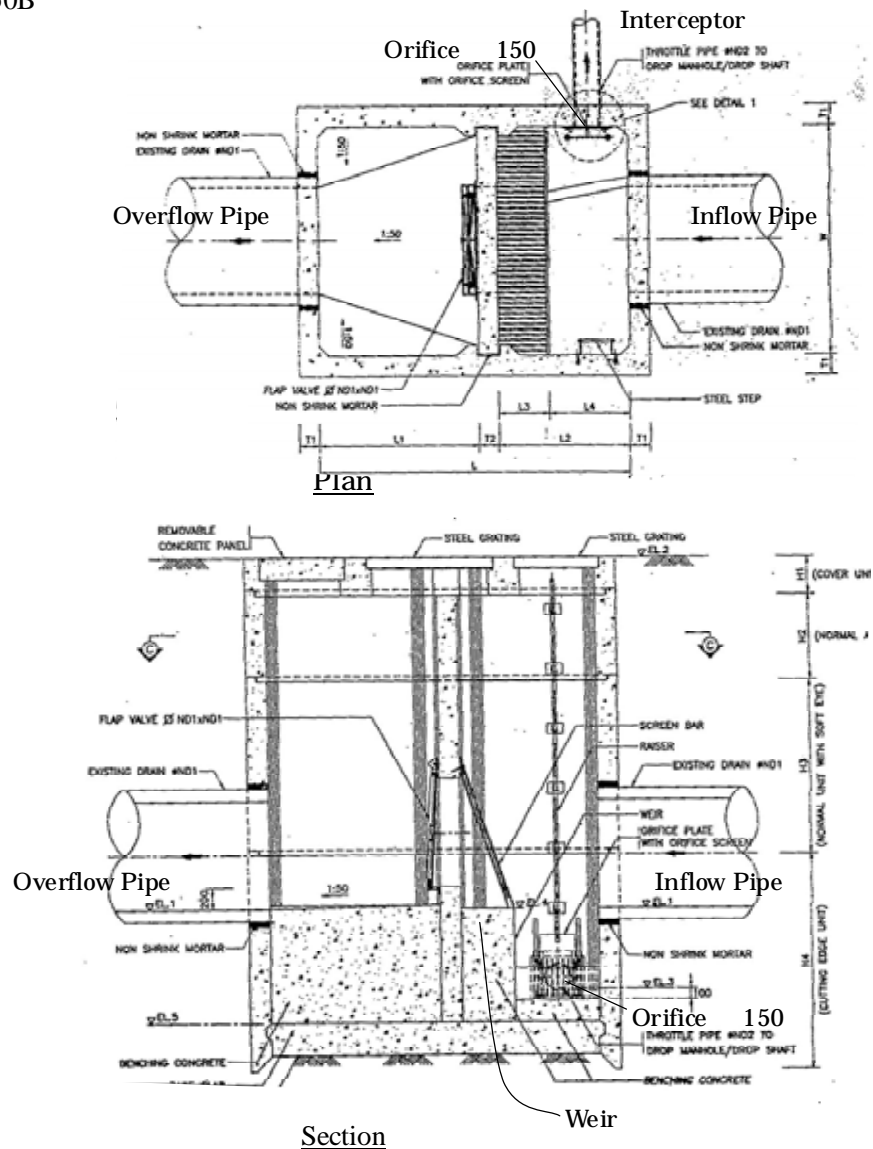


Figure 5.1 Interceptor Chamber No. 1

Calculation of water level inside manhole:

Catchment area: 0.0966 km²

Design intercepting flow rate Q_5 (5DWF) = 0.3585(m³/s/km²)×0.0966(km²) = 0.0346 m³/s

Dry weather flow $Q_{1.5}$ (1.5DWF) = 0.1081(m³/s/km²) ×0.0966(km²) = 0.0104 m³/s

Height of weir = 0.60 m

Diameter of orifice d = 0.15 m

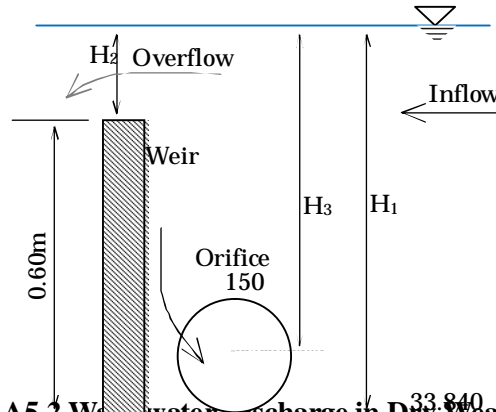


Figure A5.2 Wastewater Discharge in Dry Weather

Area of orifice $A = \pi \times 0.15^2 / 4 = 0.0177 \text{ m}^2$

Discharge from orifice $Q = C_d A (2gH_3)^{0.5}$

Coefficient of flow $C_d = 0.6$

Then $H_3 = Q^2 / 2gC_d^2 A^2$

When $Q = Q_5 = 0.0346 \text{ m}^3/\text{s}$, $C_d = 0.6$, $g = 9.8 \text{ m/s}^2$, $A = 0.0177 \text{ m}^2$

$H_3 = 0.542 \text{ m}$ is calculated

When inflow to the chamber is 5DWF, then water level in manhole $H_1 = H_3 + d/2 = 0.542 + 0.15/2 = 0.617 \text{ m}$

When $Q = Q_{1.5} = 0.0104 \text{ m}^3/\text{s}$

$H_3 = 0.049 \text{ m}$ is calculated

When inflow is 1.5DWF, water level in manhole is calculated to be $H_1 = H_3 + d/2 = 0.049 + 0.15/2 = 0.124 \text{ m}$

Comparing weir height (0.60 m) and water level, following points are made clear;

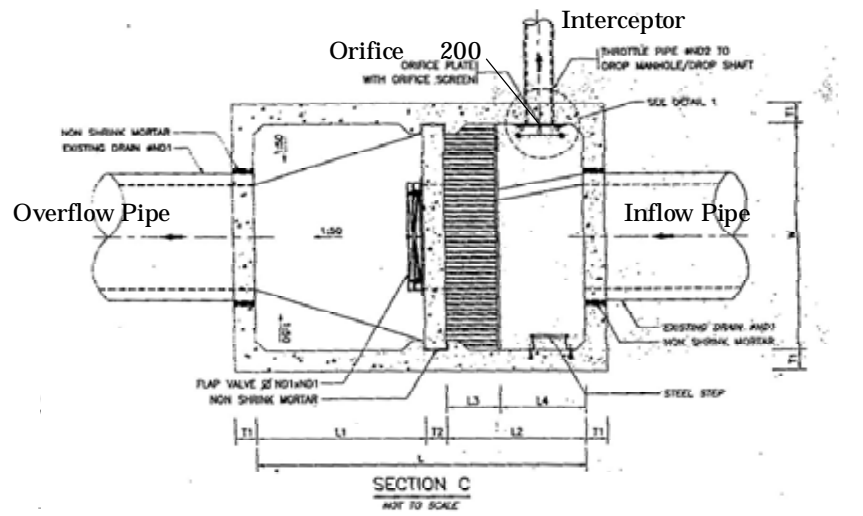
- In dry weather, weir height is higher than water level, and overflow does not occur.
- When design intercepting flow (5DWF) flows in, water level exceeds weir height by 1.7 cm, then overflow occurs.

Interceptor chamber No.2

Treatment area: Din Daen

Manhole No.: I IPC167B

Drawing:



Plan

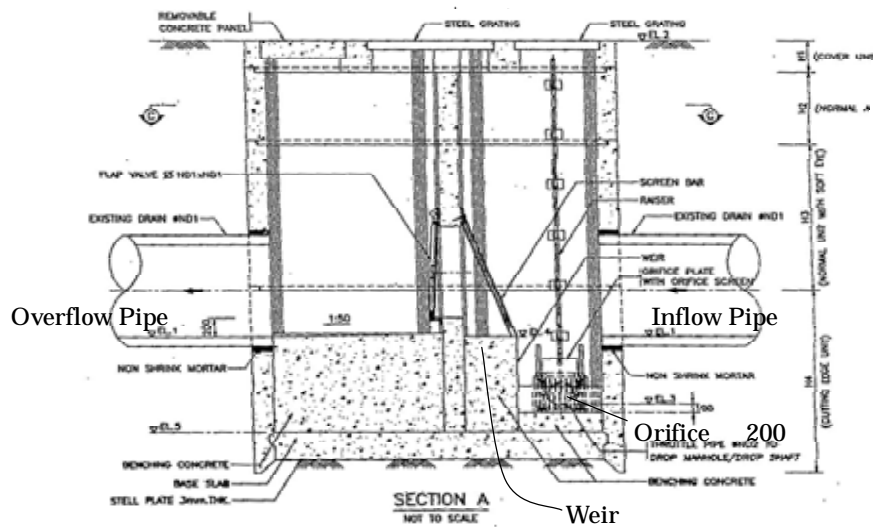


Figure A5.3 Interceptor Chamber No. 2

Calculation of water level inside manhole:

Catchment area: 0.0683 km^2

Design intercepting flow rate Q_5 (5DWF) = $0.8722(\text{m}^3/\text{s}/\text{km}^2) \times 0.0683(\text{km}^2) = 0.0596 \text{ m}^3/\text{s}$

Dry weather flow $Q_{1.5}$ (1.5DWF) = $0.0168 \text{ m}^3/\text{s}$

Height of weir = 0.61 m

Diameter of orifice $d = 0.25 \text{ m}$

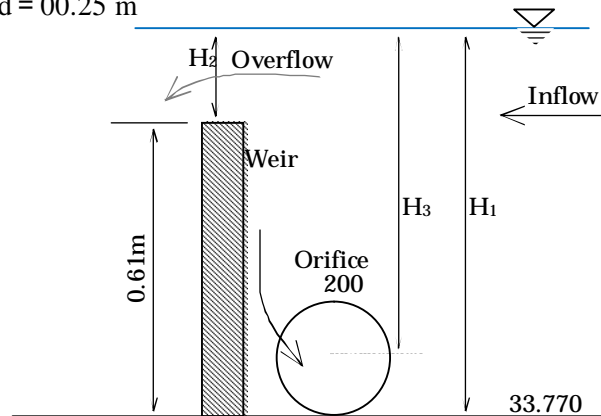


Figure 5.4 Wastewater Discharge in Dry Weather

Area of orifice $A = \pi \times 0.20^2 / 4 = 0.0314 \text{ m}^2$

Discharge from orifice $Q = C_d A (2gH_3)^{0.5}$

Coefficient of flow $C_d = 0.6$

Then $H_3 = Q^2 / 2gC_d^2 A^2$

When $Q = Q_5 = 0.0596 \text{ m}^3/\text{s}$, $C_d = 0.6$, $g = 9.8 \text{ m/s}^2$, $A = 0.0314 \text{ m}^2$

$H_3 = 0.510 \text{ m}$ is calculated

When inflow to the chamber is 5DWF, then water level in manhole $H_1 = H_3 + d/2 = 0.511 + 0.20/2 = 0.610 \text{ m}$

When $Q = Q_{1.5} = 0.0168 \text{ m}^3/\text{s}$

$H_3 = 0.041 \text{ m}$ is calculated

When inflow is 1.5DWF, water level in manhole is calculated to be $H_1 = H_3 + d/2 = 0.041 + 0.20/2$

$= 0.141 \text{ m}$

Comparing weir height (0.61 m) and water level, following points are made clear regarding interceptor chamber IPC167B;

- In dry weather, weir height is higher than water level, and overflow does not occur.
- When design intercepting flow (5DWF) flows in, water level equal to weir height, then overflow does not occur.

