

## Water Quality Study

The water quality study of Sungai Way was undertaken by a certified laboratory (EraLab) on Friday, March 7, 2008 from 9.30am to 12pm. The official Certificate of Analysis of the water quality study is attached in Annex 1. The water quality results are presented in the table below.



*Eralab Field Consultants taking water samples from Sungai Way.*

**Table 1: Water Quality Results of Sungai Way taken on March 7, 2008.**

PARAMETER	RESULTS		
	W1	W2	W3
pH	7.10	7.41	7.40
DO (mg/l)	3.46	2.44	0.94
TSS (mg/l)	12	8	55
NH <sub>3</sub> -N (mg/l)	6.34	4.22	9.25
BOD (mg/l)	5	4	10
COD (mg/l)	28	35	120
Feecal Coliform (cfu/100ml)	10000	6400	13400

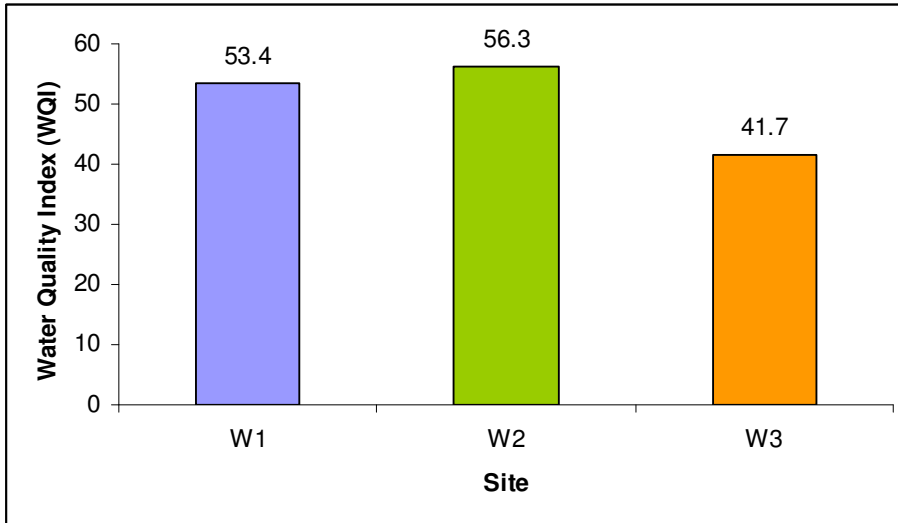
We used these results to calculate the Water Quality Index (WQI) using this formula:

$$\text{WQI} = 0.22 \times \text{SIDO} + 0.19 \times \text{SIBOD} + 0.16 \times \text{SICOD} + 0.15 \times \text{SIAN} + 0.16 \times \text{SISS} + 0.12 \times \text{SipH}$$

- **SIDO** Sub-Index DO (in % saturation)
- **SIBOD** Sub-Index BOD
- **SICOD** Sub-Index COD
- **SIAN** Sub-Index NH<sub>3</sub>N
- **SISS** Sub-Index SS
- **SipH** Sub-Index pH

The WQI of the sites are illustrated in Figure 1.

The water quality in Sungai Way is highly influenced by industrial, residential and commercial effluents. Based on the WQI, all 3 sites are considered polluted under the National Classification Standards. Under the Interim National River Water Quality Standards, W1 and W2 are in Class III, and W3 is considered Class IV water quality. The quality of the water deteriorates downstream due to the accumulation and increase of wastewater being discharged into the river.



**Figure 1:** A bar chart showing the Water Quality Index (WQI) of W1, W2 and W3 calculated from the water quality results.

Discussion on the water parameter results

*pH*

pH is the measure of acidity or alkalinity of the water. The pH of water should be at 7 which is neutral, and if it was slightly more acidic, some aquatic organisms might find it difficult to survive.

The pH at all 3 sites are within range and are considered good enough to support life.

**Table 1:** Interim National River Water Quality Standards

Class	I	II	III	IV	V
<b>Parameter</b>					
<b>BOD</b>	<1	1-3	3-6	6-12	>12
<b>COD</b>	<10	10-25	25-50	50-100	>100
<b>NH3N</b>	<0.1	0.1-0.3	0.3-0.9	0.9-2.7	>2.7
<b>DO</b>	>7	5-7	3-5	1-3	<1
<b>pH</b>	>7	6-7	5-6	<5	>5
<b>SS</b>	<25	25-50	50-150	150-300	>300
<b>WQI</b>	>92.7	76.5-92.7	51.9-76.5	31.0-51.9	<31.0

### *Dissolved Oxygen (DO)*

Dissolved oxygen measures the amount of gaseous oxygen (O<sub>2</sub>) dissolved in the water. Total dissolved gas concentrations in water should not exceed 110 percent.

Concentrations above this level can be harmful to aquatic life. Adequate dissolved oxygen is necessary for good water quality and to provide for aerobic life forms. As dissolved oxygen levels in water drop below 5.0 mg/l, aquatic life is put under stress. The lower the concentration, the greater the stress.

As can be seen above, the DO readings at all 3 sites were below 5 mg/l and decreased from upstream to downstream. This indicates that as the river flows downstream, there is less oxygen available for aquatic organisms. This is related to the COD and BOD levels which are discussed in further detail below.

### *Total Suspended Solids (TSS)*

Total suspended solids (TSS) gives a measure of the turbidity of the water. Suspended solids cause the water to be milky or muddy looking due to the light scattering from very small particles in the water. Polluted waters are commonly turbid and improvement is usually marked by greater clarity.

The turbidity of the water in W1 and W2 is not that bad, but as it reaches W3, the clarity of the water greatly decreases and it becomes more murky.

### *Ammonia (NH<sub>3</sub>-N)*

Ammonia is an inorganic form of nitrogen contained in fertilizers, sewage, and animal wastes. It is also a product of bacterial decomposition of organic matter. Ammonia becomes a concern if high levels are present. In this form (NH<sub>3</sub>-N), it can be toxic to aquatic organisms.

The ammonia levels at all 3 sites are extremely high and this is a cause of concern for living organisms in the river. The main sources of ammonia in Sungai Way probably comes from residential effluents and IWK discharge.

### *Biological Oxygen Demand (BOD)*

BOD is a measure of the oxygen used by microorganisms to decompose waste. If there is a large quantity of organic waste (dead plants, leaves, grass clippings, manure, sewage, or even food waste) in the water supply, there will also be a lot of bacteria present working to decompose this waste. In this case, the demand for oxygen will be high (due to all the bacteria) so the BOD level will be high.

The BOD levels in W1 and W2 are considered average whereas the BOD level in W3 is considered high. This is due to the large amount of sludge and other waste that is found in the river. When BOD levels are high, dissolved oxygen (DO) levels decrease because the oxygen that is available in the water is being consumed by the bacteria. Since less dissolved oxygen is available in the water, fish and other aquatic organisms may not survive.

### *Chemical Oxygen Demand (COD)*

Chemical oxygen demand (COD) is a measure of the capacity of water to consume oxygen during the decomposition of organic matter and the oxidation of inorganic chemicals such as ammonia and nitrite.

The COD levels in W1 and W2 are average and in W3 it is very high, indicating that the decomposition of matter in the water is consuming a lot of oxygen. This means that there would be very little oxygen left to support other aquatic organisms.

#### *Faecal Coliform (E. Coli)*

Large quantities of faecal coliform bacteria in water may indicate a higher risk of pathogens being present in the water, which are dangerous to human life. Untreated organic matter that contains faecal coliform can be harmful to the environment because it reduces the amount of oxygen available to aquatic organisms.

W1 and W3 are affected by discharge from IWK plants that are situated about 100m away, which explains the high faecal coliform reading. At W2, the water is diluted by other incoming sources of water from drains, so the faecal coliform levels are lower.

# Annex 1 Water Quality Certificate of Analysis



**ERALab Sdn Bhd.** - 274864 M  
 (Environmental Research & Analytical Laboratory)  
 No. 3 & 3C, Jalan 19/29, 46300 Petaling Jaya,  
 Selangor Darul Ehsan.  
 Tel: 603-7954 1025 / 7954 1797 Fax: 603-7958 1406  
 Email: eralab@streamyx.com



## CERTIFICATE OF ANALYSIS

**Lab Report No** : 08/03/W075      **Client** : Global Environment Centre  
**Sample Description** : Water Samples      **Location** : SS2, Petaling Jaya  
**Date Received** : 07/03/2008      **Date Issued** : 17/03/2008

PARAMETER	RESULTS:			TEST METHOD
	W1	W2	W3	
pH	7.10	7.41	7.40	APHA, 4500H <sup>+</sup> B
DO (mg/l)	3.46	2.44	0.94	APHA, 4500 O-G
TSS, (mg/l)	12	8	55	APHA, 2540 D
NH <sub>3</sub> -N, (mg/l)	6.34	4.22	9.25	APHA, 4500-NH <sub>3</sub> C
BOD, (mg/l)	5	4	10	APHA, 5210 B
COD, (mg/l)	28	35	120	APHA, 5220 C
Feacal Coliform (cfu/100ml)*	10000	6400	13400	APHA, 9222 D

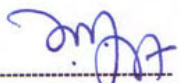
**Method Reference:**

- Standard Methods for the Examination of Water and Wastewater (1995) 19th. Edition, APHA, AWWA, WPCF.

NOTE: : B.O.D test started on 07/03/2008

: \*\* = Parameter not under the Scope of SAMM Accreditation



  
 (NOOR AZIMAH MUSTAFA) AMIC  
 Senior Chemist

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