EM&A Report

SkyCity Nine Eagles Golf Course

Quarterly EM&A Compliance Report

November 2010 to January 2011

AUSTRALIA | ASIA | MIDDLE EAST | AFRICA | PACIFIC

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PREPARATION, REVIEW AND AUTHORISATION

Revision #	Date	Prepared by	Reviewed by	Approved for Issue by
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The purpose of this Project is to construct and operate a 9-hole Golf Course at the east side of the North Commercial District (NCD) on the Airport Island as an interim arrangement prior to the area's future development as a business park. The interim golf facility, known as "SkyCity Nine Eagles Golf Course" is intended to serve airport passengers, overseas visitors and airport workers until August 2013.

According to the approved EM&A Manual, monthly compliance monitoring of lake water quality at four locations (W1 and W2 in Lake A and W3 and W4 in Lake B) is required during the second phase of the Operation Period, with reporting on a quarterly basis. Parameters monitored comprise Suspended Solids (SS), Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD_5), nitrogen, phosphorous, temperature and salinity.

This is the fifteenth Quarterly Compliance report covering November 2010 to January 2011 and complies with the reporting requirements stated in the approved EM&A Manual.

During the reporting quarter, there were exceedances of Limit Levels and Action Levels for SS, which are considered to have been caused by naturally occurring algae. As soon as monthly results were available, EPD and the Golf Course Supervisor were notified of the exceedances as required by the Event/Action Plan. Furthermore, the Golf Course Supervisor was also advised that lake water was not of an acceptable quality for discharge and that the control valve must not be opened until there are no longer any exceedances.

The concentrations of SS in November were higher than those in December, which were higher than those in January, thus giving a decreasing trend of SS concentrations over the reporting quarter. The results also show that both nitrogen and phosphorous concentrations were well below their respective Action Levels, which indicates that the algae has not been caused by accumulation of excessive nutrients from fertilizer use on the Golf Course. Rather, it is considered that algal growth has resulted from hot and sunny weather in November and early December – this is a natural phenomenon. As such, and given that the control valve must remain closed, it was considered unnecessary for follow-on monitoring to be carried out, or for the monitoring frequency to be increased.

Aqua Bio-Trol liquid, a natural algae remover, was added to lake water in November, December and January to reduce algal growth and, combined with cooler temperatures in late December and January, appears to be working.

During the reporting quarter, no complaints were received; and there were no notifications of summons. There were also no openings of the control valve, emergency or otherwise. As such, there was no off-site release of lake water and therefore no impact to the marine environment.

1 PROJECT DESCRIPTION

1.1 Overview

The purpose of this Project is to construct and operate a 9-hole Golf Course at the east side of the North Commercial District (NCD) on the Airport Island as an interim arrangement prior to the area's future development as a business park (see ***Figure 1-1***). The interim golf facility, known as "SkyCity Nine Eagles Golf Course" is intended to serve airport passengers, overseas visitors and airport workers until August 2013.

The Project is managed by SkyCity Nine Eagles Golf Course, who has engaged Asia Turf Solutions Ltd. to establish and maintain the turfgrass of the Golf Course. SMEC Asia Ltd have been employed as the Environmental Team (ET) for the Operation Period since May 2010 and have engaged ALS Technichem Pty Ltd as the HOKLAS accredited testing laboratory to carry out lake water analysis. Construction was completed on 31 December 2006, the first phase of the Operation Period was completed on 30 April 2007, and the second phase commenced on 1 May 2007.

1.2 Operation

The Golf Course has been designed to contain water within two artificial lakes, which are linked together by two underwater pipes. The lakes provide a source of freshwater for irrigation. All rainwater and surplus irrigation water collected within the Golf Course will drain back into the lakes for reuse, through a sub-soil drainage system.

The lakes are maintained at a capacity of 15,000m^3. This is not "full" but is the level that provides the required visual appearance. During the winter (dry) months, however, the lake water may fall below this level. The maximum capacity of the lakes is 20,000m^3.

If the capacity of the lakes exceeds 20,000m^3, then the Golf Course may flood. To avoid this, the Golf Course Supervisor can authorise the opening of a control valve to allow the water to overflow from the lakes into storm drains that discharge off-site via Outfall No. 8. However, the valve can only be opened if the lake water monitoring results indicate that water is of an acceptable quality. Under normal circumstances, the control valve remains closed and discharge off-site is not possible. All opening/closing of the control valve is logged on site.

If the latest lake water monitoring results indicate that water is not of an acceptable quality, then the valve cannot be opened, the lake water cannot overflow and the Golf Course may begin to flood. This is part of the mitigation design to prevent off-site discharge of water that does not meet the required standard.

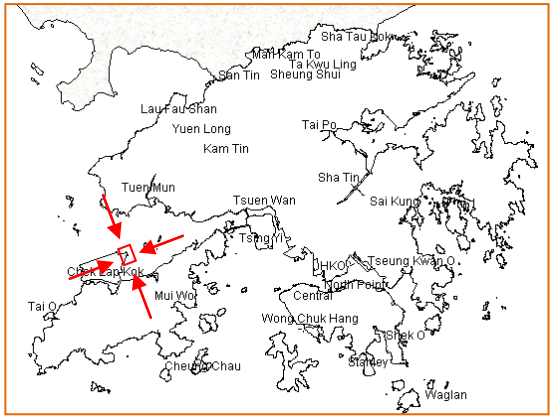
The bund that surrounds the site is at least 1.5m high and up to 90,000m^3 of floodwater can be retained within the Golf Course in addition to the 20,000m^3 lake capacity. In this situation, water samples from the flooded Golf Course will be taken more frequently. Only when water has returned to an acceptable quality will the control valve be opened to allow water to overflow from the lake and into off-site storm drains that discharge via Outfall No. 8, thereby allowing the flood to recede.

The system by which this water control is achieved is shown in ***Figure 1-2***.

Figure 1-1 Location of SkyCity Golf Course on the Airport Island

Source: Image courtesy of Airport Authority

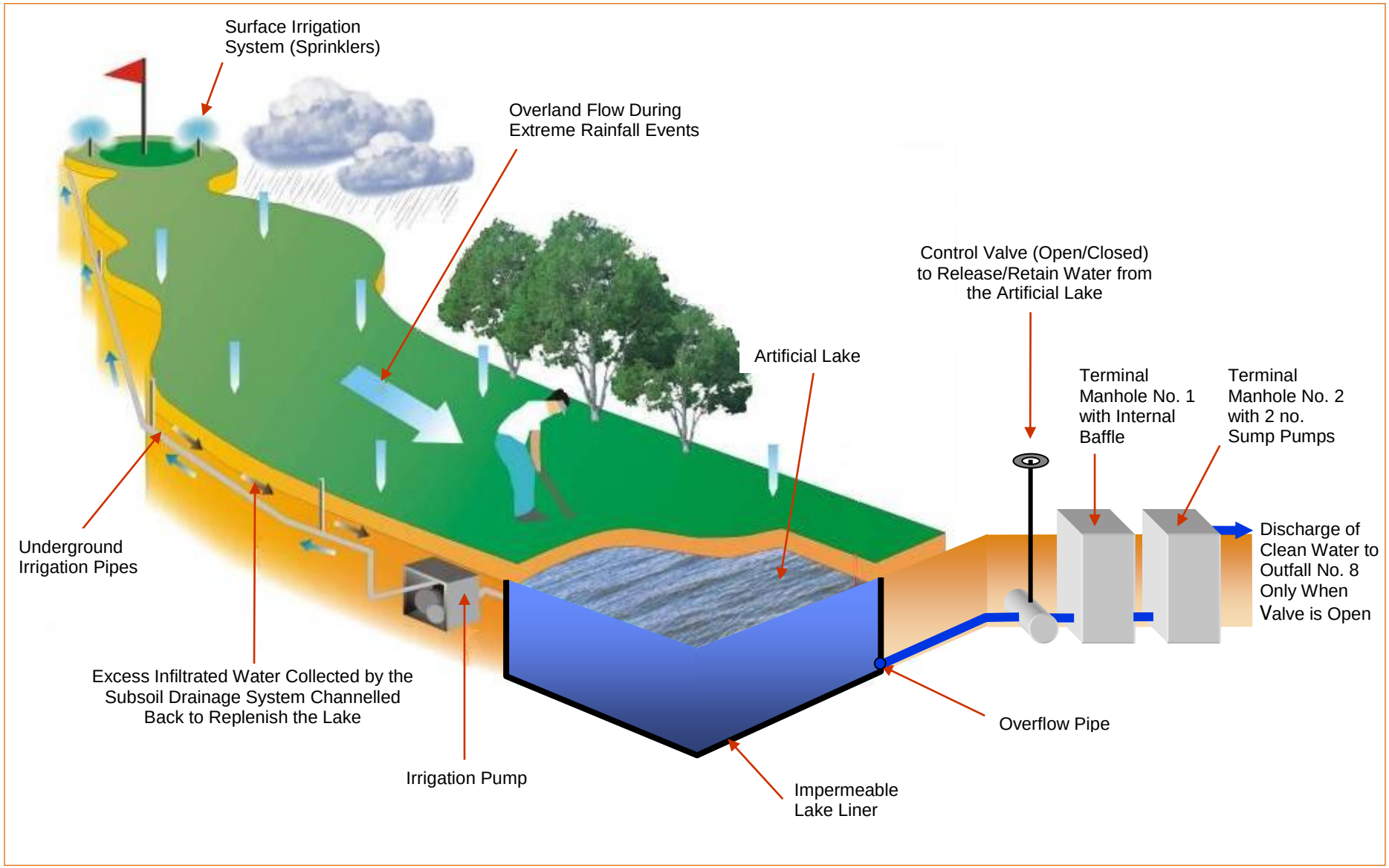
Location Map



Key

1. Terminal 2 & SkyPlaza
   (Retail, F&B & Entertainment)
   二號客運大樓及翔天廊(零售、食肆及娛樂區)
2. HKIA Tower
   機場行政大樓
3. AsiaWorld - Expo
   亞洲國際博覽館
4. 2nd on-airport hotel
   第二間機場酒店
5. SkyPier
   海天客運碼頭
6. SkyCity Nine Eagles Golf Course
   航天城高爾夫球場
7. Airport World Trade Centre
   暫名:機場世界貿易中心

Figure 1-2 Schematic of Lake Water Control System



2 LAKE WATER QUALITY EM&A

2.1 EM&A Programme

Monitoring of Dissolved Oxygen (DO) in mg/ℓ, Suspended Solids (SS) in mg/ℓ, Biochemical Oxygen Demand (BOD_5) in mg/ℓ, Total Nitrogen in mg/ℓ, Total Phosphorous in mg/ℓ, Salinity in g/ℓ, and temperature in °C was carried out by the ET to ensure that any deterioration in lake water quality could be readily detected and timely action could be taken to rectify the situation if this was due to site operations.

DO, temperature and salinity were measured in-situ whilst other parameters were determined in a HOKLAS-accredited laboratory.

2.1.1 Monitoring This Quarter

The actual lake water monitoring schedule for this quarter (November 2010 to January 2011) is given in ***Table 2-1***, below.

Table 2-1 Monitoring Schedule for This Quarter

Sampling Date	Sampling Locations
12 November 2010	W1 to W4
10 December 2010	W1 to W4
14 January 2010	W1 to W4

2.1.2 Monitoring Next Quarter

The planned lake water monitoring schedule for the next quarter (February to April 2011) is given in ***Table 2-2***, below.

Table 2-2 Monitoring Schedule for the Next Quarter

Sampling Date	Sampling Locations
11 February 2011	W1 to W4
10 March 2011	W1 to W4
15 April 2011	W1 to W4

2.2 Equipment and Methodology

Because of the relatively shallow water, in-situ measurements and water sampling were conducted at 0.5m from the surface (the mid-point of the 1m deep lake). Water samples for all monitoring parameters were collected, stored, preserved and analysed according to *APHA Standard Methods for the Examination of Water and Wastewater, 19th Ed, #17*.

In-situ monitoring was carried out using a DO concentration and DO saturation were carried out using a YSI Model 85 CE-C-M-Y multi-parameter meter and the range, resolution and accuracy of the equipment is provided in ***Table 2-3***.

Table 2-3 In-situ Monitoring Equipment Details

In-situ Parameters	Measuring Devices	Measurement Precision
Dissolved Oxygen	YSI Professional Plus	0.1mg/ℓ and 0.1%
Salinity		0.1ppt (or g/ℓ)
Temperature		0.1°C

A Kahlisco water sampler was used to obtain water samples for subsequent SS analysis in the laboratory. A sufficient volume of the sample is collected in clean, high density polythene bottles, packed in ice (cooled to 4°C without being frozen), and delivered to the ALS laboratory immediately after monitoring. The analysis of the collected samples starts by the next working day following APHA *Standard Methods* #2540D.

2.3 Maintenance and Calibration

All in-situ monitoring instruments are calibrated and certified by ALS at monthly intervals throughout all stages of the lake water quality monitoring programme.

The YSI Multi-purpose Meter is calibrated once per monitoring day by the wet bulb method. Calibration at the ALS laboratory is carried out once every month in a water sample of known dissolved oxygen concentration. The sensor is immersed in the water and after thermal equilibration, the known mg/ℓ value is keyed in and the calibration is carried out automatically. Calibration details are provided in ***Appendix 1***.

2.4 Parameters Monitored

The following parameters are monitored and compared to Action/Limit (A/L) Levels:

- Dissolved Oxygen
- Suspended Solids
- BOD_5
- Total Nitrogen
- Total Phosphorous

There are no A/L Levels for temperature or salinity – these parameters are recorded for information only.

2.5 Monitoring Locations

Monitoring locations together with grid references are shown in ***Figure 2-1***. Monitoring Stations are designated as W1, W2, W3 and W4.

2.6 Monitoring Date, Time, Frequency and Duration

In accordance with the EM&A Manual, the monitoring frequency of lake water quality is shown as ***Table 2-4***.

Table 2-4 Monitoring Frequency

	Operation Phase	
	Below A/L Level	A/L Level Exceedance
Monitoring Frequency	Monthly	Weekly

2.7 Action / Limit Levels

According to the approved EM&A manual, the A/L Levels for the compliance monitoring (for monitoring locations W1 to W4) are shown in ***Table 2-5***, below.

Table 2-5 Action and Limit Levels for Lake Water Quality

Parameter	Acceptable Standard (mg/ℓ)	
	Action Level	Limit Level
Suspended Solids	20	30
BOD_5	13.5	20
Dissolved Oxygen	4	3
Total Nitrogen	20	30
Total Phosphorous	3.5	5

In case of exceedance of A/L Levels caused by the operation of the Golf Course, the ET shall immediately implement the Event/ Action Plan (E/AP), shown in ***Table 2-6***, below, in order to resolve lake water quality problems:

Table 2-6 E/AP for Lake Water Quality Monitoring

Event	Action
Exceedance of Action Level	• Notify the Golf Course Supervisor of the exceedance, providing full details (time, location, parameter, level, etc.). • Increase the frequency of monitoring of the particular parameter(s) to "Action/Limit Level Exceedance" as shown in ***Table 2-4***. • If water quality continues to worsen, it may be prudent to review the Turfgrass Management Plan (TMP) in terms of application of nutrients and agree any revisions with the Golf Facility Supervisor. • Notify the Golf Facility Supervisor when water quality falls below "Action Level" and reduce monitoring frequency to "Below Action/Limit Level" as shown in ***Table 2-4***.
Exceedance of Limit Level	• Notify EPD and Golf Course Supervisor of the exceedance, providing full details (time, location, parameter, level, etc.). • Suspend any ongoing application of organic nutrients. • Determine the likely cause of the exceedance(s). Review the TMP in terms of application of nutrients and agree any revisions with the Golf Facility Supervisor. Continue to irrigate the Golf Course using lake water. • Increase the frequency of monitoring of the particular parameter(s) to "Action/Limit Level Exceedance" as shown in ***Table 2-4***. (if not already at this frequency) to demonstrate the effectiveness of remedial measures and to confirm that water quality has returned to acceptable levels. • Notify EPD and Golf Course Supervisor when water quality falls below "Action Level" (not "Limit Level") and reduce monitoring frequency to "Below Action/Limit Level" as shown in ***Table 2-4***.

Figure 2-1 Locations for Lake Water Quality Monitoring

Key

- Lake Water Quality Monitoring Location
- Underground Control Valve
- Overflow from Lake into Control Valve
- Underground Pipe for Clean Flow
- Connection to Outfall No. 8
- Underground Pipes Connecting Lakes A and B

3 MONITORING RESULTS

3.1 Summary of Results

A summary of scheduled lake water monitoring results for the reporting quarter is provided in ***Table 3-1***, below. Detailed results are provided in ***Appendix 2*** and graphical plots since commencement of the second phase of Operation are given in ***Appendix 3***.

Table 3-1 Summary of Compliance Monitoring Data during Reporting Quarter

Monitoring Location		Salinity (g/ℓ)	Temperature (°C)	SS (mg/ℓ)	BOD_5 (mg/ℓ)	DO Saturation (%age)	DO Concentration (mg/ℓ)	Total Nitrogen (mg/ℓ)	Total Phosphorous (mg/ℓ)
W1	Mean	0.1	20.0	**41.7**	2.0	95.6	8.7	1.0	0.1
	Minimum	0.1	17.1	**30.0**	2.0	92.4	8.2	0.9	0.1
	Maximum	0.1	22.8	**52.0**	2.0	102.0	9.6	1.2	0.1
W2	Mean	0.1	20.1	**34.0**	2.0	96.4	8.8	1.1	0.1
	Minimum	0.1	17.2	**23.0**	2.0	93.6	8.3	1.0	0.1
	Maximum	0.1	22.9	**43.0**	2.0	102.0	9.4	1.2	0.1
W3	Mean	0.1	19.9	**35.0**	2.0	98.3	8.8	1.1	0.1
	Minimum	0.1	17.5	18.0	2.0	91.6	8.5	1.0	0.1
	Maximum	0.1	22.5	**46.0**	2.0	105.0	9.1	1.3	0.1
W4	Mean	0.1	20.0	**40.7**	2.0	98.7	8.8	1.1	0.1
	Minimum	0.1	17.4	**33.0**	2.0	91.8	8.4	1.0	0.1
	Maximum	0.1	22.4	**50.0**	2.0	105.0	9.3	1.2	0.1

Note: Bold indicates Action Level exceedance; **Bold** indicates **Limit Level** exceedance

As can be seen from the above summary, during the reporting quarter, there were almost continuous exceedances of Limit Level for SS.

As soon as monthly results were available, EPD and the Golf Course Supervisor were notified of the exceedances as required by the Event/Action Plan. Furthermore, the Golf Course Supervisor was also advised that lake water was not of an acceptable quality for discharge and that the control valve must not be opened until there are no longer any exceedances.

It was not considered necessary to carry out follow-up monitoring, nor to increase the sampling frequency – this is discussed below, based on the data in ***Appendix 2***.

3.2 Discussion

3.2.1 November 2010

There were exceedances of Limit Level for SS at all four monitoring locations. Based on observations, we consider that the high SS concentrations were due to algal growth in the lakes – water in the lakes was visibly green and clouded with algae during sampling.

However, the results show that both nitrogen and phosphorous concentrations are well below their respective Action Levels, which indicates that the algae has not been caused by accumulation of excessive nutrients from fertilizer use on the golf course. Rather, we consider that algal growth has resulted from the hot and sunny weather – this is a natural phenomenon, not the result of operation of the Golf Course. As such, and given that the control valve must remain closed, it was considered unnecessary for follow-on monitoring to be carried out, or for the frequency of monitoring to be increased.

In an attempt to control the water quality problem caused by excessive algal growth, "Aqua Bio-Trol Liquid" was added to lake water during November. This is a liquid microbial pond clarifier, comprising a proprietary blend of 58 strains of aerobic and facultative beneficial bacteria, and is a safe, natural way to establish and maintain cleaner pond and lake water without the addition of chemicals. Further details of "Aqua Bio-Trol Liquid" are provided in ***Appendix 4***. However, being a biological agent, no immediate improvement in water quality is expected – it will take time for an effect to be observed.

3.2.2 December 2010

There were exceedances of Limit Level for SS at all four monitoring locations, although concentrations were lower than in November. Both nitrogen and phosphorous concentrations were well below their respective Action Levels.

For the same reasons as stated above, we consider the continued algal growth to be a natural phenomenon, not the result of operation of the Golf Course. As such, and given that the control valve must continue to remain closed, it was considered unnecessary for follow-on monitoring to be carried out, or for the frequency of monitoring to be increased.

"Aqua Bio-Trol Liquid" continued to be added to lake water during December.

3.2.3 January 2011

SS concentrations at location W4 exceeded the Limit Level; concentrations at locations W1 and W2 only exceeded the Action Level; and there were no exceedances at location W3. Exceedances at each station were again lower than those of December. Both nitrogen and phosphorous concentrations are well below their respective Action Levels.

For the same reasons as stated above, we consider the continued presence of algae to be a natural phenomenon, not the result of operation of the Golf Course. As such, and given that the control valve must continue to remain closed, it was considered unnecessary for follow-on monitoring to be carried out, or for the frequency of monitoring to be increased. The recent colder weather has slowed algal growth and we are seeing improvements in water quality.

"Aqua Bio-Trol Liquid" continued to be added to lake water during January.

3.3 Operational Practice

Table 3-2, below, shows the operational practice during the reporting quarter, i.e., the activities relating to the management of water in the lakes. Because lake water is not considered to be of an acceptable quality, the control valve has remained closed and there has been no discharge off-site into the surrounding marine waters. The control valve remained closed as of end-January 2011.

Table 3-2 Operational Results

Month	Month-end Lake Water Depth (m)	Can Control Valve Be Opened?	Has Control Valve Been Opened?	Quantity of Water Discharged (m^3)
November 2010	1.20	No	No	0
December 2010	0.95	No	No	0
January 2011	0.90	No	No	0

3.4 Complaints and Notifications of Summons

During the reporting quarter, no complaints were received; and there were no notifications of summons. There were also no openings of the control valve, emergency or otherwise.

Despite recent reductions in algae and corresponding decreases in SS concentrations, water quality remains an issue and the lake water is still not of an acceptable quality for discharge. The ET will continue to closely review the application of “Aqua Bio-Trol Liquid” and anticipates an improvement in lake water quality in the next quarter because of this application and because of the continued colder weather.

4 COMMENTS, RECOMMENDATIONS AND CONCLUSIONS

Reporting during the second phase of the Operation Period is required on a quarterly basis. This is the fifteenth Quarterly Compliance report covering November 2010 to January 2011 and complies with the reporting requirements stated in the approved EM&A Manual.

Compliance monitoring of lake water quality is required on a monthly basis, with an increase in frequency to weekly if there are Action or Limit Levels exceedances caused by the operation of the Golf Course. Parameters tested include SS, DO, BOD_5, nitrogen, phosphorous, temperature and salinity. Monthly compliance monitoring was carried out on 12 November 2010, 10 December 2010 and 14 January 2011 at four locations within the two lakes.

During the reporting quarter, there were exceedances of Limit Levels and Action Levels for SS. Because lake water is not considered to be of an acceptable quality, the control valve has remained closed and there has been no discharge off-site into the surrounding marine waters.

The concentrations of SS in November were higher than those in December, which were higher than those in January, thus giving a decreasing trend of SS concentrations over the reporting quarter. The results also show that both nitrogen and phosphorous concentrations were well below their respective Action Levels, which indicates that the algae has not been caused by accumulation of excessive nutrients from fertilizer use on the Golf Course. Rather, it is considered that algal growth has resulted from hot and sunny weather in November and early December – this is a natural phenomenon. As such, and given that the control valve must remain closed, it was considered unnecessary for follow-on monitoring to be carried out, or for the monitoring frequency to be increased.

Aqua Bio-Trol liquid, a natural algae remover, was added to lake water in November, December and January to reduce algal growth and, combined with cooler temperatures in late December and January, appears to be working.

Despite recent reductions in algae and corresponding decreases in SS concentrations, water quality remains an issue and the lake water is still not of an acceptable quality for discharge. The ET will continue to closely review the application of “Aqua Bio-Trol Liquid” and anticipates an improvement in lake water quality in the next quarter because of this application and because of the continued colder weather.

During the reporting quarter, no complaints were received; and there were no notifications of summons. There were also no openings of the control valve, emergency or otherwise. As such, there was no off-site release of lake water and therefore no impact to the marine environment.

APPENDIX 1

Equipment Calibration Details

CERTIFICATE OF ANALYSIS

Work Order: HK1027046
Sub-batch: 1
Date of Issue: 25/11/2010
Client: SMEC ASIA LIMITED

Calibration of Mulitimeter

Item : YSI Multimeter
Model No.: YSI Professional Plus
ALS Lab ID: HK1027046-001

Serial No.: 09K100735
Equipment No.: N/A
Date of Calibration: 12 November, 2010

Testing Results :

Dissolved Oxygen

Expected Reading	Recording Reading
3.4 mg/L	3.5 mg/L
5.0 mg/L	5.0 mg/L
7.8 mg/L	7.6 mg/L
Allowing Deviation	± 0.2 mg/L

Testing Method:

APHA (20th edition), 4500-OC & G

Temperature

Expected Reading	Recording Reading
7.8 °C	8.2 °C
23.0 °C	22.9 °C
Allowing Deviation	±2.0 °C

Testing Method:

In House Method

Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

ALS Technichem (HK) Pty Ltd
ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order: HK1029369
Sub-batch: 1
Date of Issue: 10/12/2010
Client: SMEC ASIA LIMITED

Calibration of Mulitimeter

Item :	YSI Multimeter	Serial No.:	09K100735
Model No.:	YSI Professional Plus	Equipment No.:	N/A
ALS Lab ID:	HK1029369 -001	Date of Calibration:	10 December, 2010

Testing Results :

Dissolved Oxygen

Expected Reading	Recording Reading
3.4 mg/L	3.5 mg/L
5.0 mg/L	5.0 mg/L
7.8 mg/L	7.6 mg/L
Allowing Deviation	± 0.2 mg/L

Testing Method:

APHA (20th edition), 4500-OC & G

Temperature

Expected Reading	Recording Reading
7.8 °C	8.2 °C
23.0 °C	22.9 °C
Allowing Deviation	±2.0 °C

Testing Method:

In House Method

Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

CERTIFICATE OF ANALYSIS

Work Order: HK1101193
Sub-batch: 1
Date of Issue: 14/01/2011
Client: SMEC ASIA LIMITED

Calibration of Mulitimeter

Item :	YSI Multimeter	Serial No.:	09K100735
Model No.:	YSI Professional Plus	Equipment No.:	N/A
ALS Lab ID:	HK1101193 -001	Date of Calibration:	14 January, 2011

Testing Results :

Dissolved Oxygen

Expected Reading	Recording Reading
3.4 mg/L	3.5 mg/L
5.0 mg/L	5.0 mg/L
7.8 mg/L	7.6 mg/L
Allowing Deviation	± 0.2 mg/L

Testing Method:

APHA (20th edition), 4500-OC & G

Temperature

Expected Reading	Recording Reading
7.8 °C	8.2 °C
23.0 °C	22.9 °C
Allowing Deviation	±2.0 °C

Testing Method:

In House Method

Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

APPENDIX 2

Lake Water Quality Monitoring Data

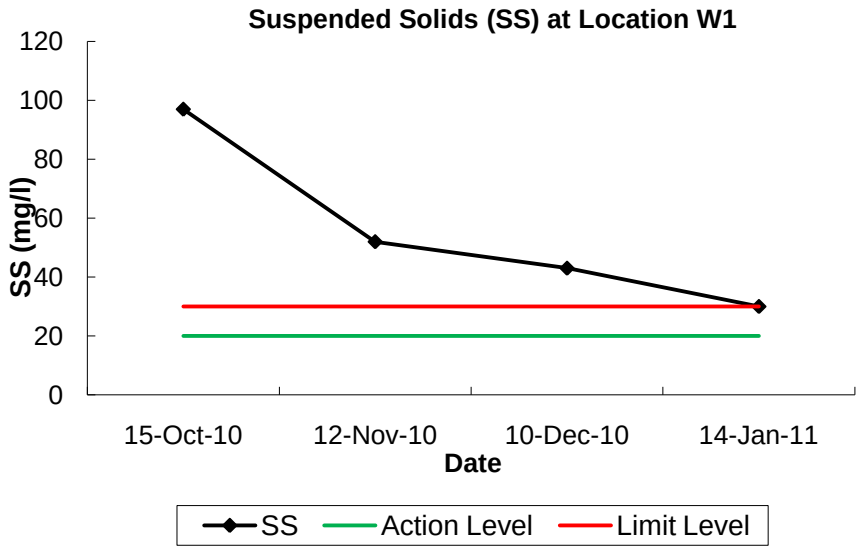
Date	Time	Station	Salinity (g/ℓ)	Temperature (°C)	SS (mg/ℓ)	BOD_5 (mg/ℓ)	DO Saturation (%age)	DO Conc. (mg/ℓ)	Total Nitrogen (mg/ℓ)	T. Phosphorous (mg/ℓ)
12 November 2010	07:05	W1	0.1	22.8	**52.0**	2.0	102.0	8.3	1.0	0.1
	07:10	W2	0.1	22.9	**36.0**	2.0	102.0	8.3	1.0	0.1
	07:15	W3	0.1	22.5	**46.0**	2.0	105.0	8.5	1.0	0.1
	07:20	W4	0.1	22.4	**50.0**	2.0	105.0	8.4	1.0	0.1
10 December 2010	12:10	W1	0.1	20.2	**43.0**	2.0	92.4	8.2	1.2	0.1
	12:15	W2	0.1	20.3	**43.0**	2.0	93.6	8.6	1.2	0.1
	12:25	W3	0.1	19.8	**41.0**	2.0	98.4	8.8	1.3	0.1
	12:30	W4	0.1	20.1	**39.0**	2.0	99.2	8.7	1.2	0.1
14 January 2011	07:02	W1	0.1	17.1	**30.0**	2.0	92.4	9.6	0.9	0.1
	07:10	W2	0.1	17.2	**23.0**	2.0	93.7	9.4	1.0	0.1
	07:20	W3	0.1	17.5	18.0	2.0	91.6	9.1	1.0	0.1
	07:32	W4	0.1	17.4	**33.0**	2.0	91.8	9.3	1.0	0.1

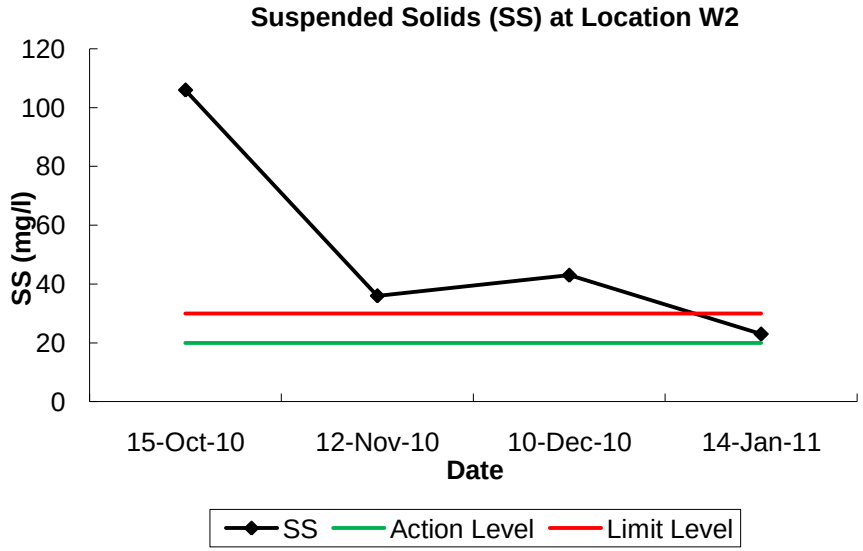
Mean	0.1	20.0	37.8	2.0	97.3	8.8	1.1	0.1
Minimum	0.1	17.1	18.0	2.0	91.6	8.2	0.9	0.1
Maximum	0.1	22.9	52.0	2.0	105.0	9.6	1.3	0.1

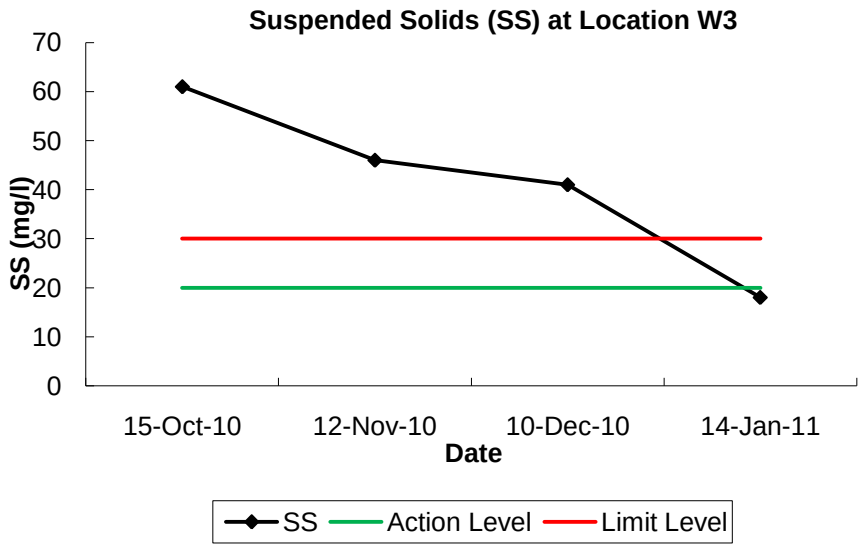
Notes: **Bold** indicates Action Level exceedance; **Bold** indicates **Limit Level** exceedance

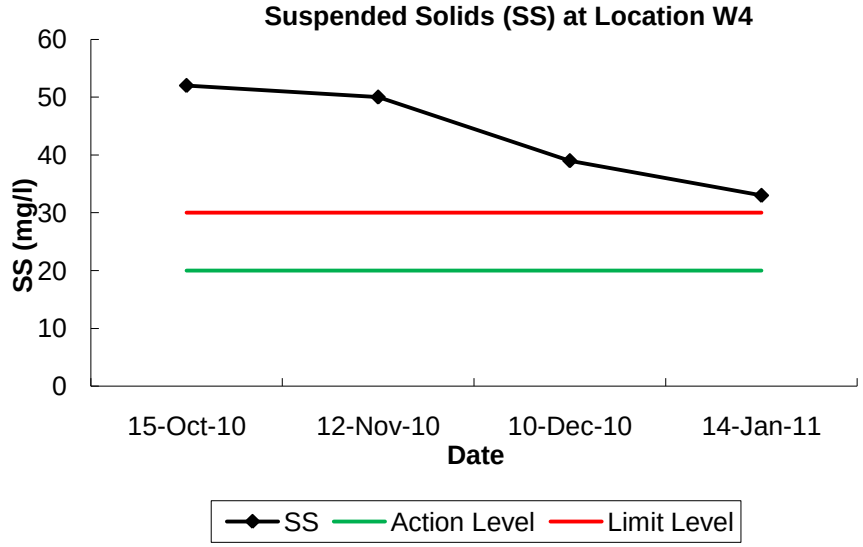
APPENDIX 3

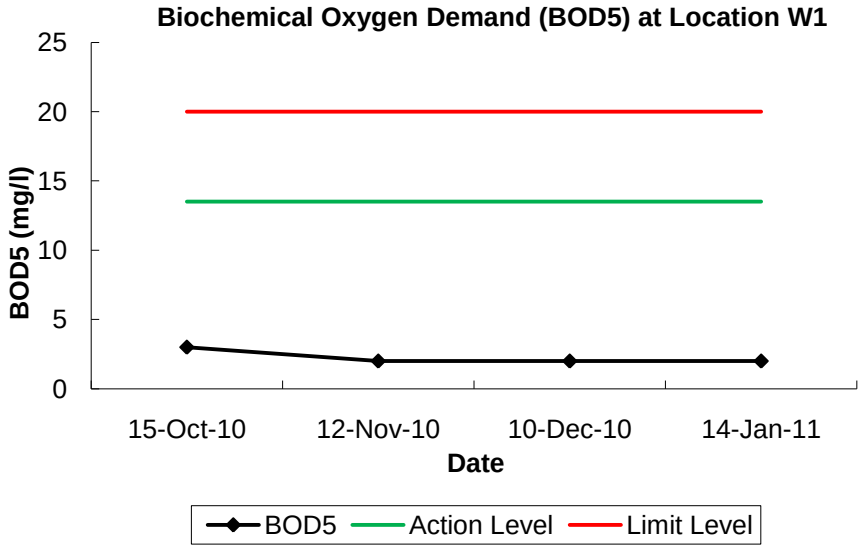
Graphical Plots of Monitoring Data for the Past Four Months

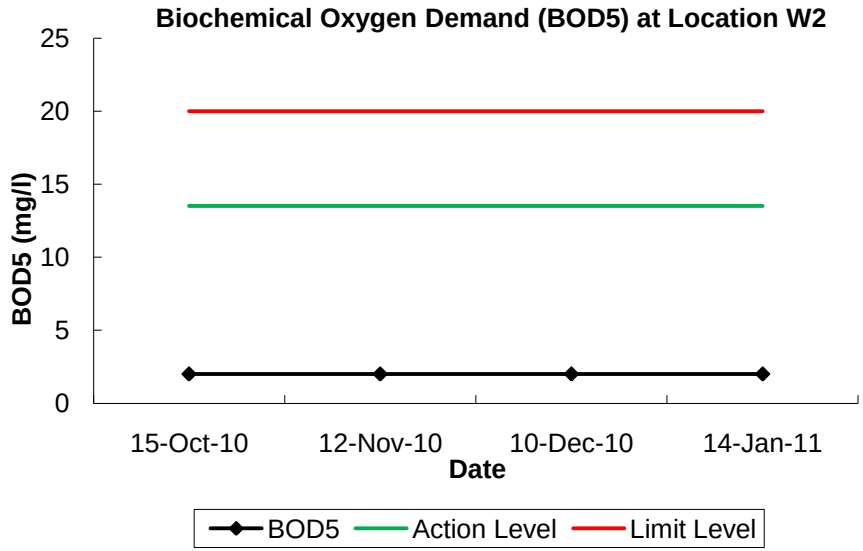

Suspended Solids (SS) at Location W1
SS (mg/l)
120
100
80
60
40
20
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
SS
Action Level
Limit Level

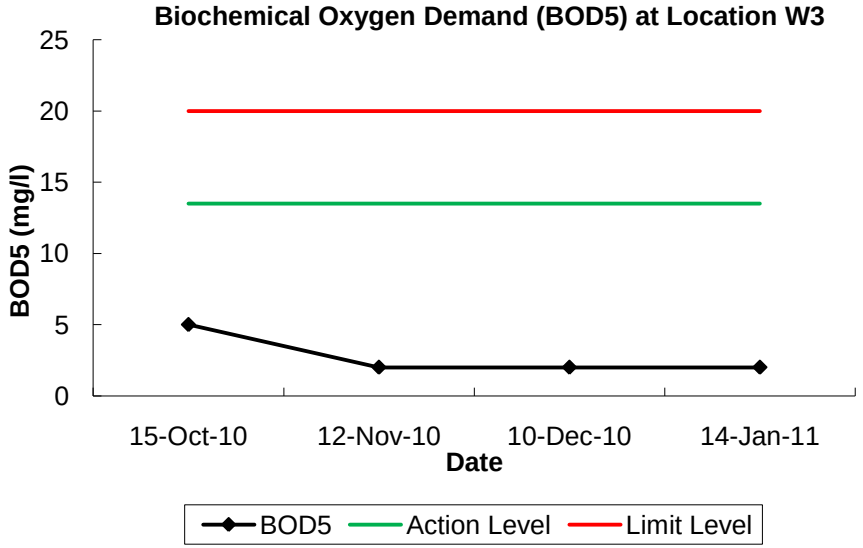

Suspended Solids (SS) at Location W2
SS (mg/l)
120
100
80
60
40
20
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
SS
Action Level
Limit Level

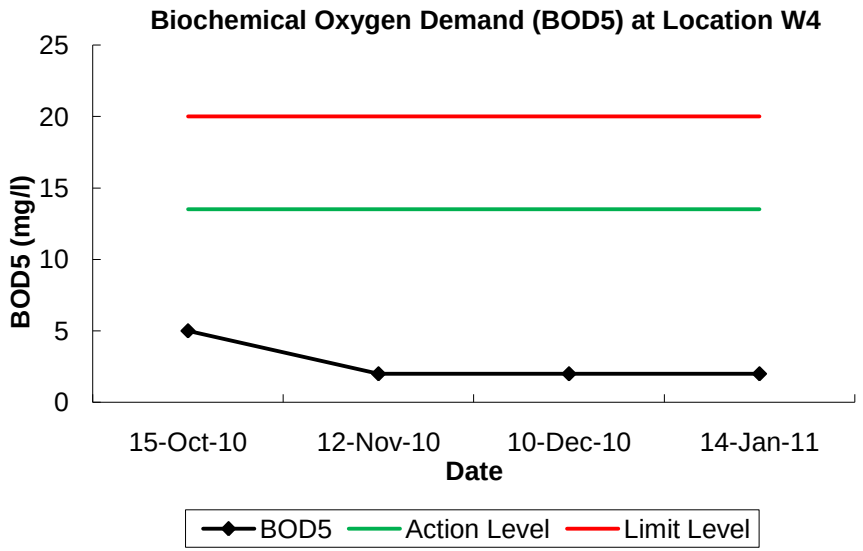

Suspended Solids (SS) at Location W3
SS (mg/l)
70
60
50
40
30
20
10
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
SS
Action Level
Limit Level

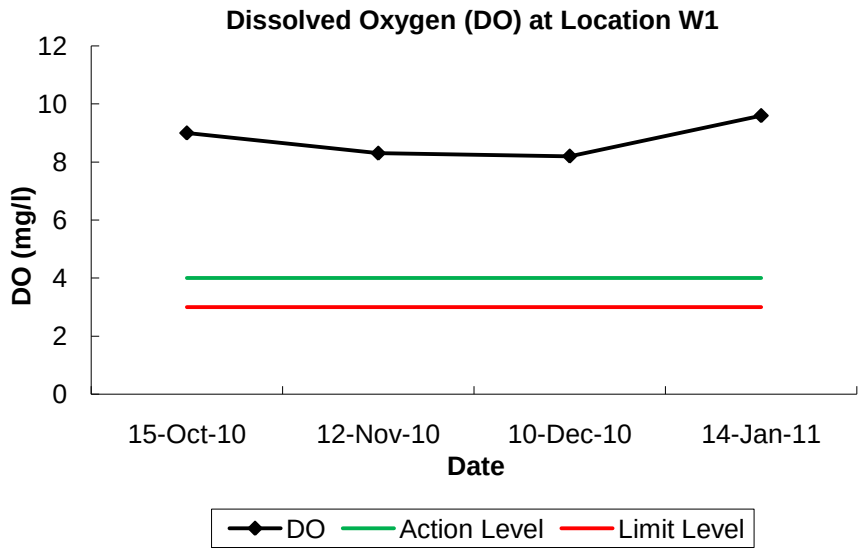

Suspended Solids (SS) at Location W4
SS (mg/l)
60
50
40
30
20
10
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
SS
Action Level
Limit Level

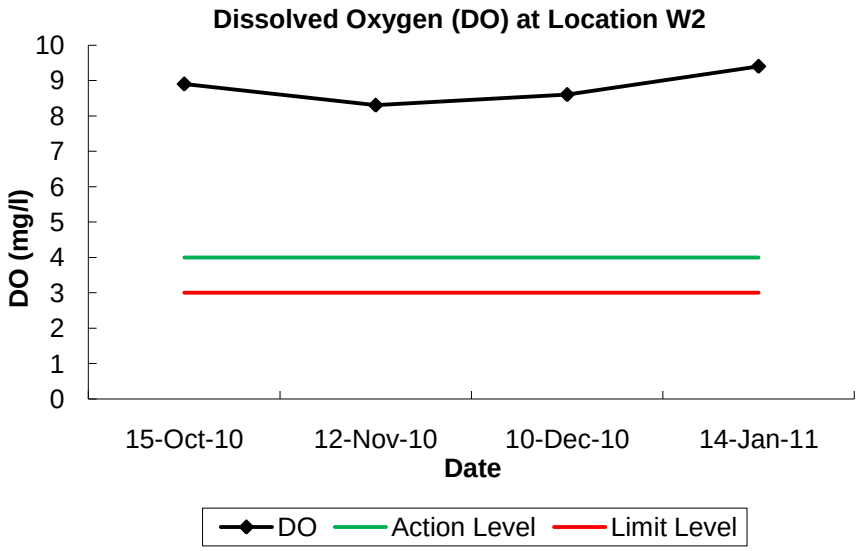

Biochemical Oxygen Demand (BOD5) at Location W1
BOD5 (mg/l)
25
20
15
10
5
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
BOD5
Action Level
Limit Level

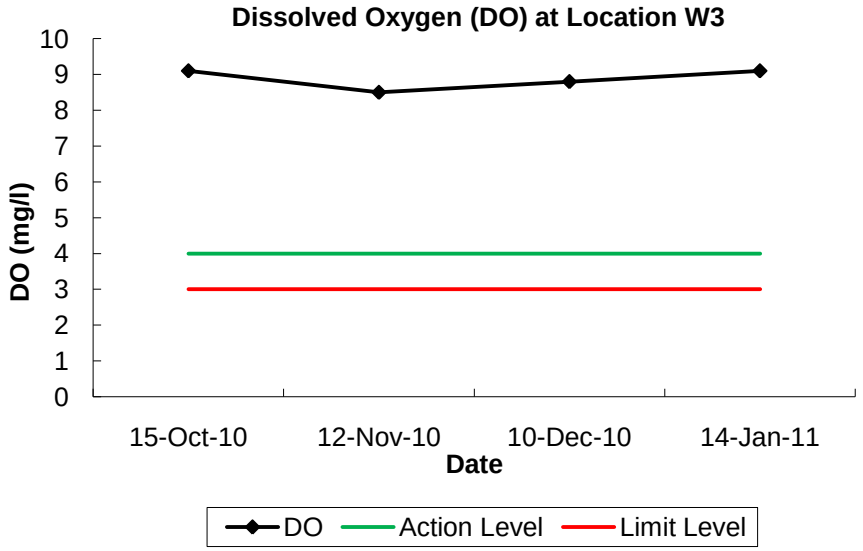

Biochemical Oxygen Demand (BOD5) at Location W2
BOD5 (mg/l)
25
20
15
10
5
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
BOD5
Action Level
Limit Level

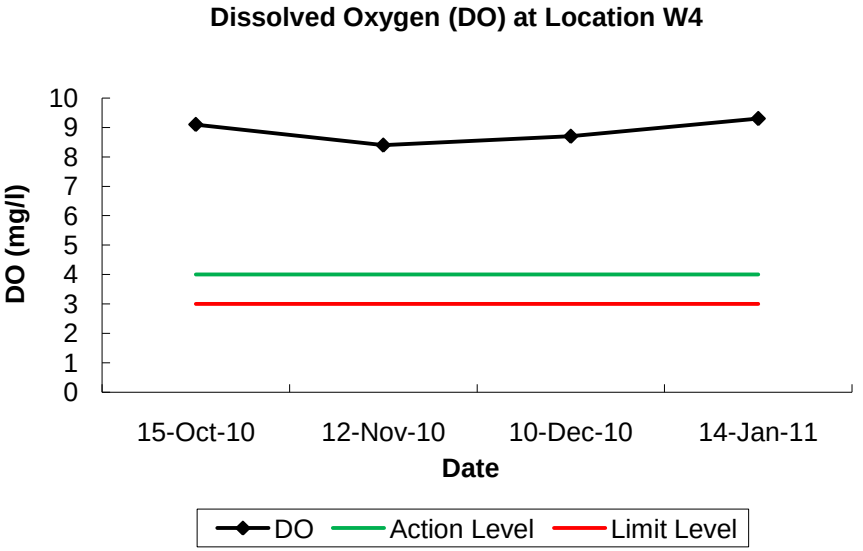

Biochemical Oxygen Demand (BOD5) at Location W3
BOD5 (mg/l)
25
20
15
10
5
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
BOD5
Action Level
Limit Level

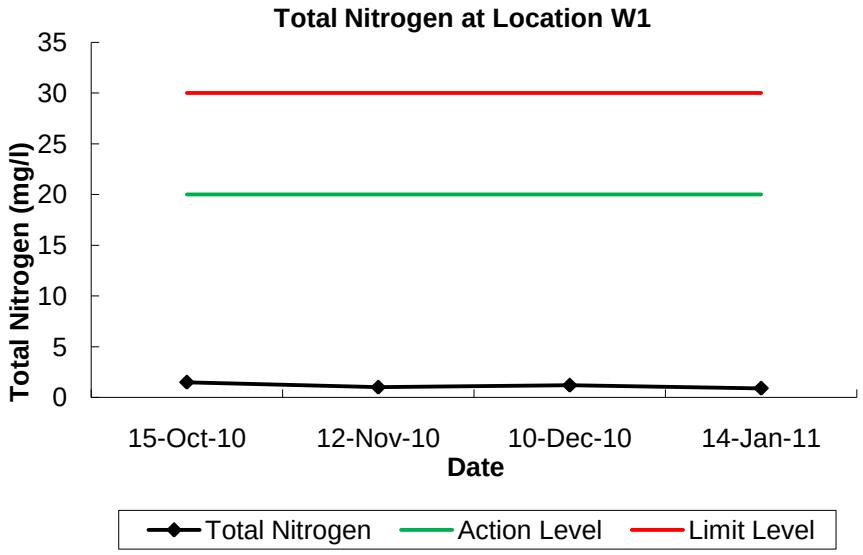

Biochemical Oxygen Demand (BOD5) at Location W4
BOD5 (mg/l)
25
20
15
10
5
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
BOD5
Action Level
Limit Level

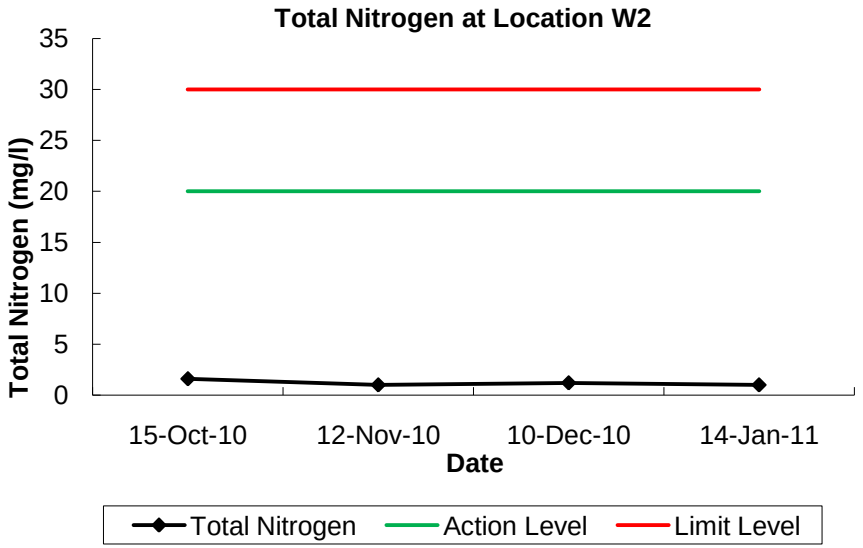

Dissolved Oxygen (DO) at Location W1
DO (mg/l)
0
2
4
6
8
10
12
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
DO
Action Level
Limit Level

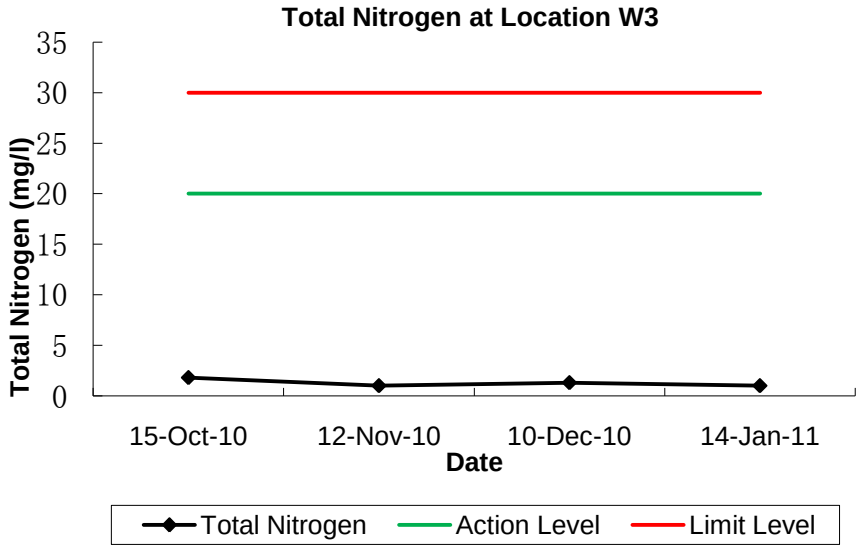

Dissolved Oxygen (DO) at Location W2
DO (mg/l)
0
1
2
3
4
5
6
7
8
9
10
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
DO
Action Level
Limit Level

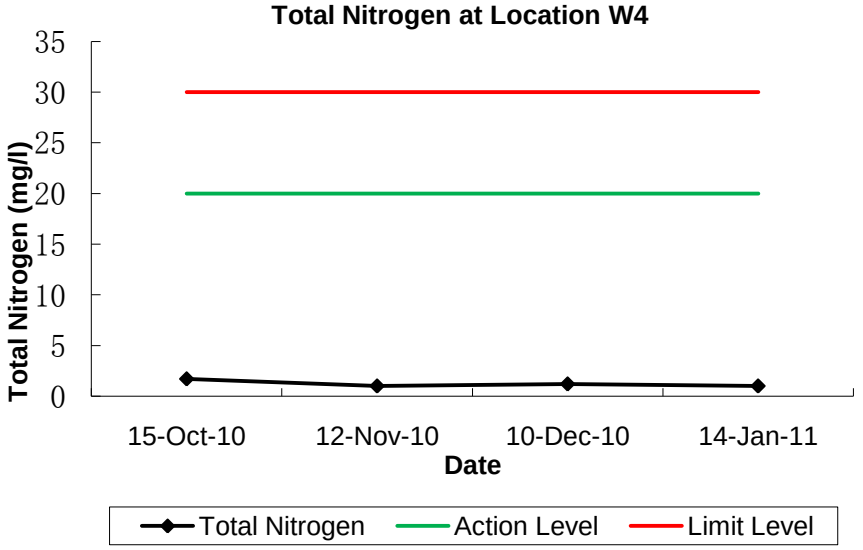

Dissolved Oxygen (DO) at Location W3
DO (mg/l)
0
1
2
3
4
5
6
7
8
9
10
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
DO
Action Level
Limit Level

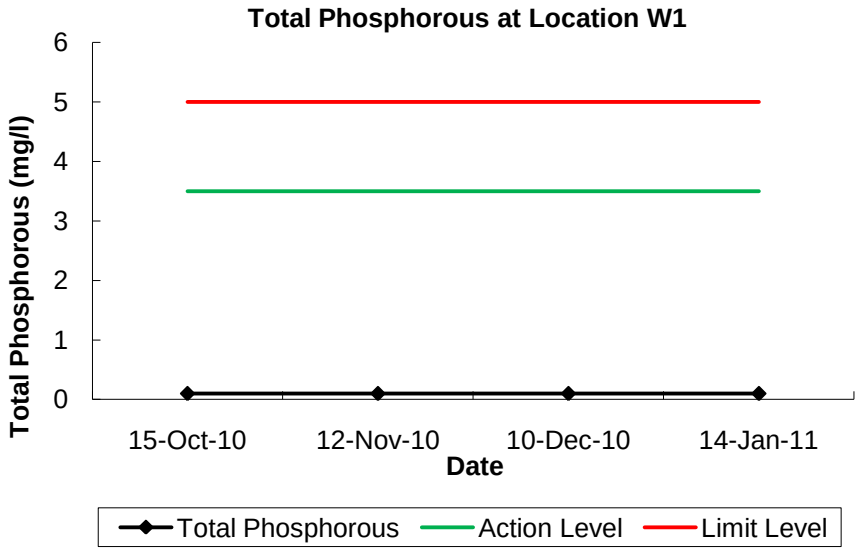

Dissolved Oxygen (DO) at Location W4
DO (mg/l)
0
1
2
3
4
5
6
7
8
9
10
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
DO
Action Level
Limit Level

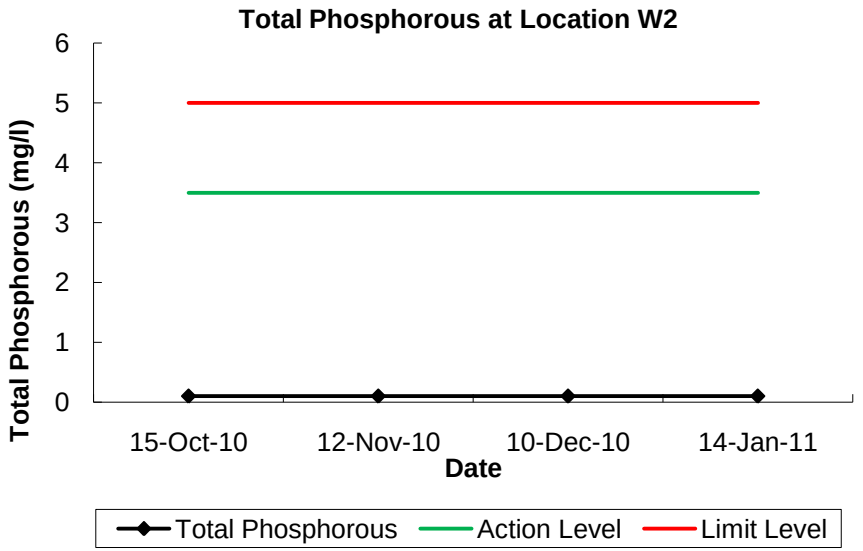

Total Nitrogen at Location W1
Total Nitrogen (mg/l)
35
30
25
20
15
10
5
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
Total Nitrogen
Action Level
Limit Level

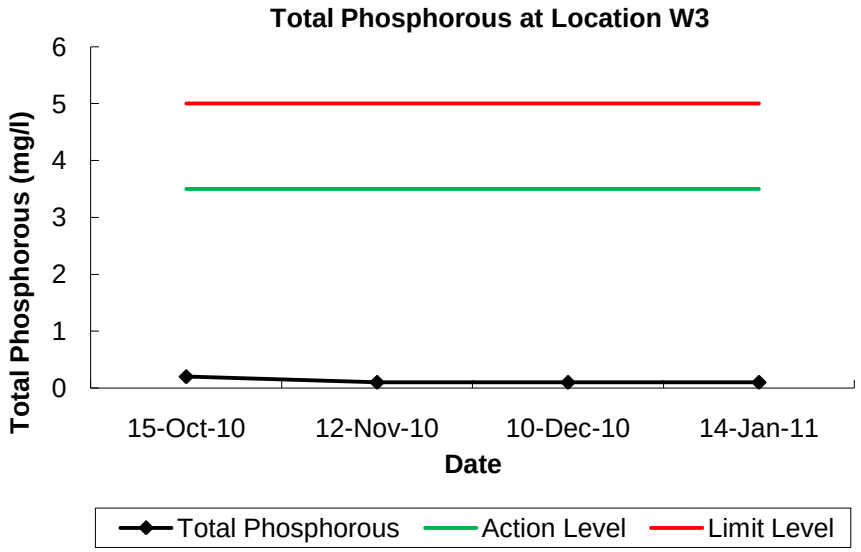

Total Nitrogen at Location W2
Total Nitrogen (mg/l)
35
30
25
20
15
10
5
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
Total Nitrogen
Action Level
Limit Level

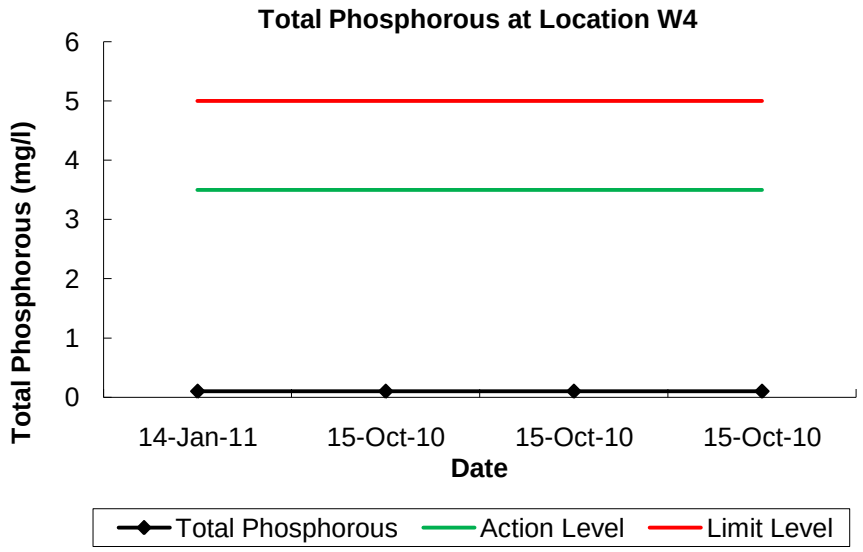

Total Nitrogen at Location W3
Total Nitrogen (mg/l)
35
30
25
20
15
10
5
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
Total Nitrogen
Action Level
Limit Level


Total Nitrogen at Location W4
Total Nitrogen (mg/l)
35
30
25
20
15
10
5
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
Total Nitrogen
Action Level
Limit Level


Total Phosphorous at Location W1
Total Phosphorous (mg/l)
6
5
4
3
2
1
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
Total Phosphorous
Action Level
Limit Level


Total Phosphorous at Location W2
Total Phosphorous (mg/l)
6
5
4
3
2
1
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
Total Phosphorous
Action Level
Limit Level


Total Phosphorous at Location W3
Total Phosphorous (mg/l)
6
5
4
3
2
1
0
15-Oct-10
12-Nov-10
10-Dec-10
14-Jan-11
Date
Total Phosphorous
Action Level
Limit Level


Total Phosphorous at Location W4
Total Phosphorous (mg/l)
6
5
4
3
2
1
0
14-Jan-11
15-Oct-10
15-Oct-10
15-Oct-10
Date
Total Phosphorous
Action Level
Limit Level

APPENDIX 4

Aqua Bio-Trol Liquid – Product Datasheet

Aqua Bio-Trol Liquid

Liquid Microbial Pond Clarifier

PRODUCT DATA BULLETIN

Features

- ***Eliminates pond scum and green, soupy conditions***
- ***Improves water clarity***
- ***Reduces foul odors and organic sediment***
- ***Contains facultative bacteria capable of withstanding low oxygen levels***
- ***Reduces levels of harmful nitrates & ammonia***
- ***Effective under a wide range of climactic conditions***
- ***Enhances conditions for all aquatic life***
- ***Reduces biological oxygen demand***
- ***Non-toxic, safe for fish, plants & applicator***
- ***Microencapsulated, microbial stimulants***

Aqua Bio-Trol Liquid is the safe, natural way to establish and maintain cleaner pond and lake water without chemicals. *Aqua Bio-Trol Liquid* eliminates pond scum and green, *soupy* conditions, while eliminating foul odors. *Aqua Bio-Trol Liquid* improves water clarity and digests excess organic matter in ponds, lakes and fountains.

Aqua Bio-Trol Liquid helps to create and maintain a healthier pond, lake and fountain water ecosystem through non-chemical treatment. *Aqua Bio-Trol Liquid* is an all natural, microbial based product effective for improving poor water conditions, and especially for maintenance of healthy water conditions once they are established. *Aqua Bio-Trol Liquid* is a concentration of naturally occurring microbes, which act to bring pond and lake water into proper ecological balance.

Aqua Bio-Trol Liquid is completely biodegradable and non-toxic to humans, animals and water life. The result of treatment is reduced organic sediment and particulate, reduced sludge, clear water, and enhanced conditions for all aquatic life.

Aqua Bio-Trol Liquid microbes preemptively consume organic matter which feeds algae and which leads to anaerobic conditions, including bad odors. The active microbes in *Aqua Bio-Trol Liquid* feed on excess nutrients in the entire water column, from sludge at the bottom to suspended particulate, to green organic matter on the surface. Routine application helps keep water in it's best condition without the use of potentially harmful chemicals.

DIRECTIONS FOR USE

Aqua Bio-Trol Liquid is most effective when water temperatures range from 50° to 100° F. For best results, provide adequate surface or subsurface aeration. Subsuface aeration is preferred. For maximum efficiency, assure a minimum of 5-6 % dissolved oxygen.

Apply by distributing liquid as much as possible around pond and lake edges. Avoid dumping liquid in one location.

Pond Volume	Initial Treatment	Monthly Maintenance
Acre Foot 325,900 gallons	4 gallons	2 gallons

Formulas to help in your calculations

- **Length x Width x Depth (feet) x 7.48 = Number of Gallons**
- **One acre-foot of water = 325,900 gallons**
- **One acre-foot of water = 1,233 CuMt**

Active Ingredients

A proprietary blend of 58 strains of aerobic and facultative beneficial bacteria at a minimum concentration of 6.6 x 10^7 CFU per ml (including Bacillus subtilis)

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