



Quarterly EM&A Compliance Report



SkyCity Nine Eagles Golf Course

August 2013 to October 2013



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Revision #	Date	Prepared by	Reviewed by	Approved for Issue by
1	November 2013	Winnie MA 	Antony WONG 	Alexi BHANJA 

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SMEC COMPANY DETAILS

SMEC Asia Limited

27/F Ford Glory Plaza, 37-39 Wing Hong Street, Cheung Sha Wan, Kowloon, Hong Kong

T +852 3995 8100 | F +852 3995 8101

smecasia@smec.com | www.smec.com

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EXECUTIVE SUMMARY

The 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 golf facility, known as "SkyCity Nine Eagles Golf Course" is intended to serve passengers, visitors and airport workers.

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 (BOD₅), nitrogen, phosphorous, temperature and salinity.

This is the twenty-sixth Quarterly Compliance report covering August 2013 to October 2013 and complies with the reporting requirements stated in the approved EM&A Manual.

In August 2013, there were exceedances of Limit Level for SS at W1 and W2 in Lake A and exceedances of Action Level for SS at W3 and W4 in Lake B. Compared to the previous month, the level of SS was much higher in Lake A. This may be due to the continuous hot weather and the increasing of growth of algae in the lakes. However, there were no exceedances of any other parameters. Total nitrogen and total phosphorous concentrations remained below Action Levels, which indicate that organic nutrients were NOT the cause of the exceedances.

In September 2013, there were exceedances of Limit Level for SS at W1, W2, W3 and W4. Compared to the previous month, the level of SS were much higher in both Lake A and B, again possibly due to the continuous hot weather and the increasing of growth of algae in the lakes. However, there were no exceedances of any other parameters. Total nitrogen and total phosphorous concentrations remained below Action Levels, which indicate that organic nutrients were NOT the cause of the exceedances.

In October 2013, there were exceedances of Limit Level for SS at W1, W2, W3 and W4 and exceedances of Action Level for BOD₅ at W3 and W4 in Lake B. The SS concentration in the lakes was, however, lower than the previous month and is likely caused by naturally occurring algae in the water. The high level in BOD₅ at W3 and W4 may have resulted from a malfunction earlier in the month of one of the aerator/fountains in Lake B. This breakdown resulted in a decreased level of oxygen in the water that resulted in number of fish deaths – dead fish were observed during water sampling. Since BOD₅ is a measure of the organic content of the water, these exceedances in Lake B may reflect the fish deaths. There is also a higher concentration of total nitrogen in Lake B than Lake A (although still below Action Level), which may be the result of the decomposition of dead fish and the associated release of ammonia and other products of organic decay. Total nitrogen and total phosphorous concentrations, however, remained below Action Levels, which indicate that organic nutrients were NOT the cause of the exceedances.

As soon as monthly results were available, EPD and the Golf Course Supervisor were notified of any exceedances, as required by the Event/Action Plan. Furthermore, the Golf Course Supervisor was also advised that lake water was or was not of an acceptable quality for discharge and that the control valve could not be opened.

There were no complaints, notifications of summons received during the reporting quarter. 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 golf facility, known as "SkyCity Nine Eagles Golf Course" is intended to serve airport passengers, overseas visitors and airport workers.

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 of the golf course was completed on 31 December 2006, the first phase of the Operation Period was completed on 30 April 2007, and the second (and current) 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 15,000m³. 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 20,000m³.

If the capacity of the lakes exceeds 20,000m³, 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 90,000m³ of floodwater can be retained within the Golf Course in addition to the 20,000m³ 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.

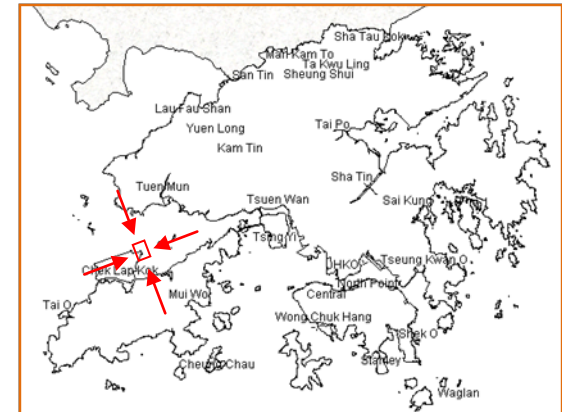
The system by which this water control is achieved is shown in *Figure 1-2*.

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



Source: Image courtesy of Airport Authority

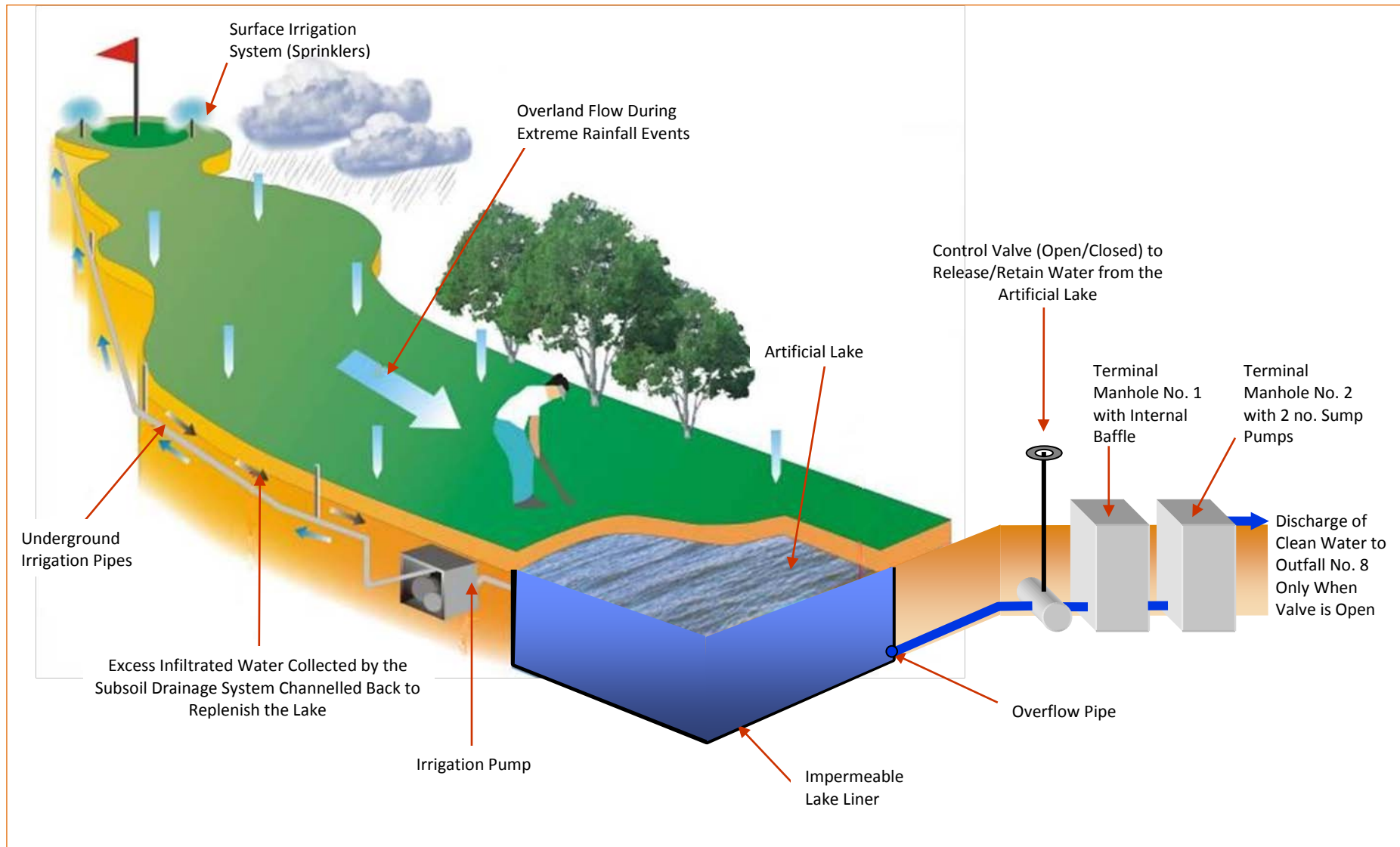
Location Map



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

1.3 EM&A Programme

Monitoring of Dissolved Oxygen (DO) in mg/ℓ, Suspended Solids (SS) in mg/ℓ, Biochemical Oxygen Demand (BOD₅) 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.

1.3.1 Monitoring This Quarter

The actual lake water monitoring schedule for this quarter (August to October 2013) is given in **Table 2-1**, below.

Table 2-1 Monitoring Schedule for This Quarter

Sampling Date	Sampling Locations
9 August 2013	W1 to W4
13 September 2013	W1 to W4
11 October 2013	W1 to W4

1.3.2 Monitoring Next Quarter

The planned lake water monitoring schedule for the next quarter (August to October 2013) is given in **Table 2-2**, below.

Table 2-2 Monitoring Schedule for the Next Quarter

Sampling Date	Sampling Locations
8 November 2013	W1 to W4
13 December 2013	W1 to W4
14 January 2014	W1 to W4

1.4 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.

1.5 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](#).

1.6 Parameters Monitored

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

- Dissolved Oxygen
- Suspended Solids
- BOD₅
- Total Nitrogen
- Total Phosphorous

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

1.7 Monitoring Locations

Monitoring locations together with grid references are shown in [Figure 2-1](#). Monitoring Stations are designated as W1, W2, W3 and W4.

1.8 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

1.9 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 Event/Action P for Lake Water Quality Monitoring

Event	Action
Exceedance of Action Level	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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**



3 MONITORING RESULTS

1.10 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/	Temperature (°C)	SS (mg/	BOD ₅ (mg/	DO Saturation (%age)	DO Concentration (mg/	Total Nitrogen (mg/	Total Phosphorous (mg/
W1	Mean	0.1	28.4	46	5.5	85	6.5	3	0.2
	Minimum	0.1	27.5	41	4.0	75	5.8	2	0.1
	Maximum	0.1	29.7	53	6.0	106	7.9	3	0.2
W2	Mean	0.1	28.4	46	5.8	87	6.6	3	0.2
	Minimum	0.1	27.5	41	4.0	77	5.8	2	0.1
	Maximum	0.1	29.7	51	7.0	110	8.2	3	0.2
W3	Mean	0.1	28.5	38	7.8	75	5.9	4	0.1
	Minimum	0.1	28.0	28	5.0	68	5.5	3	0.1
	Maximum	0.2	29.0	49	14.0	88	6.7	5	0.2
W4	Mean	0.1	28.5	38	8.0	76	5.9	4	0.1
	Minimum	0.1	28.0	28	5.0	63	5.4	3	0.1
	Maximum	0.2	29.0	48	14.0	92	6.8	5	0.2

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

1.11 Discussion

1.11.1 August 2013

In August 2013, there were exceedances of Limit Level for Suspended Solids (SS) at W2 in Lake A and exceedances of Action Level for SS at W3 and W4 in Lake B. Compared to the previous month, the level of SS was much higher in Lake A. This may be due to the continuous hot weather and the increasing of growth of algae in the lakes.

Therefore, in accordance with the EM&A Manual, the Golf Facility Supervisor was advised that **the control valve shall remain closed and there shall be no discharge off-site into the surrounding marine waters** until such time as lake water has returned to an acceptable quality.

There were, however, no exceedances of any other parameters – total nitrogen and total phosphorous concentrations remained below Action Levels, which indicate that organic nutrients were NOT the cause of the exceedances.

As the reason for the exceedance is understood, it is not considered necessary to increase frequency of monitoring at this time. Since the application of organic nutrients is not the cause of the exceedance, there is no need to suspend application of organic nutrients, to review the TMP, or remedial measures in terms of turfgrass management.

While the water quality in the lakes remains below acceptable levels for discharge it should be noted that there has been no discharge off-site and so there have been no adverse environmental impacts to the surrounding marine environment.

1.11.2 September 2013

In September 2013, there were exceedances of Limit Level for SS at W1, W2, W3 and W4. Compared to the previous month, the level of SS were much higher in both Lake A and B, again possibly due to the continuous hot weather and the increasing of growth of algae in the lakes.

Therefore, in accordance with the EM&A Manual, the Golf Facility Supervisor was advised that **the control valve shall remain closed and there shall be no discharge off-site into the surrounding marine waters** until such time as lake water has returned to an acceptable quality.

There were, however, no exceedances of any other parameters – total nitrogen and total phosphorous concentrations remained below Action Levels, which indicate that organic nutrients were NOT the cause of the exceedances.

As the reason for the exceedance is understood, it is not considered necessary to increase frequency of monitoring at this time. Since the application of organic nutrients is not the cause of the exceedance, there is no need to suspend application of organic nutrients, to review the TMP, or remedial measures in terms of turfgrass management.

While the water quality in the lakes remains below acceptable levels for discharge it should be noted that there has been no discharge off-site and so there have been no adverse environmental impacts to the surrounding marine environment.

1.11.3 October 2013

In October 2013, there were exceedances of Limit Level for SS at W1, W2, W3 and W4 and exceedances of Action Level for BOD₅ at W3 and W4 in Lake B. The SS concentration in the lakes was, however, lower than the previous month and is likely caused by naturally occurring algae in the water. The high level in BOD₅ at W3 and W4 may have resulted from a malfunction earlier in the month of one of the aerator/fountains in Lake B. This breakdown resulted in a decreased level of oxygen in the water that resulted in number of fish deaths – dead fish were observed during water sampling. Since BOD₅ is a measure of the organic content of the water, these exceedances in Lake B may reflect the fish deaths. There is also a higher concentration of total nitrogen in Lake B than Lake A (although still below Action Level), which may be the result of the decomposition of dead fish and the associated release of ammonia and other products of organic decay.

Therefore, in accordance with the EM&A Manual, the Golf Facility Supervisor was advised that **the control valve shall remain closed and there shall be no discharge off-site into the surrounding marine waters** until such time as lake water has returned to an acceptable quality.

There were no exceedances of the other parameters – total nitrogen and total phosphorous concentrations remained below Action Levels, which indicate that organic nutrients were NOT the cause of the exceedances.

As the reason for the exceedance is understood, it is not considered necessary to increase frequency of monitoring at this time. Since the application of organic nutrients is not the cause of the exceedance, there is no need to suspend application of organic nutrients, to review the TMP, or remedial measures in terms of turfgrass management.

While the water quality in the lakes remains below acceptable levels for discharge it should be noted that there has been no discharge off-site and so there have been no adverse environmental impacts to the surrounding marine environment.

1.12 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. The lake water quality in the reporting quarter was not considered to be of an acceptable for discharge. Therefore, the control valve remained closed and no water was discharged off site in August to October.

Table 3-2 Operational Results

Month	Month-end Lake Water Depth (m)	Can Control Valve Be Opened?	Was Control Valve Opened?	Quantity of Water Discharged (m ³)
August 2013	1.4	No	No	0
September 2013	0.9	No	No	0
October 2013	0.6	No	No	0

1.13 Complaints and Notifications of Summons

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

4 COMMENTS, RECOMMENDATIONS AND CONCLUSIONS

Reporting during the second phase of the Operation Period is required on a quarterly basis. This is the twenty-sixth Quarterly Compliance report covering August 2013 to October 2013 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, BOD₅, nitrogen, phosphorous, temperature and salinity.

In August 2013, there were exceedances of Limit Level for SS at W1 and W2 in Lake A and exceedances of Action Level for SS at W3 and W4 in Lake B. Compared to the previous month, the level of SS was much higher in Lake A. This may be due to the continuous hot weather and the increasing of growth of algae in the lakes. However, there were no exceedances of any other parameters. Total nitrogen and total phosphorous concentrations remained below Action Levels, which indicate that organic nutrients were NOT the cause of the exceedances.

In September 2013, there were exceedances of Limit Level for SS at W1, W2, W3 and W4. Compared to the previous month, the level of SS were much higher in both Lake A and B, again possibly due to the continuous hot weather and the increasing of growth of algae in the lakes. However, there were no exceedances of any other parameters. Total nitrogen and total phosphorous concentrations remained below Action Levels, which indicate that organic nutrients were NOT the cause of the exceedances.

In October 2013, there were exceedances of Limit Level for SS at W1, W2, W3 and W4 and exceedances of Action Level for BOD₅ at W3 and W4 in Lake B. The SS concentration in the lakes was, however, lower than the previous month and is likely caused by naturally occurring algae in the water. The high level in BOD₅ at W3 and W4 may have resulted from a malfunction earlier in the month of one of the aerator/fountains in Lake B. This breakdown resulted in a decreased level of oxygen in the water that resulted in number of fish deaths – dead fish were observed during water sampling. Since BOD₅ is a measure of the organic content of the water, these exceedances in Lake B may reflect the fish deaths. There is also a higher concentration of total nitrogen in Lake B than Lake A (although still below Action Level), which may be the result of the decomposition of dead fish and the associated release of ammonia and other products of organic decay. Total nitrogen and total phosphorous concentrations, however, remained below Action Levels, which indicate that organic nutrients were NOT the cause of the exceedances

As the reason for the exceedances over the reporting quarter is understood, it was not considered necessary to increase frequency of monitoring. Since the application of organic nutrients is not the cause of the exceedances, there is no need to suspend application of organic nutrients, to review the TMP, or remedial measures in terms of turfgrass management.

During the reporting quarter there were no complaints and 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



ALS Technichem (HK) Pty Ltd

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: MR ALEXI BHANJA
CLIENT: SMEC ASIA LIMITED
ADDRESS: 27/F, FORD GLORY PLAZA,
37-39 WING HONG STREET,
CHEUNG SHA WAN,
KOWLOON, HONG KONG.
PROJECT: SKY CITY GOLF COURSE

WORK ORDER: HK1325227
SUB-BATCH: 1
LABORATORY: HONG KONG
DATE RECEIVED: --
DATE OF ISSUE: 24/09/2013

COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.
Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

Scope of Test: Dissolved Oxygen and Temperature
Description: Multimeter
Brand Name: YSI
Model No.: Professional Plus
Serial No.: 09K100735
Equipment No.: --
Date of Calibration: 23 August, 2013

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.
Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

ISSUING LABORATORY: HONG KONG

Address

ALS Technichem (HK) Pty Ltd
11/F Chung Shun Knitting Centre
1-3 Wing Yip Street
Kwai Chung
HONG KONG

Phone: 852-2610 1044
Fax: 852-2610 2021
Email: hongkong@alsglobal.com


Mr. Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1325227
SUB-BATCH: 1
Date of Issue: 24/09/2013
Client: SMEC ASIA LIMITED



Description: Multimeter
Brand Name: YSI
Model No.: Professional Plus
Serial No.: 09K100735
Equipment No.: --
Date of Calibration: 23 August, 2013 **Date of next Calibration:** 23 November, 2013

Parameters:

Dissolved Oxygen

Method Ref: APHA (21st edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
4.38	4.49	0.11
7.04	7.19	0.15
8.48	8.57	0.09
Tolerance Limit (\pm mg/L)		0.20

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical

Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading ($^{\circ}$ C)	Displayed Reading ($^{\circ}$ C)	Tolerance ($^{\circ}$ C)
12.0	12.8	0.8
23.0	23.5	0.5
38.0	37.7	-0.3
Tolerance Limit (\pm $^{\circ}$ C)		2.0


 Mr. Fung Lim Chee, Richard
 General Manager -
 Greater China & Hong Kong

APPENDIX 2

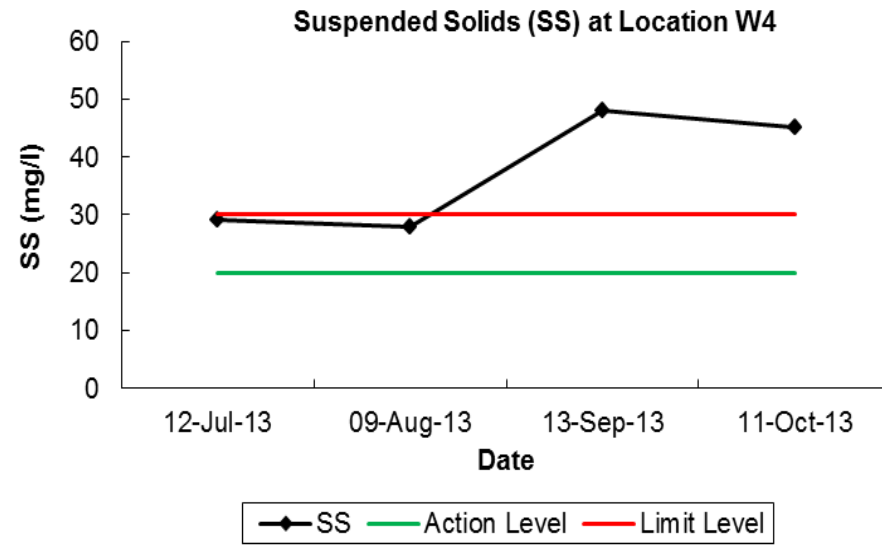
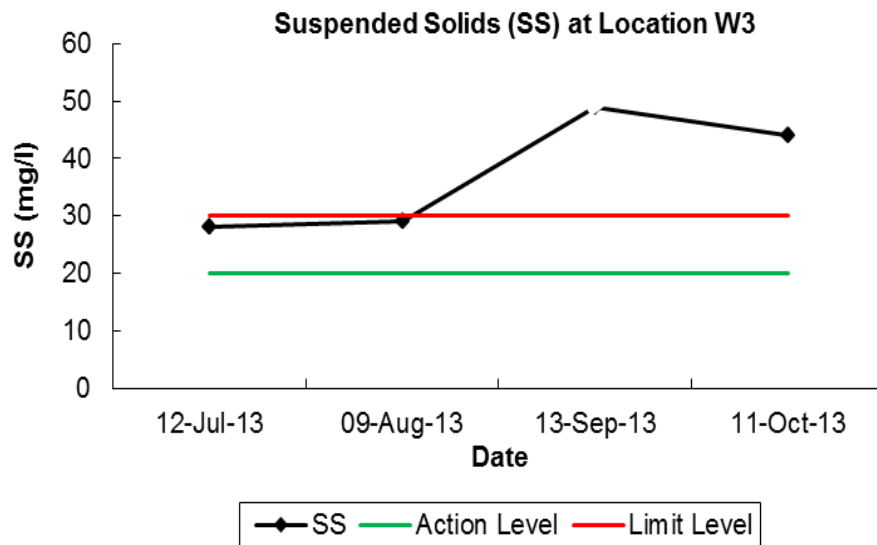
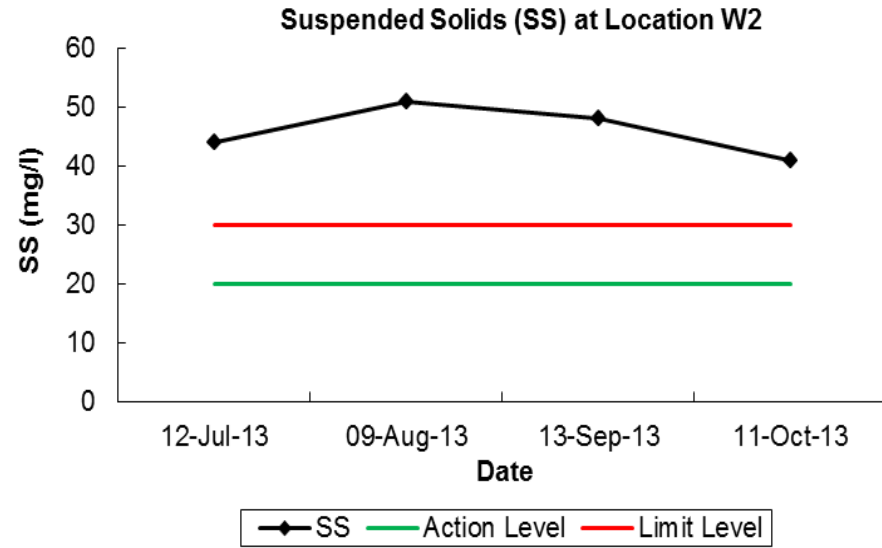
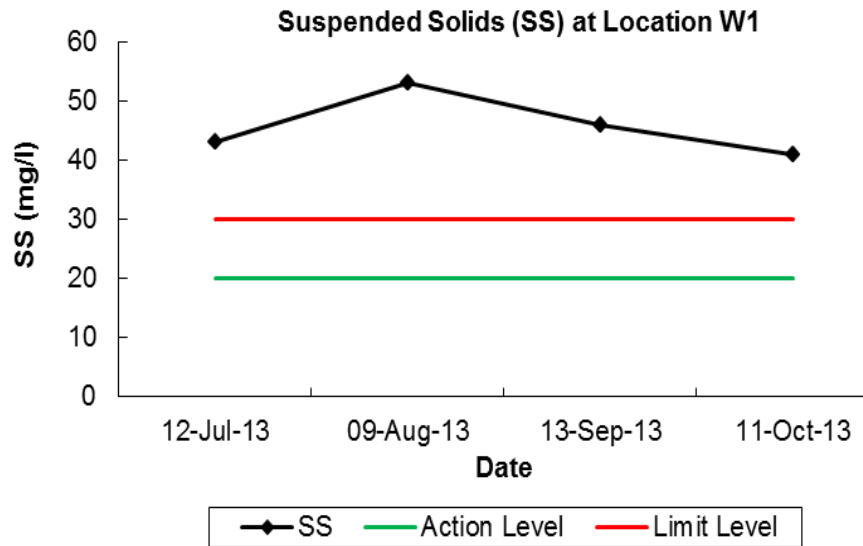
Lake Water Quality Monitoring Data

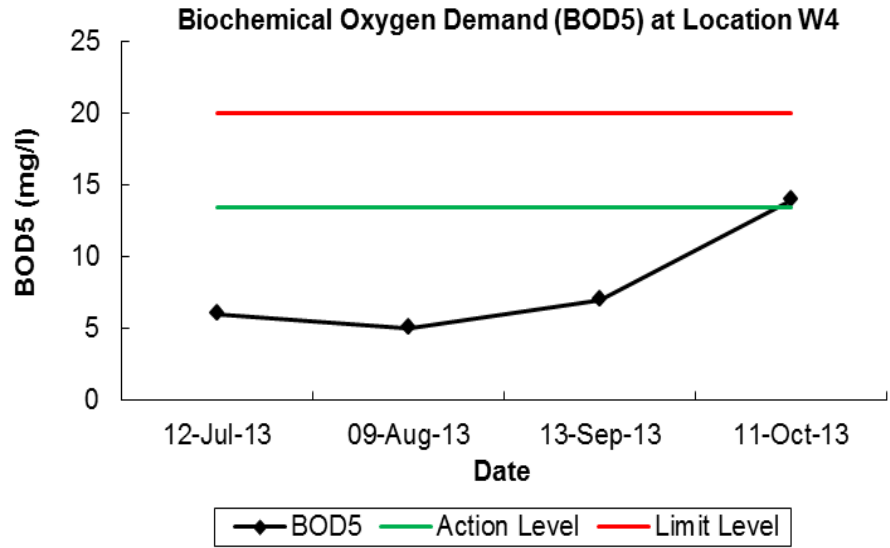
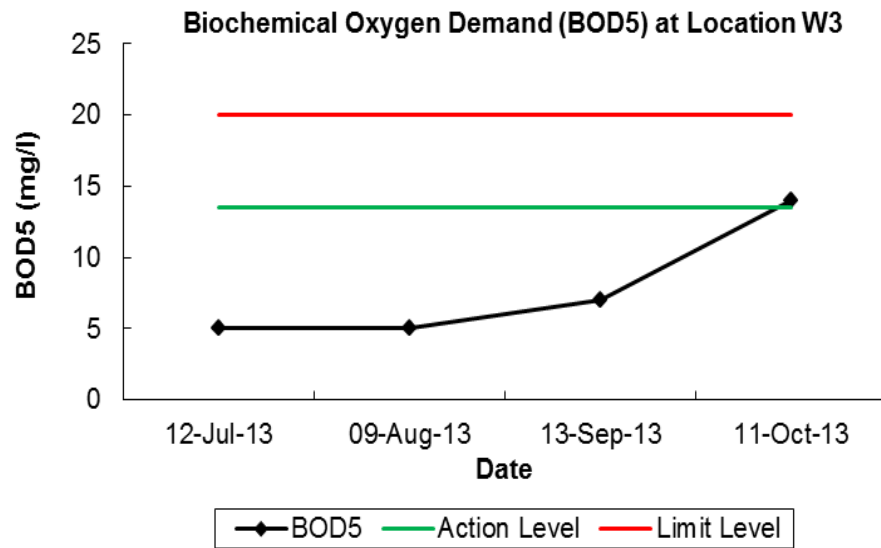
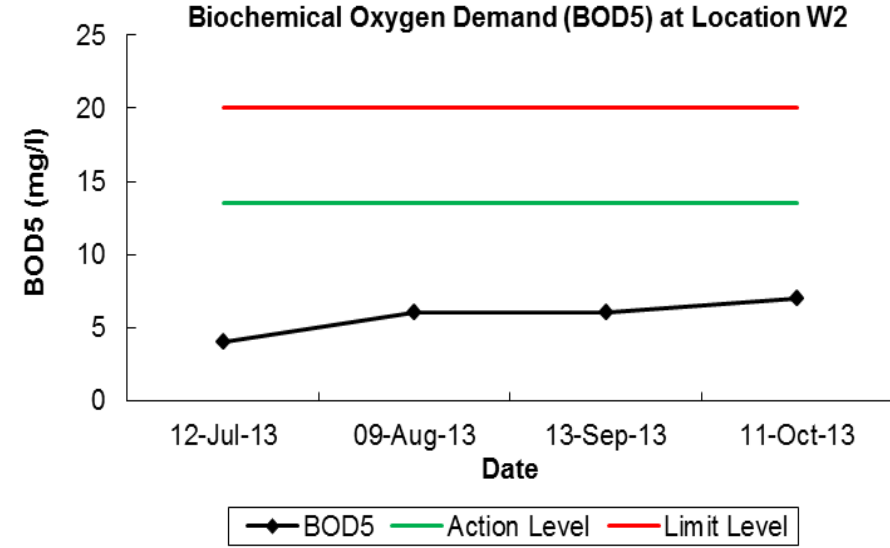
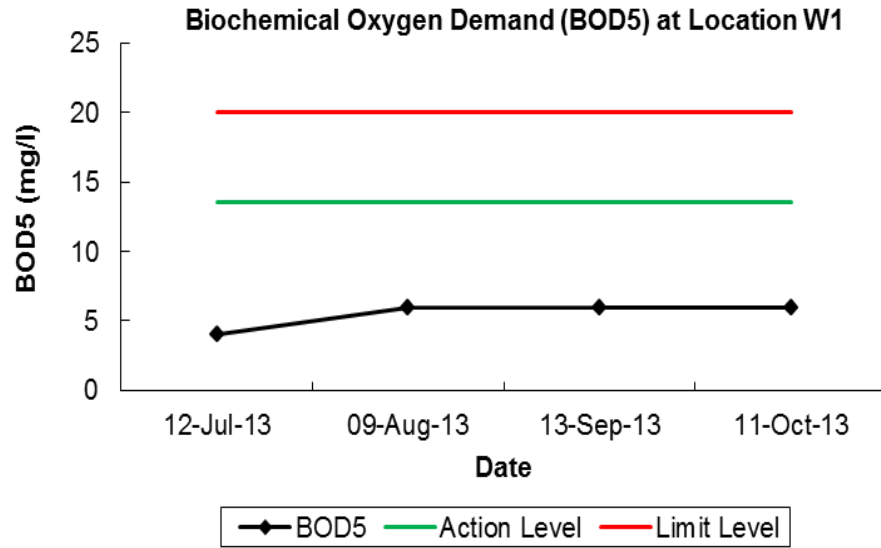
Date	Time	Station	Salinity (g/ℓ)	Temperature (°C)	SS (mg/ℓ)	BOD5 (mg/ℓ)	DO Sat (%Saturation)	DO Conc (mg/ℓ)	Total Nitrogen (mg/ℓ)	Total Phosphorous (mg/ℓ)
9-August-13	6:50	W1	0.1	29.7	53	6	75.0	6.1	3.1	0.2
	6:45	W2	0.1	29.7	51	6	77.9	6.1	3.3	0.2
	6:35	W3	0.1	28.9	29	5	67.8	5.7	3.0	0.2
	6:30	W4	0.1	28.8	28	5	71.1	5.7	2.9	0.2
13-September-13	7:20	W1	0.1	28.9	46	6	82.1	5.8	3.1	0.2
	7:15	W2	0.1	28.8	48	6	82.0	5.8	3.0	0.2
	7:05	W3	0.1	29.0	49	7	77.8	5.6	3.8	0.2
	7:00	W4	0.1	29.0	48	7	77.9	5.6	3.7	0.2
11-October-13	7:50	W1	0.1	27.5	41	6	75.0	6.0	2.4	0.2
	7:45	W2	0.1	27.5	41	7	76.8	6.1	2.2	0.2
	7:35	W3	0.1	28.0	44	14	67.7	5.5	4.7	0.2
	7:30	W4	0.1	28.1	45	14	63.3	5.4	4.9	0.2
Mean			0.1	28.5	42	7	80.6	6.2	3.0	0.2
Minimum			0.1	27.5	28	4	63.3	5.4	1.6	0.1
Maximum			0.2	29.7	53	14	110.0	8.2	4.9	0.2

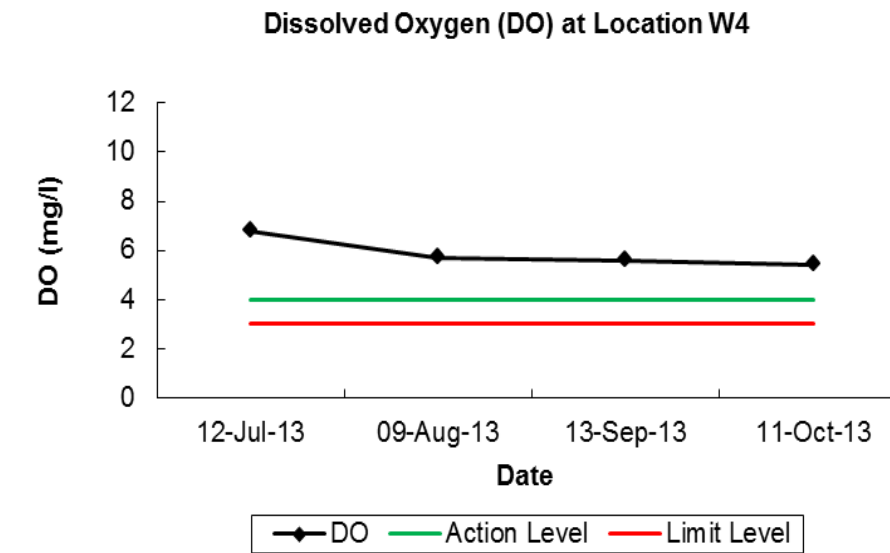
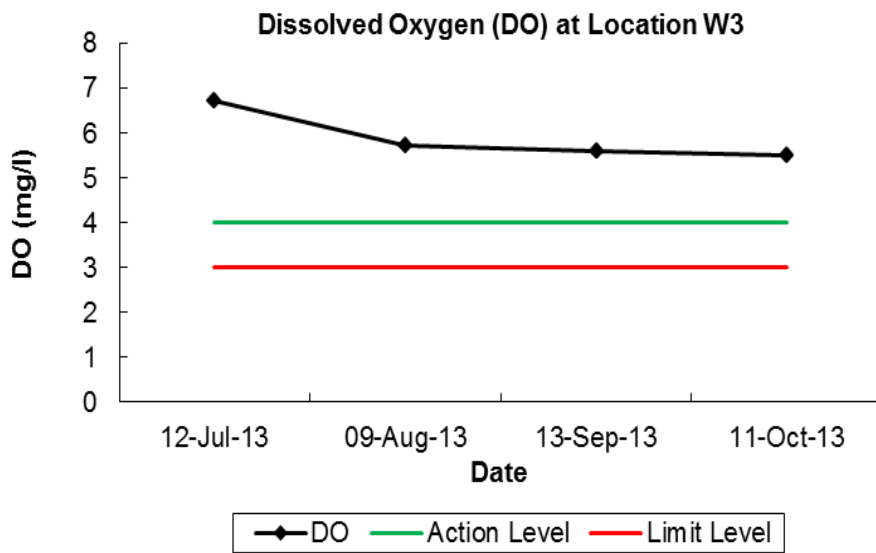
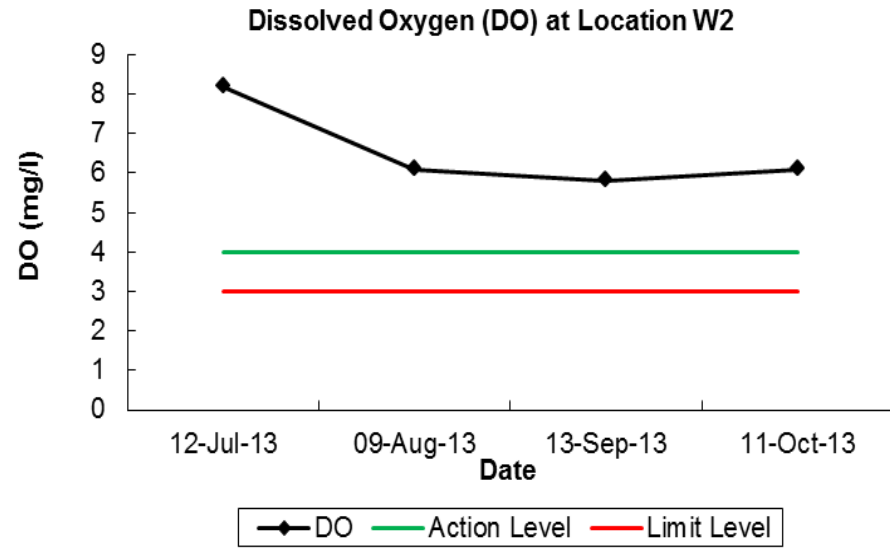
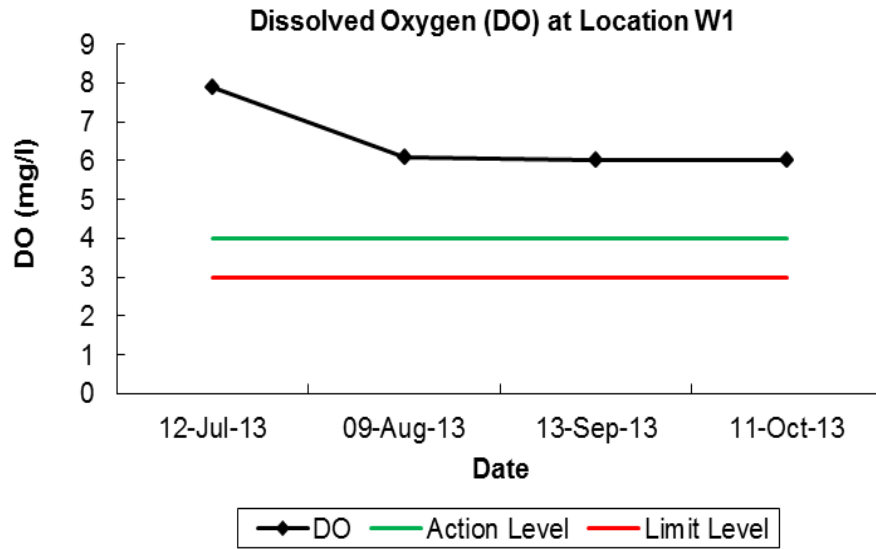
Note: **Bold** indicates Action Level exceedance; **Bold** indicates **Limit Level** exceedance

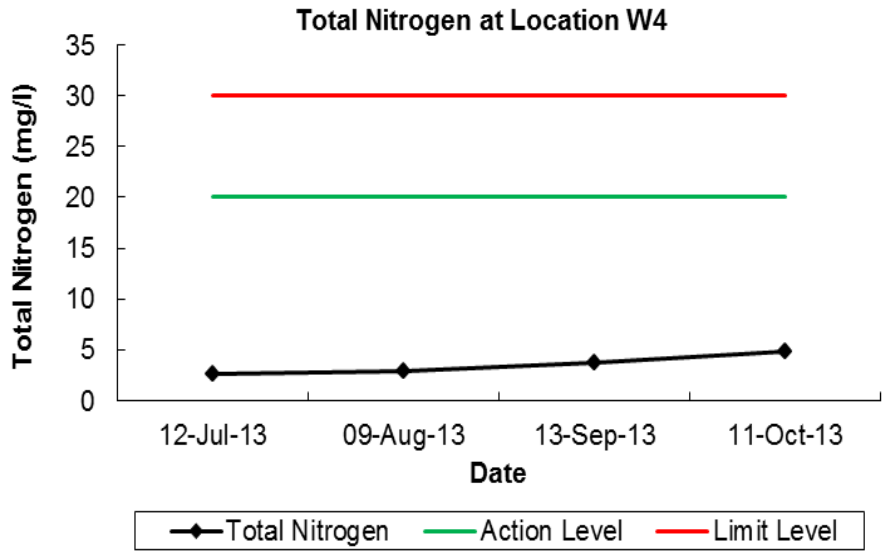
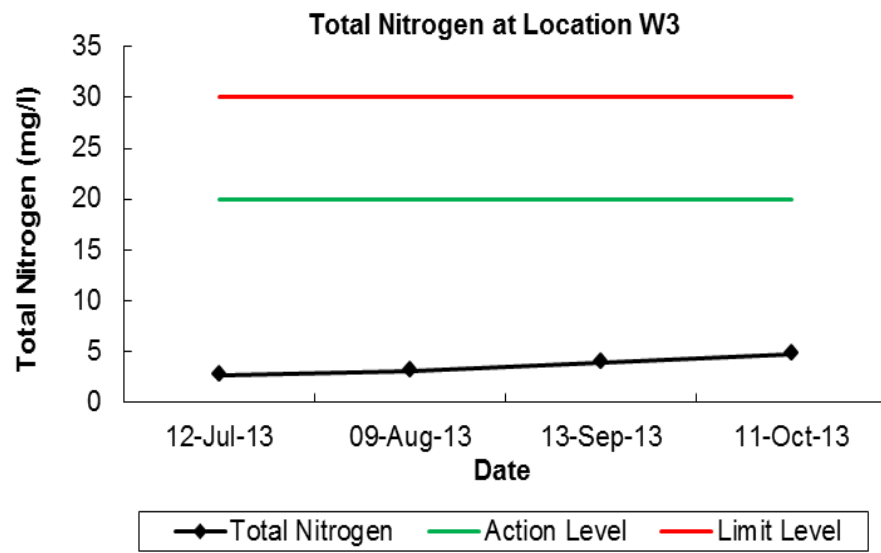
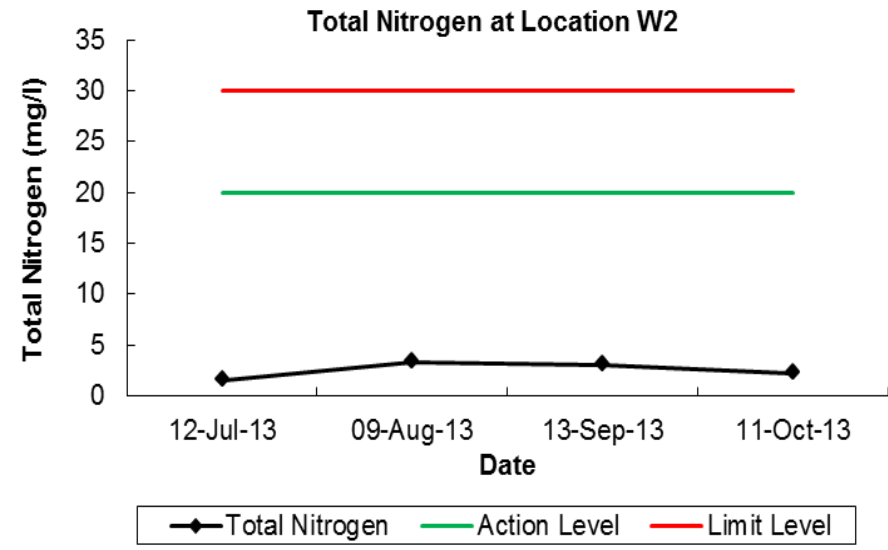
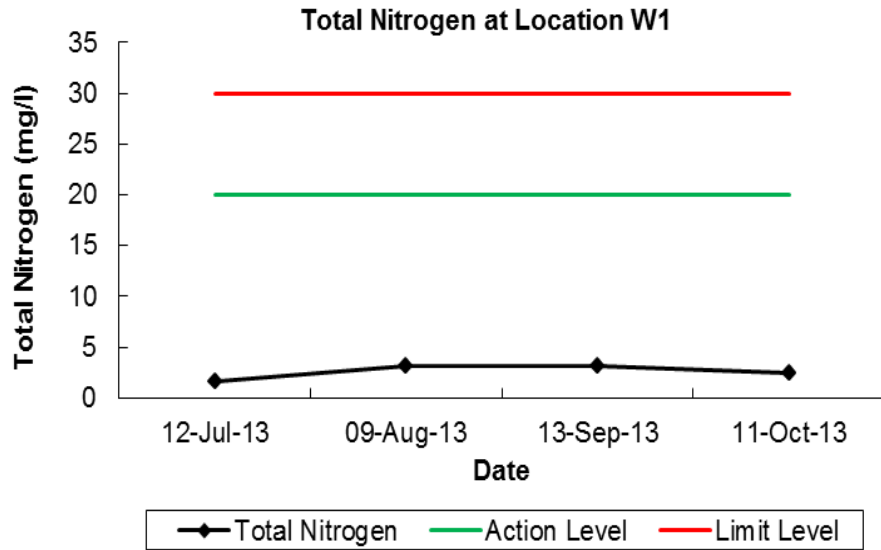
APPENDIX 3

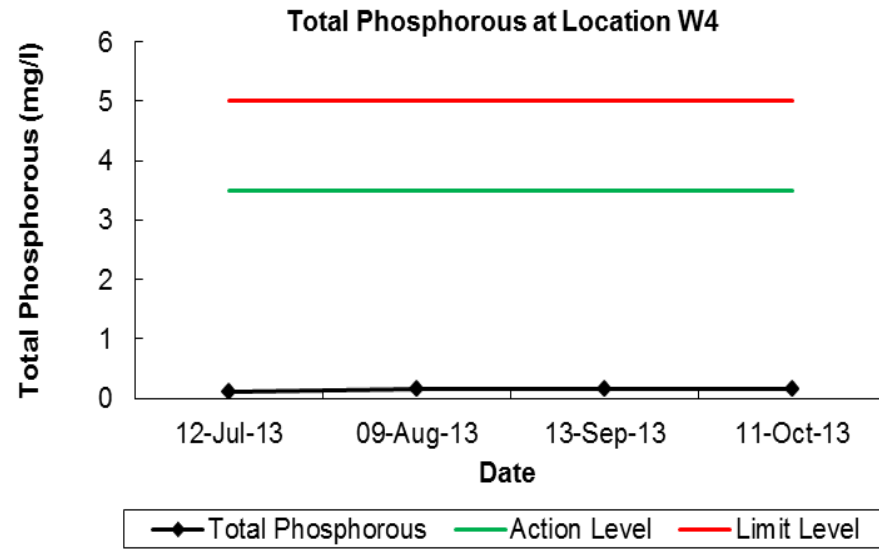
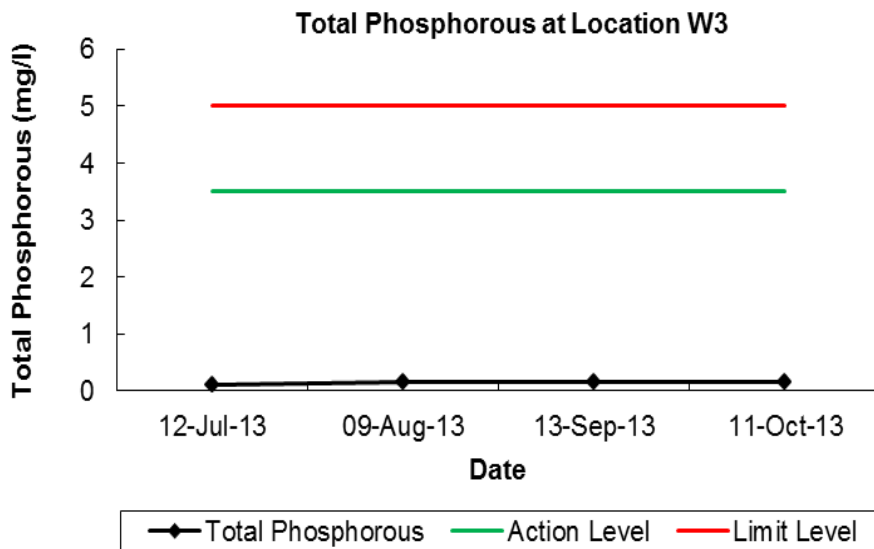
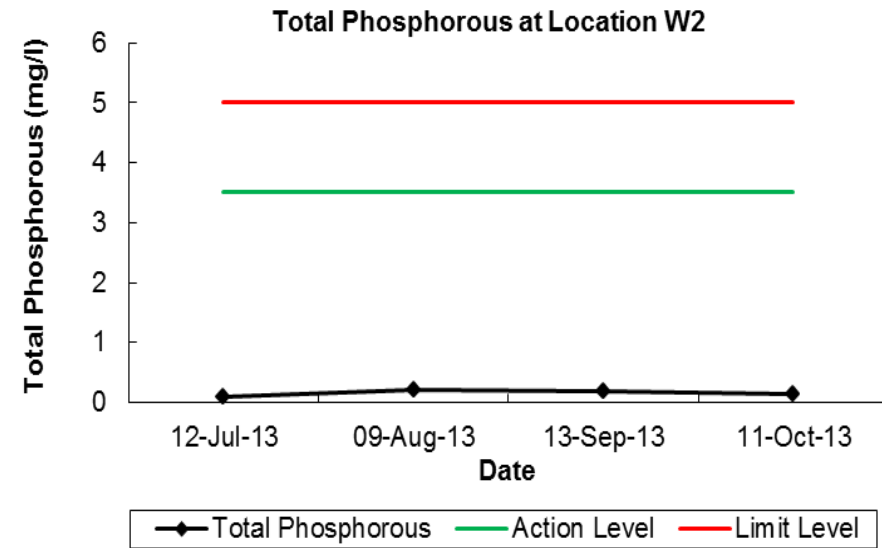
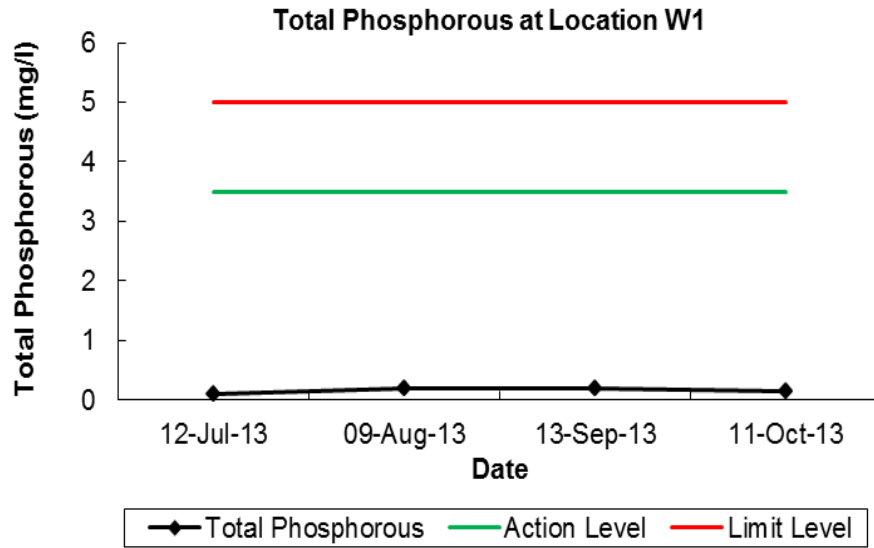
Graphical Plots of Monitoring Data for the Past Four Months











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. Subsurface 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 10⁷ CFU per ml (including *Bacillus subtilis*)

Warranty: Seller warrants that the product conforms to its chemical description and is reasonably fit for the purpose stated on the label when used in accordance with directions under normal conditions of use; but neither this warranty nor any other warranty of merchantability or fitness of a particular product expressed or implied, extends to the use of this product contrary to label conditions, or under conditions not reasonably foreseeable to the seller; and buyer assumes the risk of any such use.



13802 Chrisman Road ■ Houston, Texas 77039 USA
800.442.9821 ■ Fax 281.590.3353

www.parkwayresearch.com ■ www.brandtconsolidated.com