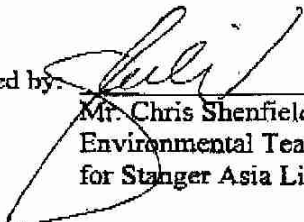


**QUARTERLY**  
**ENVIRONMENTAL MONITORING AND AUDIT REPORT**  
**FOR**  
**CONTRACT No. CV/2002/13**  
**FILL BANK AT TUEN MUN AREA 38**  
**JULY TO SEPTEMBER 2003**  
**(Revision No. 0)**

Report No.: ET11869

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22/10/2003

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## **EXECUTIVE SUMMARY.**

This is the 1<sup>st</sup> Quarterly Environmental Monitoring and Audit (EM&A) report for Contract No. CV/2002/13 – Fill Bank at Tuen Mun Area 38. The site has been in operation as a public filling area as part of the overall reclamation works. The site currently operates from 08:00 to 20:00 except during the Chinese New Year holidays to provide a stable outlet for public fill to serve the construction industry. This report covers the monitoring works conducted from 28<sup>th</sup> June to 30<sup>th</sup> September 2003.

### **Construction Activities for the Reported Period.**

- Earthwork between +5mPD and +15mPD.
- Collection of public fill from land access and marine access.
- Tree planting.
- Construction of combined reception and exit offices, weighbridges and queuing area.
- Erection of hoarding.

### **Air Quality Monitoring.**

Two stations (A1 and A2) have been identified as the locations for the monitoring of 24-hour and 1-hour Total Suspended Particulates (TSP). The Monitoring of 24-hour TSP was carried out on sixteen occasions at A1 and on eight occasions at A2. Monitoring of 1-hour TSP was carried out on forty-eight occasions at A1 and on twenty-four occasions at A2. Monitoring at A2 was commenced on mid-August due to the difficulties of installing an electricity supply at that location. There was no exceedance to the set Action and Limit levels for both parameters at both stations during the reporting period.

### **Water Quality Monitoring.**

Water quality in terms of turbidity, dissolved oxygen, suspended solids, temperature, and salinity, was carried out on thirty-nine occasions at FM1, FM2, FC1 and FC2. There were 78 Action Level (14 – D.O. - Surface & Middle, 45 – D.O. – Bottom, 8 – Turb., and 11 – SS) and 38 Limit Level (4 – D.O. – Surface & Middle, 5 - D.O. – Bottom, 6 – Turb., and 23 - SS) exceedances during the reporting period. Although there was surface runoff generated on-site due to rainfall, this runoff was desilted via catchpits, sand and silt removal facilities and intercepting channels. Hence the aforementioned exceedances are not believed to be associated with the works at the Fill Bank.

### **Landscape Audit**

In this reporting period, there was no specific site observation regarding the landscape aspect.

### **Waste Management.**

559,600m<sup>3</sup> public fill was collected to stockpiling area. 9.24t C&D waste and general refuse were disposed of at WENT Landfill. Chemical waste generated was stored in temporary storage area.

**Complaints and Notifications of Summonses and Successful Prosecutions.**

No complaints or notification of summonses received this reported period.

**Site Inspections.**

Thirteen weekly site inspections were carried out by the Environmental Team (ET) in this reporting period. Three audits by the Independent Environmental Checker (IEC) were carried out in this reporting period. The major observations, action by the Contractor and the environmental outcomes are summarised in the Section 7 of this report.

## **1. INTRODUCTION.**

### **1.1 Background.**

Stanger Asia Ltd. has been commissioned by the Penta-Ocean Construction Co. Ltd. to provide an Environmental Team (ET) to monitor air and water quality and audit landscape works for Contract No.CV/2002/13. The team is to take a pro-active role in all issues, which may be of environmental concern during the establishment, operation and decommissioning phases of the Fill Bank at Tuen Mun Area 38..

The Independent Environmental Checker (IEC) appointed for this project is Materialab Consultants Ltd.

In this report, the air and water quality monitoring works and landscape audit conducted from 28<sup>th</sup> June to 30<sup>th</sup> September 2003 will be detailed and reviewed. All monitoring works were carried in accordance to “*Agreement No, PW 01/2002 Project Profile for Fill Bank at Tuen Mun Area 38, Environmental Monitoring and Audit Manual*”.

### **1.2 Report Structure.**

The purpose of this report is to detail and review the air and water quality monitoring works and landscape audit undertaken from 28<sup>th</sup> June to 30<sup>th</sup> September 2003.

The report follows the format given below:

Section 1	Introduction and background information to the content of this report.
Section 2	This section gives the information of the project.
Section 3	This section summarises all the environmental permits and licenses.
Section 4	Summary of the EM&A requirements is presented.
Section 5	This section details the implemented mitigation measures.
Section 6	Details monitoring results.
Section 7	The site environmental audits are summarized in this section.
Section 8	The status for solid and liquid waste management for the site is overviewed.
Section 9	Complaints, notifications of summons and successful prosecutions are summarized.
Section 10	This section gives a conclusion in relation to all monitoring activities.

## **2. PROJECT INFORMATION.**

### **2.1 Site Description.**

The works mainly comprise the construction of temporary storm water system, setting up of C&D material loading/unloading facilities, setting up/ refurbishing site facilities, stockpiling of 4.9 million m<sup>3</sup> of public fill, and decommissioning of the temporary fill bank.

The site layout plan is shown in Figure 2.1.

### **2.2 Project Organization.**

Mr. L.M. Chan is the Engineer's Representative for the Civil Engineering Department, Government of the HKSAR. (Tel: 2762 5602, Fax: 2714 0113).

The Independent Environmental Checker (IEC) for this project is headed by Mr. Joseph Poon - Manager of Materialab Consultants Ltd. (Tel: 2450 8238, Fax: 2450 6138).

Mr. Lok Wah Fung is the Site Agent for Penta-Ocean Construction Co., Ltd. (Tel: 2491 1584, Fax: 2496 0433).

The Environmental Team (ET) for the project is Stanger Asia Ltd. The team is headed by Mr Chris Shenfield – Senior Environmental Scientist. (Tel: 2682 1203, Fax: 2682 0046).

The Organization Chart with the key personnel contacts names and telephone numbers is given in Appendix I.

### **2.3 Construction Programme.**

The overall construction programme is given in Appendix VI. Details of the construction activities are listed below.

- Site clearance;
- Construction of storm water drainage system;
- Stockpiling of 4.9 million m<sup>3</sup> of public fill;
- Construction of landscape works; and
- Removal of stockpiled public fill.

### 3. ENVIRONMENTAL PERMITS AND LICENSES.

The summary of the status of all environmental permits, licenses and notification for this project as at September 2003 is summarized in the following table.

**Table 3.1 Summary of the Environmental Permits and Licenses**

Description	Licence/Permit No.	Date of Issue	Date of Expiry	Status
Environmental Permit	EP-153/2003	13-Feb-03	--	Issued
Registration of Chemical Waste Producer	WPN5296-421-P2800-03	05-Aug-03	--	Issued

### 4. SUMMARY OF EM&A REQUIREMENTS.

#### 4.1 Air Quality.

##### *Monitoring Location.*

The project has two designated locations (A1 & A2) for the monitoring of air quality. A1 is a fixed location in the vicinity of the site office to monitoring the TSP levels at River Trade Terminal and A2 is a movable location to the western boundary of the site that is designed to move as works progress. The air monitoring locations are shown in Figure 4.1.

**Table 4.1 Coordinates of Air Quality Monitoring Stations**

Station	HK Metric Grid – Easting	HK Metric Grid - Northing
A1	811368	825593
A2	811126*	825132*

\* - Coordinates of present location.

##### *Methodology*

Measurement of 24-hour and 1-hour TSP levels were carried out in accordance to the high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50). The high volume samplers are calibrated at bi-monthly intervals. The calibration kit (Anderson Model G2535) comprising pressure plates and a transfer standard is traceable to the internationally recognized standard.

##### *Laboratory Measurement.*

Laboratory measurements were carried out in Stanger Asia Ltd. own HOKLAS accredited laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments.



*Monitoring Parameters Frequency.*

**Table 4.2 Air Quality Monitoring Frequency**

Monitoring Locations	Parameter	Frequency
A1 & A2	24-hr TSP	Once in every six days
	1-hr TSP	Three times in every six days

*Action and Limit Levels.*

The Action levels for air quality monitoring were established from the impact monitoring data of Contract No. CV/2000/01 prior to the commencement of the fill bank utilising the criteria laid out in *section 4.7* of the EM&A Manual for the project. The Limit levels for air quality monitoring has been set in line with statutory guidelines for air quality in Hong Kong. Action and Limit levels for both 24-hour and 1-hour TSP are given in the following table.

**Table 4.3 Action and Limit Levels for Air Quality**

Parameter Monitored	Action Level, $\mu\text{g}/\text{m}^3$	Limit Level, $\mu\text{g}/\text{m}^3$
1-hour TSP	344	500
24-hour TSP	192	260

## **4.2 Water Quality.**

In accordance with the EM&A Manual, the water quality monitoring data obtained from Stage 2 Reclamation Works (Contract No. CV/2000/01) was used as the impact monitoring data. It is not necessary to repeat the water quality monitoring. The water quality monitoring of the Reclamation Project (CV/2000/01) was completed on 24.09.2003 and that of the Fill Bank Project (CV/2002/13) commenced on 27.09.2003.

*Monitoring Locations.*

The EM&A Manual produced for this project has proposed two monitoring stations (FM1 & FM2) and two control stations (FC1 & FC2) for the carrying out of water quality monitoring. Control Station FC1 will act as upstream control station for the mid-ebb tide with control station FC2 acting as upstream control stations for the mid-flood tide.

The designated monitoring stations are shown in Figure 4.2.

*Methodology (Fill Bank Project).*

Measurements are taken at three water depths, namely 1m below water surface, mid-water and 1m above seabed at both mid-flood and mid-ebb tides. Replicates samples and measurements of turbidity, dissolved oxygen (mg/L), dissolved oxygen (% saturation) and temperature at each depth of each station are taken. Suspended solids shall be determined in the laboratory. For the purpose of evaluating the water quality, all values for suspended solids and turbidity shall be depth-averaged. All on-site monitoring equipment was calibrated three-monthly at Stanger Asia's HOKLAS accredited laboratory.

*Laboratory Analysis (Fill Bank Project).*

The laboratory measurements of suspended solids were carried out at Stanger Asia Limited, a HOKLAS accredited laboratory in accordance with Method No. 2540D 17<sup>th</sup> Edition of APHA.

Stanger Asia operates a comprehensive quality assurance and quality control programmes for QA/AC procedures in accordance with the requirements of HOKLAS accreditation, all filters were equilibrated and weighted repeatedly until the difference of two consecutive results is less than 0.5 mg.

*Monitoring Parameters and Frequency.*

**Table 4.4 Water Quality Monitoring Frequency**

Monitoring Locations	Monitoring Parameters	Frequency	Requirements
Designated Control Stations: FC1 & FC2.	Dissolved Oxygen, Salinity, Suspended Solids, Temperature and Turbidity.	Three days per week.	At three depths during mid-ebb and mid-flood tides.
Designated Monitoring Stations: FM1 & FM2.			

*Action and Limit Levels.*

The Action and Limit levels for water quality monitoring were established from the impact monitoring data of Contract No. CV/2000/01 prior to the commencement of the fill bank utilising the criteria laid out in *section 6.8* of the EM&A Manual for the project.

**Table 4.5 Action and Limit Level for Water Quality**

Parameter	Action level	Limit level
Dissolved Oxygen in mg/L.		
Surface & Middle	<4.78mg/L	<4mg/L
Bottom.	<4.16mg/L	<2mg/L
Suspended Solids (SS) in mg/L (depth-averaged)	>120% of upstream control station's SS at the same time of the same day.	>130% of upstream control station's SS at the same tide of the same day .
Turbidity (Tby) in NTU	>120% of upstream control station's Tby at the same tide of the same day.	>130% of upstream control station's Tby at the same tide of the same day.

All the figures given in the table are used for reference only and the EPD may amend the figures whenever necessary.

**4.3 Event and Action Plans.**

The Event and Action Plans for air and water are attached in Appendix II of this report.

**5. IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES.**

The contractor implemented various environmental mitigation measures as recommended in the Project Profile and Environmental Permit. The implementation status is attached in Appendix III.

**6. MONITORING RESULTS.**

**6.1 Air Quality Monitoring.**

Monitoring of 24-hour and 1-hour TSP is summarized in the following tables. The results are present graphically in Figures 6.1 and 6.2.

**Table 6.1 Results of 24-hour TSP Monitoring Data**

Location	Number of Monitoring	Number of Exceedance	
		Action Level	Limit Level
A1	16	0	0
A2	8	0	0
Action Level	192 $\mu\text{g}/\text{m}^3$		
Limit Level	260 $\mu\text{g}/\text{m}^3$		

**Table 6.2 Results of 1-hour TSP Monitoring Data**

Location	No. of Monitoring	No. of Exceedance	
		Action Level	Limit Level
A1	48	0	0
A2	24	0	0
Action Level	344 $\mu\text{g}/\text{m}^3$		
Limit Level	500 $\mu\text{g}/\text{m}^3$		

**6.2 Water Quality Monitoring.**

Water quality in terms of turbidity, dissolved oxygen and suspended solids was conducted at FM1, FM2, FC1 and FC2 at a frequency of three days per week, at mid-flood and mid-ebb tides. Results for water quality monitoring are summarised in the following table. Graphical presentations of the results are shown in Figure 6.3 – Figure 6.10.

**Table 6.3 Summary of Water Quality Monitoring Data**

Parameter	Number of Occasions Monitored	Exceedance Level		Total
		Action	Limit	
Surface & Middle Dissolved Oxygen	154	14	4	18
Bottom Dissolved Oxygen	154	45	5	50
Turbidity	154	8	6	14
Suspended Solids	154	11	23	34
Total	616	78	38	116

There were 78 Action Level and 38 Limit Level exceedances during the reporting period. Exceedances of dissolved oxygen were reported frequently. These exceedances were not attributed to the Project, as for most cases the water at the control station was also depleted of oxygen. For the others, the exceedances were possibly due to surface run-off from shoreline and nearby outfalls.

All exceedances of turbidity and suspended solids to the daily values from the control stations were minor and not believed to be related to the Project as most of the data was well below the monitoring results obtained during the baseline monitoring period. Some elevated results were obtained for monitoring conducted during, or after rainfall. Although there would have been surface runoff generated on-site due to rainfall, this runoff would have been desilted via catchpits, sand and silt removal facilities and intercepting channels. Therefore, the exceedances were not believed to be associated with the Project. These exceedances were possibly due to Pearl River flow and discharge from the nearby shoreline and associated outfalls.

Although the exceedances for this reporting period were not considered to be related to the Fill Bank Project, the IEC, ER, and contractor were notified and the Contractor was reminded to implement and maintain all necessary mitigation measures to avoid deteriorating the water quality.

*Quarterly Assessment of Impacts from Construction Activities*

A quarterly assessment of impacts on suspended solids from construction activities at the project site, including comparison of the difference between the quarterly mean and 1.3 times of the ambient mean for each monitoring station, which is defined as 30% increase of the baseline data of the parameter is summarized in Table 6.4. All quarterly assessment analytical results demonstrate that the quarterly means of suspended solids at all stations are not significantly higher than the 1.3 on water quality times of the ambient means (p<0.05).

**Table 6.4 Quarterly Assessment of Impacts on Suspended Solids**

Monitoring Station	Significant Difference?	SS Level Increased to more than 1.3 Times of Ambient Mean?
FM1	Y	N
FM2	Y	N
FC1	Y	N
FC2	Y	N

**7. ENVIRONMENTAL AUDIT.**

**7.1 Site Inspections.**

Thirteen site inspections were carried out by the Environmental Team (ET) in this reporting period. Three audits by the Independent Environmental Checker (IEC) were carried out in this reporting period. The major observations by the ET and IEC, actions by the Contractor and outcomes are summarised in the following tables.

*Environmental Team*

**Table 7.1 Summary of Findings, Actions and Outcomes of Site Inspection by the ET**

Observations	Actions by Contractor	Outcome
<b>July 2003</b>		
Accumulation of silt in the drainage system. (2 <sup>nd</sup> , 11 <sup>th</sup> , 16 <sup>th</sup> and 30 <sup>th</sup> July 2003)	Regular clearance of drainage systems.	Situation improved. (23 <sup>rd</sup> July 2003) To be observed in the next reporting period.
Automatic wheel washing facility was not working. (2 <sup>nd</sup> , 11 <sup>th</sup> , 16 <sup>th</sup> and 23 <sup>rd</sup> July 2003)	Contractor arranged for maintenance and provided manual wheel wash.	The facility was working. (30 <sup>th</sup> July 2003)
Stockpiling of materials near waterfront. (16 <sup>th</sup> and 30 <sup>th</sup> July 2003)	Removal of stockpiles.	Situation rectified. (23 <sup>rd</sup> July 2003)
Fugitive dust generated from speedy site traffic. (16 <sup>th</sup> and 30 <sup>th</sup> July 2003)	Increased the frequency of watering and enforced speed limit to 10 km/hr.	Situation improved. (23 <sup>rd</sup> July 2003)
Accumulation of stagnant water observed. (30 <sup>th</sup> July 2003)	Filling in of areas of stagnant water.	To be observed in the next reporting period.
<b>August 2003</b>		
Accumulation of silt in the drainage system. (29 <sup>th</sup> August 2003)	Regular clearance of drainage systems.	To be observed in the next reporting period.
Some haul roads and work sites were dry although watering was in operation. (29 <sup>th</sup> August 2003)	Increased the frequency of watering on those busy areas.	To be observed in the next reporting period.
Stockpiling of materials near waterfront. (14 <sup>th</sup> and 22 <sup>nd</sup> August 2003)	Stockpiles removed.	Situation rectified. (29 <sup>th</sup> August 2003)
Chemical drums were stored on bare ground. (7 <sup>th</sup> and 14 <sup>th</sup> August 2003)	Chemical drums placed in drip trays.	Chemical drums were stored in drip trays. (22 <sup>nd</sup> August 2003)
Dark smoke was generated from equipment. (14 <sup>th</sup> and 22 <sup>nd</sup> August 2003)	Maintenance of equipment.	Less dark smoke was observed. (29 <sup>th</sup> August 2003)
Fugitive dust generated from speedy site traffic. (7 <sup>th</sup> and 29 <sup>th</sup> August 2003)	Increased the frequency of watering and enforced speed limit to 10 km/hr.	Situation improved. (14 <sup>th</sup> August 2003)

**Table 7.1 (cont'd) Summary of Findings, Actions and Outcomes of Site Inspection by the ET**

Observations	Actions by Contractor	Outcome
<b>September 2003</b>		
The automatic wheel washing facility was not operating. Vehicles were not cleaned before leaving the site. (11 <sup>th</sup> & 17 <sup>th</sup> September 2003)	Operation resumed as soon as possible. Labour deployed to conduct manual wheel washing.	Most vehicles were cleaned before leaving the site. (24 <sup>th</sup> September 2003)
Some haul roads and work sites were dry although watering was in operation. (11 <sup>th</sup> September 2003)	Increased the frequency of watering on those busy areas.	Situation improved. (17 <sup>th</sup> September 2003)
Stockpiling of materials near waterfront. (11 <sup>th</sup> , 17 <sup>th</sup> & 24 <sup>th</sup> September 2003)	Remove and reduced the stockpiles.	Situation improved. (29 <sup>th</sup> September 2003)
Generator and chemical drums were stored on bare ground. (17 <sup>th</sup> September 2003)	Placed generator and chemical drums in drip trays.	Some chemical drums were stored in drip trays. (24 <sup>th</sup> September 2003)
Stagnant water was observed. (11 <sup>th</sup> & 17 <sup>th</sup> September 2003)	Cleared the drainage channels to drain away stagnant water.	Drainage channels were cleared and pools were filled. (24 <sup>th</sup> September 2003)
The public roads around the site entrance were dusty. (24 <sup>th</sup> September 2003)	Operated the road cleaner more frequently.	Situation improved. (29 <sup>th</sup> September 2003)

*Independent Environmental Checker*

**Table 7.2 Summary of Findings, Actions and Outcomes of Site Inspection by the IEC**

Observations	Actions by Contractor	Outcome
<b>16<sup>th</sup> July 2003</b>		
Wheel washing facilities was not maintained or working.	Contractor arranged for maintenance and provided manual wheel wash.	Situation rectified. (30 <sup>th</sup> July 2003)
The drainage system was filled with deposits.	Clearance of the drainage system.	Situation improved. (23 <sup>rd</sup> July 2003)
Haul roads and access roads were dry and dusty.	Increased the frequency of watering and enforced speed limit to 10 km/hr.	Situation improved. (23 <sup>rd</sup> July 2003)

**Table 7.2 (cont'd) Summary of Findings, Actions and Outcomes of Site Inspection by the IEC**

Observations	Actions by Contractor	Outcome
<b>14<sup>th</sup> August 2003</b>		
Stockpiles without cover were observed at the seafront.	Removed the stockpiles.	Situation rectified. (29 <sup>th</sup> August 2003)
The drainage channels were blocked.	Cleared the drainage channels.	Situation improved. (22 <sup>nd</sup> August 2003)
Continuous dark smoke from equipment was observed.	Maintained the equipment.	Less dark smoke was observed. (29 <sup>th</sup> August 2003)
Oil drums were not placed in drip trays and the outlet of tray was not sealed.	Placed oil drums in drip trays and seal the outlet properly.	Oil drums were stored in drip trays and the outlet was sealed. (22 <sup>nd</sup> August 2003)
Vehicles were travelling in excess of the 10km/hr speed limit.	Increased the frequency of watering and enforced speed limit to 10 km/hr.	Situation improved. (14 <sup>th</sup> August 2003)
<b>17<sup>th</sup> September 2003</b>		
Seawall was not maintained stockpile free.	Removed and reduced the stockpiles.	Situation improved. (29 <sup>th</sup> September 2003)
Automated wheel washing facility was under repair and manual wheel wash ineffective.	Operation resumed as soon as possible. Labour deployed to conduct manual wheel washing effectively.	Situation improved. (24 <sup>th</sup> September 2003)
Hoarding at River Trade Terminal was still to be erected.	To erect hoarding as soon as possible.	Erection of hoarding commenced. (29 <sup>th</sup> September 2003)
U-channel near the River Trade Terminal was blocked by collapsed slopes.	Cleared the u-channel channels.	The u-channel was cleared. (24 <sup>th</sup> September 2003)
Oil drums were not placed in drip trays.	Placed oil drums in drip trays.	Some chemical drums were stored in drip trays. (24 <sup>th</sup> September 2003)

## 7.2 Landscape and Visual.

Three landscape audits was conducted during the reporting period. Hoarding has been erected along Lung Mun Road. Buffer trees were being planted along the northern perimeter of the site. As indicated by the Contractor, slopes of the fill bank will be covered or hydroseeded as far as practicable.

## 8. WASTE MANAGEMENT.

559,600m<sup>3</sup> public fill was collected to stockpiling area. 9.24t C&D waste and general refuse were disposed of at WENT Landfill. Chemical waste generated was stored in temporary storage area.

The contractor is reminded to store all chemical drums and generators in drip trays to avoid land contamination from spillage of chemicals. The valve of the trays shall be sealed. Covers can also be provided to reduce accumulation of standing water from rainfall inside the trays.

**9. COMPLAINTS, NOTIFICATIONS OF SUMMONSES AND SUCCESSFUL PROSECUTIONS.**

No complaint was received this quarter. Complaint Log is attached in Appendix IV. Cumulative statistics on complaints, notifications of summonses and successful prosecutions are attached in Appendix V.

**10. CONCLUSION.**

This Quarterly Environmental Monitoring and Audit Report details the monitoring works carried out during the period from 28<sup>th</sup> June to 30<sup>th</sup> September 2003. The monitoring works were effective to generate data to identify or confirm the absence of impact attributable to the works.

All results for the air quality monitoring conducted this quarter were acceptable with no exceedance to set Action or Limit levels for either 24 or 1-Hour TSP level being recorded at monitoring locations A1 (vicinity of Engineer's Office) and A2 (western site boundary). However some elevated results, when compared to baseline data, were noted in this reported period. The Contractor was reminded to implement and maintain all the required mitigation measures in relation to air quality.

In relation to the monitoring of water quality, there were 78 Action Level and 38 Limit Level exceedances during the reporting period. Since surface runoff generated on-site due to rainfall would have been desilted via catchpits, sand and silt removal facilities and intercepting channels, these exceedances were not considered to be associated with the Fill Bank Project. However, the contractor was reminded to implement and maintain all necessary mitigation measures to avoid deteriorating the water quality.

No specific observation was reported from landscape audit and no environmental complaint and summon was received during this quarter.