





Contract No. 13/WSD/17

Design, Build and Operate First Stage of Tseung Kwan O Desalination Plant

Quarterly EM&A Report No.14 (Period from 1 June 2023 to 31 August 2023)

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Date:		19	October 2023		19 00	ctober 2	:023



Water Supplies Department New Works Branch Consultants Management Division 6/F Sha Tin Government Offices 1 Sheung Wo Che Road Sha Tin New Territories

Your reference:

Our reference:HKWSD202/50/109259Date:20 October 2023

Attention: Mr Sam Hui/ Mr H L Lai

BY EMAIL & POST (email: wl_hui@wsd.gov.hk/ jack_hl_lai@wsd.gov.hk)

Dear Sirs

Agreement No. CE 5/2019 (EP) Independent Environmental Checker for First Stage of Tseung Kwan O Desalination Plant – Investigation Verification of Quarterly EM&A Report No.14 (June – August 2023)

We refer to emails of 17 and 19 October 2023 attaching Quarterly EM&A Report No.14 (June – August 2023) for the captioned project prepared by the ET.

We have no further comments and hereby verify the captioned report.

Should you have any queries regarding the above, please do not hesitate to contact the undersigned on 2618 2831.

Yours faithfully ANEWR CONSULTING LIMITED

Alex Chan Independent Environmental Checker

CYCA/lsmt





REVISION HISTORY

Rev.	Description of Modification	DATE
1.	First Issue for Comments	17/10/2023
2.	Revised According to the Comment	19/10/2023

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i



CONTENTS

	I
Basic Project Information	5
Noise	.10
Water Quality	.14
Waste	.18
Landfill Gas Monitoring	.21
Summary of Monitoring Exceedance, Complaints, Notification of Summons and Prosecutions	24
EM&A Site Inspection	.26
Conclusions and Recommendations	.27
	Basic Project Information Noise Water Quality Waste Landfill Gas Monitoring Summary of Monitoring Exceedance, Complaints, Notification of Summons and Prosecutions EM&A Site Inspection Conclusions and Recommendations

Appendix A	Master Programme
Appendix B	Overview of Desalination Plant in Tseung Kwan O
Appendix C	Summary of Implementation Status of Environmental Mitigation
Appendix D	Water Quality Monitoring Graphical Presentation
Appendix E	Summary of Exceedances
Appendix F	Waste Flow Table
Appendix G	Complaint Log
Appendix H	Event/Action Plan for Water Quality Monitoring
Appendix I	Event/Action Plan for Construction Noise Exceedance



EXECUTIVE SUMMARY

INTRODUCTION

- A1. The Project, Design, Build and Operate First Stage of Tseung Kwan O Desalination Plant (TKODP), is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO) and is currently governed by a Further Environmental Permit (EP No. FEP 01/503/2015/A) for the construction and operation of the Contract.
- A2. In accordance with the Environmental Monitoring and Audit (EM&A) Manual for the Contract, EM&A works for marine water quality, noise, waste management and ecology should be carried out by Environmental Team (ET), Acuity Sustainability Consulting Limited (ASCL), during the construction phase of the Contract.
- A3. This is the 14th Quarterly EM&A Report, prepared by ASCL, for the Contract summarizing the monitoring results and audit findings of the EM&A programme at and around Tseung Kwan O Area 137 (TKO 137) during the reporting period from 1 June 2023 to 31 August 2023.
- A4. The EM&A programme for this contract has covered environmental monitoring on construction noise level at selected NSRs and Contractor's environmental performance auditing in the aspects of construction dust, construction noise, water quality, waste management, Landscape and Visual and Ecology.

SUMMARY OF MAIN WORKS UNDERTAKEN & KEY MITIGATION MEASURES IMPLEMENTED

A5. Key activities carried out in this reporting period for the Project included the followings:

Administration Building

- Carrying out the floor tiles works at 1/F and 2/F
- Installation of doors and handrails
- Construction of block wall in the pipe duct
- Installation of building services, cable laying, electrical switchboard

Chemical building

- Installation of permanent doors
- Construction of trunk load pits
- Underground utility construction work

Main Electrical & Central Chiller Plant Building

- Installation of chillers, building services, electrical switchboard and cable laying ActiDAFF
- Underground utility construction work
- Installation of access covers on roof
- Construction of staircase no 2
- Erection and dismantling of scaffolding, installation of underdrain media and electrical equipment and installation of access covers on roof

Product Water Storage Tank Building



- Resin Injection Work & Water Test for Chlorine Contact Tank A
- Installation of cat ladders in Water Tanks
- Installation of metal cladding, building services, cable laying, mechanical equipment, steel pipe
- Underground utility construction
- Sealing slab opening

OSCG Building

- Installation of Design for Manufacturing and Assembly (DfMA) Panel and metal cladding
- Underground utility construction work
- Installation of building services, mechanical equipment, metal cladding and roller shutters and window

Reverse Osmosis Building

- Installation of building services, electrical switchboard, mechanical equipment, steel pipe, Glass Reinforced Plastics (GRP) pipe, pressure test of the GRP pipe, Membrane Loading, raised floor
- Installation of metal cladding, handrailing and louvers
- Underground utility construction work

• Pipe laying at corridor

Post Treatment Building

- Installation of louvres, cat ladders, handrailing and metal cladding
- Installation of building services, mechanical equipment and GRP pipe
- Underground utility construction work

Inspection corridor

• Construction of roof concrete slab and column and wall

 CO_2 Tanks

• Installation of pipes and building services

Combined Shaft and Pump room

- Underground utility construction work
- Installation of door, window and louver

Other

- Watermain works at CLP 132 kV Substation
- Concrete breaking, structure construction of Wave Deflector Wall at seawall area
- Foundation and staircases construction at elevated walkway
- Foot plinth concreting and barrier erection at flexible barrier
- Finial check of Marine Diffuser Pipe
- A6. The major environmental impacts brought by the above construction works include:
 - Construction dust and noise generation from marine construction works, excavation works, construction works, rock cutting works and pipe pilling driving works;



- Waste generation from the construction activities
- Impact on water quality from marine construction works and inland construction works
- A7. The key environmental mitigation measures implemented for the Project in this reporting period associated with the above construction works include:
 - Dust suppression by regular wetting and water spraying for construction works;
 - Reduction of noise from equipment and machinery on-site and regularly inspection to machinery and plants/vehicles on-site to ensure proper functioning;
 - Sorting and storage of general refuse and construction waste; and
 - Deployment of temporary silt curtain in the area where marine construction works were conducted and deployment of water sedimentation tanks for treatment of wastewater at inland areas before discharge

SUMMARY OF EXCEEDANCE & INVESTIGATION & FOLLOW-UP

- A8. No noise monitoring was conducted during the reporting period since there are no projectrelated construction activities undertaken within a radius of 300m from the monitoring locations. No exceedance of the Action Level was recorded during the reporting period.
- A9. The EM&A works for water quality were conducted during the reporting period in accordance with the EM&A Manual.
- A10. Water quality monitoring was conducted as scheduled in the reporting period. Seventyseven (77) action level exceedances and fifty-nine (59) limit level exceedances for suspended solids (SS) of impact water quality monitoring were recorded in the reporting period. All action and limit level exceedances were concluded non-project related.
- A11. In this reporting period, 207 times of landfill gas monitoring were recorded at Wan Po Road (Ch0+390 Ch0+780). No action and limit level exceedance for methane, oxygen and carbon dioxide was recorded.
- A12. Weekly site inspections of the construction works were also carried out by ET to audit the mitigation measures implementation status. Thirteen (13) times of weekly Joint site inspections were carried out by ET and IEC.
- A13. A summary of the EM&A activities in this reporting period is listed in **Table I** and summary of the environmental exceedance of the reporting period is tabulated in **Table II**.

Tuble i Summary Tuble for Encerthed in the hepot ting i chou							
EM&A Activities	Jun 2023	Jul 2023	Aug 2023				
Noise Monitoring	N/A	N/A	N/A				
Water Quality Monitoring	1, 3, 6, 8, 10, 13, 15, 17, 20, 22, 24, 27 and 29 June 2023.	1, 4, 6, 8, 11, 13, 15, 18, 20, 22, 25, 27 and 29 July 2023	1, 3, 5, 8, 10, 12, 15, 17, 19, 22, 24, 26, 29 and 31 August 2023.				
Landfill Gas	1, 2, 3, 5, 6, 7, 8, 9, 10,	3, 4, 6, 7, 8, 10, 11, 12,	1, 2, 4, 5, 6, 7, 8, 9, 10,				

Table ISummary Table for EM&A Activities in the Reporting Period

3





monitoring	12, 13, 14, 15, 16, 17, 19, 20, 21, 23, 24, 26	13, 14, 15, 18, 19, 20, 21, 22, 24, 25, 26, 27,	11, 12, 13, 14, 15, 25, 26, 27, 28, 29 and 30
	27, 28, 29 and 30 June 2023	28, 29 and 31 July 2023	August 2023
Environmental Site Inspection	6, 13, 20 and 27 June 2023	4, 11, 18 and 25 July 2023	1, 8, 15, 22 and 29 August 2023

Table IISummary Table for Exceedance in the Reporting Period

Environmental Monitoring	Parameter	No. of non- Project related exceedanceALLL		Total No. of non-Project related exceedance	No. Proj relat exceed AL	of ect ted lance LL	Total No. of Project related exceedance
Noise	L _{eq (30min)}	N/A	N/A	N/A	N/A	N/A	N/A
Water	DO	0	0	0	0	0	0
	Turbidity	0	0	0	0	0	0
	SS	77	59	136	0	0	0
	рН	0	0	0	0	0	0
	Salinity	0	0	0	0	0	0
Landfill Gas	02	0	0	0	0	0	0
	CH ₄	0	0	0	0	0	0
	CO ₂	0	0	0	0	0	0

COMPLAINT HANDLING AND PROSECUTION

A14. No environmental complaint, notifications of summons or prosecution was received during the reporting period.

Reporting Change

A15. There was no change to be reported that may affect the on-going EM&A programme.

4



1. BASIC PROJECT INFORMATION

1.1. BACKGROUND

The Acciona Agua, S.A. Trading, Jardine Engineering Corporation Limited and China State Construction Engineering (Hong Kong) Limited and as AJC Joint Venture (AJCJV) is contracted to carry out the Design, Build and Operate First Stage of Tseung Kwan O Desalination Plant (DPTKO) under Contract No. 13/WSD/17 (the Contract).

Acuity Sustainability Consulting Limited (ASCL) is commissioned by AJCJV to undertake the Environmental Team (ET) services as required and/or implied, both explicitly and implicitly, in the Environmental Permit (EP), Environmental Impact Assessment Report (EIA Report) (Register No. AEIAR-192/2015) and Environmental Monitoring and Audit Manual (EM&A Manual) for the Contract; and to carry out the Environmental Monitoring and Audit (EM&A) programme in fulfillment of the EIA Report's EM&A requirements and Contract No. 13/WSD/17 Specification requirements.

Pursuant to the Environmental Impact Assessment Ordinance (EIAO), the Director of Environmental Protection granted the Environmental Permit (No. EP-01/503/2015) and Variation of Environmental Permit (No. EP-01/503/2015/A) to Water Supplies Department (WSD); and granted the Further Environmental Permit (No. FEP-01/503/2015/A) to AJCJV for the Contract.

1.2. The Reporting Scope

This is the 14th Quarterly EM&A Report for the Project which summarizes the key findings of the EM&A programme during the reporting period from 1 June 2023 to 31 August 2023.

1.3. PROJECT ORGANIZATION

The Project Organization structure for Construction Phase is presented in **Figure 1.1**.





Contact details of the key personnel are presented in **Table 1.1** below:

Table 1.1Contact Details of Key Personnel

Party	Position	Name	Telephone no.
Project Proponent	SE/CM2	Milton Law	2634-3573
Supervising Officer	Project Manager	Christina Ko	2608-7302
(Binnies Hong Kong Limited)	Chief Resident Engineer	Roger Wu	6343-1002
The Jardine Engineering	Project Manager	Stephen Yeung	2807-4665
Construction Engineering (Hong Kong) Limited and Acciona Agua, S.A. Trading	Environmental Monitoring Manager	Brian Kam	9456-9541
Acuity Sustainability Consulting Limited	Environmental Team Leader	Jacky Leung	2698-6833
ANewR Consulting Limited	Independent Environmental Checker (IEC)	Alex Chan	2618-2831

1.4. SUMMARY OF CONSTRUCTION WORKS

Details of the major construction activities undertaken in this reporting period are shown as below. The construction programme is presented in **Appendix A**.

Administration Building

- Carrying out the floor tiles works at 1/F and 2/F
- Installation of doors and handrails
- Construction of block wall in the pipe duct
- Installation of building services, cable laying, electrical switchboard

Chemical building

- Installation of permanent doors
- Construction of trunk load pits
- Underground utility construction work

Main Electrical & Central Chiller Plant Building

Installation of chillers, building services, electrical switchboard and cable laying
 ActiDAFF

• Underground utility construction work

- Installation of access covers on roof
- Construction of staircase no 2



• Erection and dismantling of scaffolding, installation of underdrain media and electrical equipment and installation of access covers on roof

Product Water Storage Tank Building

- Resin Injection Work & Water Test for Chlorine Contact Tank A
- Installation of cat ladders in Water Tanks
- Installation of metal cladding, building services, cable laying, mechanical equipment, steel pipe
- Underground utility construction
- Sealing slab opening

OSCG Building

- Installation of Design for Manufacturing and Assembly (DfMA) Panel and metal cladding
- Underground utility construction work
- Installation of building services, mechanical equipment, metal cladding and roller shutters and window

Reverse Osmosis Building

- Installation of building services, electrical switchboard, mechanical equipment, steel pipe, Glass Reinforced Plastics (GRP) pipe, pressure test of the GRP pipe, Membrane Loading, raised floor
- Installation of metal cladding, handrailing and louvers
- Underground utility construction work
- Pipe laying at corridor

Post Treatment Building

- Installation of louvres, cat ladders, handrailing and metal cladding
- Installation of building services, mechanical equipment and GRP pipe
- Underground utility construction work

Inspection corridor

• Construction of roof concrete slab and column and wall

 CO_2 Tanks

• Installation of pipes and building services

Combined Shaft and Pump room

- Underground utility construction work
- Installation of door, window and louver

Other

- Watermain works at CLP 132 kV Substation
- Concrete breaking, structure construction of Wave Deflector Wall at seawall area
- Foundation and staircases construction at elevated walkway
- Foot plinth concreting and barrier erection at flexible barrier
- Finial check of Marine Diffuser Pipe



1.5. SUMMARY OF ENVIRONMENTAL STATUS

A summary of the valid permits, licences, and /or notifications on environmental protection for this Project is presented in **Table 1.2**.

Table 1.2Summary of the Status of Valid Environmental Licence, Notification, Permit
and Documentations

	Valid	Period	Status	Damark			
Permit/ Licences	From	То	Status	NUIIIAI K			
Environmental Permit							
EP – 503/2015/A	Throughout	the Contract	Valid	-			
FEP – 01/503/2015/A	Throughout	the Contract	Valid	-			
Notification of Construction Regulation (Form NA)	Works under	the Air Pollut	ion Control (Const	ruction Dust)			
451539	Throughout	the Contract	Valid	-			
Billing Account for Disposal of Construction Waste							
7036276	Throughout the Contract		Valid	-			
Chemical Waste Producer Registration							
5213-839-A2987-01	Throughout	the Contract	Valid	-			
Wastewater Discharge Licer	nce (Land and	Marine works)				
WT00035775-2020	23/08/2021	31/07/2025	Valid	-			
WT00044188-2023	16/06/2023 30/06/2025		Valid	-			
Construction Noise Permit							
GW-RE1338-22	22/12/2022	21/06/2023	Valid (Expired from 1 July 2023)	-			
GW-RE0640-23	22/06/2023	21/12/2023	Valid	-			

The status for all environmental aspects is presented in Table 1.3

Table 1.3Summary of Status for Key Environmental Aspects under the EM&A Manual

Parameters	Status
Water Quality	
Baseline Monitoring under EM&A Manual	The baseline water quality monitoring was conducted between 12 May 2020 and 6 June 2020
Impact Monitoring	On-going
Noise	
Baseline Monitoring	The baseline noise monitoring result has been reported

8



Parameters	Status		
	in Baseline Monitoring Report and submitted to EPD		
	under EP Condition 3.4		
Impact Monitoring	Completed		
Waste Management			
Mitigation Measures in Waste Management Plan	On-going		
Landfill Gas			
RegularMonitoringwhenConstructionWorks are within the250mConsultationZone	In this reporting period, 207 times of landfill gas monitoring were recorded at Wan Po Road (Ch0+390 – Ch0+780). No exceedance of action or limit level for methane, oxygen and carbon dioxide was observed		
Environmental Audit			
Site Inspection covering Measures of Air Quality, Noise Impact, Water Quality, Waste, Ecological Quality, Fisheries, Landscape and Visual	On-going		

Other than the EM&A work by ET, environmental briefings, trainings and regular environmental management meetings were conducted, in order to enhance environmental awareness and closely monitor the environmental performance of the contractors.

The EM&A programme has been implemented in accordance with the recommendations presented in the approved EIA Report and the EM&A Manual. A summary of implementation status of the environmental mitigation measures for the construction phase of the Project during the reporting period is provided in **Appendix C**.



2. Noise

2.1. MONITORING REQUIREMENTS

To ensure no adverse noise impact, construction noise monitoring is recommended to be carried out within 300m radius from the nearby noise sensitive receivers (NSRs), during construction phase. The NSRs selected as monitoring station are (i) NSR4 – Creative Secondary School, (ii) NSR24 – PLK Laws Foundation College, and (iii) NSR31 – School of Continuing and Professional Studies – CUHK respectively.

No impact construction noise monitoring was conducted in the reporting period due to the overly distant monitoring station from the works location, where they were farther than 1 km from the closet monitoring station NSR4 to the works location.

2.2. MONITORING PARAMETERS, FREQUENCY AND DURATION

Construction noise level would be measured in terms of the A-weighted equivalent continuous sound pressure level (LAeq). Leq_{30min} was used as the monitoring parameter for the time period between 0700 and 1900 on normal weekdays. **Table 2.1** summarizes the monitoring parameters, frequency and duration of the impact noise monitoring.

Time	Duration	Interval	Parameters
Daytime: 0700-1900	Day time: 0700-1900 (during normal weekdays)	Continuously in $L_{eq 5min}/L_{eq 30min}$ (average of 6 consecutive $L_{eq 5min}$)	L _{eq 30min} L10 30min & L90 30min

Table 2.1Noise Monitoring Parameters, Time, Frequency and Duration

2.3. MONITORING LOCATIONS

The monitoring locations should normally be made at a point 1m from the exterior of the NSRs building façade and be at a position 1.2m above the ground. A correction of +3dB(A) should be made to the free-field measurements.

According to the environmental findings detailed in the EIA report and Baseline Monitoring Report, the designated locations for the construction noise monitoring are listed in **Table 2.2** below.

NSR ID	Noise Sensitive Receivers	Monitoring Location	Position		
NSR 4	Creative Secondary School	Roof Floor	1 m from facade		
NSR 24	PLK Laws Foundation College	Pedestrian Road on Ground Floor	Free-field		
NSR 31	School of Continuing and Professional Studies - CUHK	Roof Floor	1 m from facade		

Table 2.2Noise Sensitive Receivers



The monitoring locations should normally be made at a point 1m from the exterior of the NSRs building façade and be at a position 1.2m above the ground. A correction of +3dB(A) should be made to the free-field measurements. Three noise monitoring locations for impact monitoring at the nearby sensitive receivers are shown in **Figure 2.1-2.3**.







2.4. ACTION AND LIMIT LEVELS

The Action/Limit Levels are in line with the criteria of Practice Note for Professional Persons (ProPECC PN 2/93) "Noise from Construction Activities – Non-statutory Controls" and Technical Memorandum on Environmental Impact Assessment Process issued by HKSAR Environmental Protection Department ["EPD"] under the Environmental Impact Assessment Ordinance, Cap 499, S.16 are presented in **Table 2.3**.

Table 2.3 Action and Limit Levels for Construction Noise Monitoring per EM&A Manua
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Time Period	Action Level	Limit Level (dB(A))
0700-1900 on normal weekdays	When one documented complaint is received from any one of the noise sensitive receivers	 70 dB(A) for school and 65 dB(A) during examination period

Notes: Limits specified in the GW-TM and IND-TM for construction and operation noise, respectively.

If exceedances were found during noise monitoring, the actions in accordance with the Event and Action Plan shall be carried out according to **Appendix E**.



2.5. MONITORING RESULTS AND OBSERVATIONS

Referring to EM&A manual Section 4.1.2, the impact noise monitoring should be carried out when there are project-related construction activities undertaken within a radius of 300m from the monitoring stations. No noise monitoring station was located within a radius of 300m of the Project site as shown in **Figure 2.4**, no impact monitoring for noise impact was conducted in the reporting period.



Figure 2.4 Site Layout Plan with Noise Sensitive Receivers and Desalination Plant



3. WATER QUALITY

In accordance with the recommendations of the EIA, water quality monitoring is required during dredging for the submarine pipelines and, during operation phase. In addition, baseline water quality monitoring was conducted prior to the commencement of marine construction activities.

The following Section provides details of the water quality monitoring to be undertaken by the Environmental Team (ET) to verify the distance of sediment and brine plume dispersion and to identify whether the potential exists for any indirect impacts to occur to ecological sensitive receivers. The water quality monitoring programme was carried out to allow any deteriorating water quality to be readily detected and timely action taken to rectify the situation.

Water quality monitoring for the Project can be divided into the following stages:

- Dredging activities during construction phase;
- Discharge of effluent from main disinfection during construction phase;
- Operation phase first year upon commissioning; and,
- Continuous monitoring of effluent quality.

3.1. WATER QUALITY PARAMETERS

The parameters that have been selected for measurement in situ and in the laboratory are those that were either determined in the EIA to be those with the most potential to be affected by the construction works or are a standard check on water quality conditions. Parameters measured in the impact monitoring are listed in **Table 3.1**

Parameters	Unit	Abbreviation				
In-situ measurements						
Dissolved oxygen	mg/L	DO				
Temperature	٥C	-				
pH	-	-				
Turbidity	NTU	-				
Salinity	0/00	-				
Laboratory measurements						
Suspended Solids	mg/L	SS				

Table 3.1 Parameters measured in the impact marine water quality monitoring

In addition to the water quality parameters, other relevant data were measured and recorded in Water Quality Monitoring Logs, including the location of the sampling stations, water depth, time, weather conditions, sea conditions, tidal stage, current direction and velocity, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results.



3.2. MONITORING LOCATIONS

The impact water quality monitoring locations are detailed in **Table 3.2** and shown in **Figure 3.1** below.

Station	Easting	Northing Description						
CE	843550	815243	Upstream control station at ebb tide					
CF	846843	810193	Upstream control station at flood tide					
WSR1	846864	812014	Ecological sensitive receiver at Tung Lung Chau					
WSR2	847645	812993	Fisheries sensitive receiver at Tung Lung Chau					
WSR3	848023	813262	Ecological sensitive receiver at Tung Lung Chau					
WSR4	847886	814154	Ecological sensitive receiver at Tai Miu Wan					
WSR16	845039	815287	Ecological sensitive receiver at Fat Tong Chau					
WSR33	847159	814488	Ecological sensitive receiver at Tai Miu Wan					
WSR36	846878	814081	Ecological sensitive receiver at Kwun Tsai					
WSR37	846655	813810	Ecological sensitive receiver at Tit Cham Chau					
NF1	846542	813614	Edge of mixing zone, ~ 200m west of outfall diffuser					
NF2	846942	813614	Edge of mixing zone, ~ 200m east of outfall diffuser					
NF3	846742	813414	Edge of mixing zone, \sim 200m south of outfall diffuser					

 Table 3.2
 Location of Impact Water Quality Monitoring Station



Figure 3.1 Impact Water Quality Monitoring Locations under EM&A Manual

15



3.3. MONITORING EQUIPMENT, METHODOLOGY AND QA/QC PROCEDURES

The monitoring methodology, equipment used, and QA/QC procedures could be referred to Section 3.1.2 -3.1.4, 3.1.6-3.1.7 and 3.2 of the Monthly EM&A Report.

3.4. ACTION AND LIMIT LEVELS

The Action and Limit Levels have been set based on the derivation criteria specified in the EM&A Manual and based on the baseline water quality monitoring data and the derivation criteria, the Action/Limit Levels have been derived and are presented in **Table 3.3**.

Parameters	Action	Limit							
Construction Pha	se Impact Monitoring								
DO in mg/L	Surface and Middle	Surface and Middle							
	7.30 mg L ⁻¹	4 mg L ⁻¹							
	Bottom	Bottom							
	7.31 mg L ⁻¹	2 mg L ⁻¹							
	Tung Lung Chau Fish Culture Zone	Tung Lung Chau Fish Culture Zone							
	5.1 mgL ⁻¹ or level at control station	5.0 mgL ⁻¹ or level at control station							
	(Whichever the lower)	(Whichever the lower)							
SS in mg/L	5.00 mg L^{-1} or 20% exceedance of	6.00 mg L ⁻¹ or 30% exceedance of							
(Depth-	value at any impact station compared	value at any impact station							
averaged)	with corresponding data from control	compared with corresponding data							
	station	from control station							
Turbidity in NTU	2.41 NTU or 20% exceedance of value	2.84 NTU or 30% exceedance of							
(Depth-	at any impact station compared with	value at any impact station							
averaged)	corresponding data from control	compared with corresponding data							
	station	from control station							

Table 3.3	Derived Action and Limit Levels for Water Quality
Table 3.3	Delived Action and Linni Levels for water Quanty

Notes:

i. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.

ii. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.

iii. For Turbidity, SS, iron and Salinity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.



3.5. MONITORING RESULTS AND OBSERVATIONS

General water quality monitoring at the ten monitoring stations (CE, CF, WSR1, WSR2, WSR3, WSR4, WSR16, WSR33, WSR36 and WSR37) were conducted as scheduled in the reporting month.

Seventy-seven (77) of the general water quality monitoring results of suspended solids (SS) obtained had exceeded the Action Level. Fifty-nine (59) of the general water quality monitoring results of SS obtained during the reporting quarter had exceeded the Limit Level.

Investigation on the reason of exceedance has been carried out, where the exceedances of SS were concluded to be unrelated to the project. Details of the instigation could be referred to Monthly EM&A Report **Appendix O**.



		Parameter																				
Locat	ion	Sali	inity (r	opt)		Dissol	ved Ox	xygen (mg/L)			рH		Turb	oidity (NTU)	Su	spend	ed	Τe	emp. (°	C)
			y (1	1 5	Surfa	ce & M	iddle		Botton	1				,	Solids (mg/L)							
		Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug
	Avg.	33.1	33.0	32.7	8.8	9.1	8.9	8.8	9.1	8.9	8.3	8.3	8.3	2.7	2.7	2.5	3.5	3.4	3.5	27.1	27.6	27.5
CE	Min.	32.1	31.7	31.0	8.4	8.3	8.3	8.4	8.3	8.3	8.2	8.2	8.0	2.4	2.4	2.2	2.5	2.5	2.5	21.5	21.5	21.5
	Max	33.8	34.0	33.5	9.4	9.7	9.6	9.5	9.7	9.7	8.4	8.4	8.5	3.1	3.4	3.0	24.0	8.0	9.0	28.3	28.7	28.8
	Avg.	33.3	32.9	32.8	8.9	8.9	8.8	8.9	8.9	8.8	8.3	8.3	8.2	3.2	3.2	2.9	2.7	3.3	3.6	27.7	28.0	27.8
CF	Min.	32.1	31.6	31.7	8.4	8.2	8.5	8.5	8.3	8.5	8.1	8.1	8.1	2.9	2.8	2.6	2.5	2.5	2.5	27.1	26.7	27.0
	Max	34.1	33.8	34.1	9.5	9.7	9.5	9.6	9.6	9.5	8.4	8.4	8.4	3.6	3.7	3.4	6.0	8.0	8.0	28.5	28.9	28.5
	Avg.	33.1	33.0	32.7	8.9	8.9	9.0	8.9	8.9	9.0	8.3	8.3	8.2	2.2	2.1	2.1	3.0	3.2	4.0	27.6	27.9	28.0
WSR1	Min.	32.1	31.9	31.0	8.3	8.3	8.5	8.3	8.3	8.5	8.1	8.1	8.1	1.8	1.6	1.4	2.5	2.5	2.5	26.9	26.8	27.0
	Max	34.3	34.0	33.5	9.4	9.4	9.5	9.4	9.4	9.4	8.4	8.4	8.4	2.5	2.5	2.6	8.0	6.0	20.0	28.3	28.6	28.6
	Avg.	33.3	32.6	32.7	8.8	9.0	8.9	8.8	9.0	8.9	8.3	8.3	8.3	2.1	2.1	2.1	3.4	3.1	3.7	27.6	27.9	28.0
WSR2	Min.	32.2	31.0	30.8	8.4	8.5	8.3	8.4	8.6	8.4	8.2	8.2	8.1	1.7	1.6	1.7	2.5	2.5	2.5	27.0	26.9	27.2
	Max	34.3	33.8	33.9	9.4	9.6	9.5	9.4	9.6	9.5	8.4	8.5	8.4	2.5	2.5	2.7	21.0	7.0	9.0	28.4	28.6	28.8
	Avg.	33.3	32.8	32.9	8.8	9.0	8.9	8.8	9.0	9.0	8.3	8.3	8.2	2.1	2.1	2.1	3.3	3.0	3.4	27.6	27.9	28.0
WSR3	Min.	32.4	31.2	31.5	8.3	8.5	8.3	8.3	8.6	8.4	8.1	8.1	8.0	1.7	1.4	1.6	2.5	2.5	2.5	27.1	27.0	27.0
	Max	34.2	33.7	34.1	9.4	9.4	9.4	9.2	9.4	9.5	8.5	8.4	8.4	2.5	2.5	2.5	25.0	7.0	6.0	28.3	28.9	28.6
	Avg.	33.4	33.0	32.7	8.9	9.0	8.9	8.9	9.0	8.8	8.3	8.2	8.3	2.2	2.2	2.1	4.1	3.1	4.2	27.5	28.0	28.0
WSR4	Min.	32.4	31.2	31.5	8.3	8.3	8.1	8.3	8.3	8.2	8.1	8.1	8.1	1.7	1.6	1.4	2.5	2.5	2.5	26.8	27.0	27.0
	Max	34.3	34.2	34.3	9.4	9.4	9.6	9.4	9.5	9.4	8.5	8.4	8.4	2.6	2.6	2.6	27.0	7.0	24.0	28.4	28.8	28.7
	Avg.	33.3	33.0	32.6	8.8	8.7	8.9	8.8	8.7	8.9	8.3	8.3	8.2	2.2	2.2	2.1	2.8	3.2	3.6	27.5	28.0	28.0
WSR16	Min.	31.7	31.7	31.1	8.2	8.2	8.2	8.2	8.3	8.2	8.2	8.1	8.1	1.8	1.7	1.3	2.5	2.5	2.5	27.0	26.6	26.9
	Max	34.3	33.7	33.7	9.5	9.2	9.6	9.4	9.2	9.6	8.4	8.4	8.5	2.5	2.5	2.6	6.0	8.0	10.0	28.1	28.9	28.7
	Avg.	33.1	32.8	32.7	8.8	8.9	8.9	8.8	8.9	8.9	8.3	8.3	8.2	2.2	2.1	2.2	3.3	2.9	3.4	27.5	28.0	27.9
WSR33	Min.	32.3	31.8	31.3	8.3	8.4	8.4	8.3	8.4	8.3	8.2	8.1	8.1	1.8	1.7	1.5	2.5	2.5	2.5	26.9	27.3	27.3
	Max	33.9	33.9	33.6	9.6	9.7	9.5	9.6	9.7	9.5	8.4	8.5	8.5	2.6	2.5	2.5	25.0	6.0	21.0	28.4	28.5	28.7
	Avg.	33.2	32.8	32.5	8.9	8.8	8.9	8.9	8.8	8.9	8.3	8.3	8.2	2.1	2.2	2.1	2.7	3.1	3.1	27.4	28.0	28.0
WSR36	Min.	31.9	31.8	31.0	8.3	8.4	8.3	8.3	8.4	8.4	8.1	8.1	8.0	1.7	1.6	1.4	2.5	2.5	2.5	27.0	27.3	27.3
	Max	34.4	33.5	33.8	9.5	9.4	9.4	9.5	9.3	9.4	8.4	8.4	8.4	2.6	2.5	2.5	5.0	7.0	6.0	28.4	28.6	28.7
	Avg.	33.1	32.8	32.6	8.8	9.0	8.9	8.8	8.9	8.9	8.3	8.3	8.3	2.2	2.2	2.1	2.9	3.0	3.2	27.5	28.0	28.0
WSR37	Min.	32.2	31.6	31.7	8.4	8.4	8.3	8.4	8.4	8.2	8.1	8.1	8.1	1.8	1.5	1.5	2.5	2.5	2.5	26.9	27.0	27.0
	Max	34.3	33.8	33.7	9.4	9.8	9.4	9.3	9.7	9.4	8.4	8.4	8.5	2.6	2.6	2.6	5.0	8.0	7.0	28.5	28.7	28.7

 Table 3.4
 Summary of Regular Impact Water Quality Monitoring Results (Mid-Flood)



			F									Parameter										
Locat	ion	Sal	inity (r	ont)		Dissol	ved Ox	ygen (mg/L)			nН		Turb	idity (NTU)	Su	spend	ed	Τe	emp. (o	C)
20040				, p ()	Surfa	ice & M	iddle		Botton	1		F C C C				Soli	ds (mg	g/L)				
		Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug	Jun	Jul	Aug
	Avg.	33.2	32.8	32.5	8.9	9.0	8.9	8.9	9.1	8.9	8.3	8.3	8.2	3.1	3.1	2.9	2.7	3.4	3.3	27.4	28.0	27.9
CE	Min.	31.7	31.6	31.7	8.5	8.7	8.3	8.4	8.6	8.3	8.2	8.2	8.1	2.7	2.7	2.6	2.5	2.5	2.5	26.9	27.2	27.3
	Max	34.1	33.6	33.4	9.5	9.8	9.5	9.6	9.8	9.4	8.4	8.4	8.4	3.6	3.4	3.4	6.0	9.0	6.0	28.3	28.7	28.7
	Avg.	33.1	32.8	32.6	8.9	8.9	8.9	8.9	8.9	8.9	8.2	8.3	8.2	2.7	2.7	2.5	2.9	3.3	3.6	27.5	28.0	28.0
CF	Min.	32.3	31.3	31.3	8.4	8.3	8.1	8.4	8.3	8.1	8.1	8.1	8.0	2.2	2.2	2.2	2.5	2.5	2.5	27.0	27.0	27.2
	Max	33.9	34.1	33.7	9.2	9.5	9.4	9.2	9.5	9.4	8.5	8.4	8.4	3.0	3.0	2.9	18.0	9.0	9.0	28.3	28.7	28.9
	Avg.	33.1	32.5	32.4	9.0	9.1	9.1	9.0	9.1	9.1	8.3	8.3	8.2	2.2	2.1	2.1	3.3	3.2	3.7	27.3	27.9	28.0
WSR1	Min.	31.6	31.6	30.6	8.6	8.3	8.2	8.7	8.4	8.2	8.1	8.1	8.0	1.7	1.4	1.6	2.5	2.5	2.5	26.7	27.3	27.3
	Max	34.0	33.7	33.6	9.3	9.7	9.5	9.3	9.7	9.5	8.5	8.4	8.4	2.6	2.5	2.5	27.0	8.0	10.0	28.2	28.6	28.7
	Avg.	33.2	32.9	32.6	8.8	8.8	8.9	8.8	8.8	8.9	8.3	8.3	8.2	2.2	2.1	2.1	2.8	3.2	3.7	27.6	28.0	28.0
WSR2	Min.	32.2	31.7	31.2	8.3	8.3	8.3	8.3	8.3	8.2	8.1	8.2	8.0	1.7	1.6	1.7	2.5	2.5	2.5	26.9	27.2	27.2
	Max	33.9	34.2	33.7	9.3	9.5	9.6	9.3	9.6	9.5	8.4	8.4	8.4	2.5	2.5	2.5	7.0	8.0	11.0	28.3	29.0	28.8
	Avg.	33.2	32.8	32.6	8.7	9.0	9.0	8.7	9.0	8.9	8.2	8.3	8.2	2.2	2.2	2.2	3.0	3.1	3.6	27.5	28.1	28.1
WSR3	Min.	32.4	31.7	30.9	8.3	8.3	8.4	8.3	8.3	8.3	8.1	8.1	8.0	1.6	1.7	1.7	2.5	2.5	2.5	26.7	27.0	27.2
	Max	34.1	33.9	33.7	9.3	9.7	9.5	9.2	9.8	9.6	8.4	8.5	8.4	2.5	2.6	2.6	8.0	9.0	9.0	28.4	28.8	29.0
	Avg.	33.1	32.7	32.5	8.7	8.8	8.8	8.7	8.8	8.8	8.3	8.2	8.3	2.2	2.1	2.1	3.1	3.2	4.2	27.5	27.8	27.9
WSR4	Min.	32.0	31.6	30.6	8.2	8.3	8.3	8.3	8.4	8.4	8.1	8.2	8.1	1.8	1.6	1.7	2.5	2.5	2.5	26.9	26.6	26.6
	Max	34.1	34.1	34.1	9.3	9.6	9.3	9.2	9.6	9.3	8.5	8.4	8.4	2.5	2.5	2.5	9.0	7.0	28.0	28.4	28.6	28.8
	Avg.	33.2	32.8	32.5	8.8	9.0	8.9	8.8	9.0	8.9	8.3	8.2	8.2	2.2	2.1	2.1	3.1	3.1	3.9	27.5	28.0	27.9
WSR16	Min.	32.1	31.4	31.1	8.1	8.5	8.4	8.3	8.4	8.3	8.1	8.1	8.1	1.7	1.6	1.8	2.5	2.5	2.5	27.1	27.2	27.3
	Max	34.2	34.1	33.7	9.3	9.6	9.3	9.2	9.5	9.3	8.4	8.5	8.4	2.5	2.5	2.6	10.0	10.0	9.0	28.1	28.9	28.5
	Avg.	33.2	32.8	32.6	8.8	8.9	8.8	8.8	8.9	8.9	8.3	8.3	8.2	2.2	2.1	2.1	3.0	3.1	3.7	27.6	27.9	28.0
WSR33	Min.	32.1	31.1	31.1	8.2	8.3	8.6	8.2	8.3	8.6	8.1	8.1	8.1	1.7	1.5	1.7	2.5	2.5	2.5	27.2	26.9	26.9
	Max	34.1	33.8	33.8	9.6	9.6	9.3	9.5	9.6	9.4	8.4	8.4	8.4	2.5	2.5	2.5	9.0	8.0	23.0	28.2	29.0	28.7
	Avg.	33.2	32.9	32.4	8.7	8.9	8.9	8.7	8.9	8.9	8.2	8.3	8.2	2.2	2.1	2.0	3.0	3.2	3.7	27.4	27.9	28.0
WSR36	Min.	31.8	31.2	30.7	8.1	8.3	8.3	8.2	8.3	8.3	8.1	8.1	8.1	1.6	1.6	1.5	2.5	2.5	2.5	26.9	27.3	27.3
	Max	34.2	34.2	34.1	9.4	9.3	9.5	9.4	9.5	9.6	8.4	8.4	8.4	2.5	2.5	2.5	7.0	10.0	10.0	28.3	28.8	28.6
	Avg.	33.0	32.9	32.6	8.9	8.8	8.8	8.9	8.8	8.9	8.3	8.2	8.3	2.2	2.1	2.1	3.1	3.3	3.7	27.4	27.9	28.0
WSR37	Min.	32.2	31.9	30.6	8.4	8.3	8.3	8.3	8.3	8.3	8.1	8.1	8.1	1.8	1.5	1.4	2.5	2.5	2.5	26.8	26.9	26.9
	Max	33.9	33.7	33.5	9.4	9.3	9.3	9.5	9.3	9.5	8.4	8.4	8.5	2.5	2.5	2.4	10.0	10.0	9.0	28.4	28.9	28.9

Table 3.5 Summary of Regular Impact Water Quality Monitoring Results (Mid-Ebb)



4. WASTE

The waste generated from this Project includes inert construction and demolition (C&D) materials, and non-inert C&D materials. Non-inert C&D materials are made up of general refuse, vegetative wastes, and recyclable wastes such as plastics and paper/cardboard packaging waste. Steel materials generated from the project are also grouped into non-inert C&D materials as the materials were not disposed of with other inert C&D materials. With reference to relevant handling records and trip tickets of this Project, the quantities of different types of waste generated in the reporting period are summarized in **Table 4.1**. Details of cumulative waste management data are presented as a waste flow table in **Appendix G**.

Table 4.1Quantities of Waste Generated from the Project during reporting period

	Actu	ual Quantitie	s of Inert C&I	Actual Quantities of C&D Wastes Generated Monthly								
Reporting Months	Total Quantity Generated	Total Quantity enerated Hard Rock and Large Broken Concrete		Reused in other Projects	Disposed as Public Fill	Imported Fill	Metals	Paper / cardboard packaging	Plastics ⁽¹⁾	Chemical Waste	Others, e.g. general refuse	
	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	(in ,000kg)	
June 2023	1955.240	0.000	0.000	0.000	1955.240	0.000	0.000	0.000	1.700	0.000	189.680	
July 2023	121.060	0.000	0.000	0.000	121.060	0.000	0.008	0.150	0.042	0.000	186.110	
August 2023	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	168.22	

Notes: (1) Plastics refer to plastic bottles / containers, plastic sheets / foam from packaging material



5. LANDFILL GAS MONITORING

5.1. MONITORING REQUIREMENT

In accordance with Section 11 of the EM&A Manual, monitoring of landfill gas is required for construction works within the 250m Consultation Zone. Part of the desalination plant and the indicative area of natural slope mitigation works fall within the SENT Landfill Extension Consultation Zone; and part of the 1,200 mm diameter fresh water mains along Wan Po Road falls within the SENT Landfill and SENT Landfill Extension Consultation Zones, TKO Stage II/III Restored Landfill and TKO Stage I Restored Landfill Consultation Zones.

5.2. MONITORING LOCATION

Monitoring of oxygen, methane, carbon dioxide and barometric pressure was performed for excavations at 1m depth or more within the consultation Zone.

During construction of works within the consultation zones, excavations of 1m depth or more was monitored:

- At the ground surface before excavation commences;
- Immediately before any worker enters the excavation;
- At the beginning of each working day for the entire period the excavation remains open; and
- Periodically through the working day whilst workers are in the excavation.

For excavations between 300mm and 1m deep, measurements should be carried out:

- Directly after the excavation has been completed; and
- Periodically whilst the excavation remains open.

5.3. MONITORING PARAMETERS

LFG monitoring was carried out to identify any migration between the landfill and the Project and to ensure the safety of the construction, operation and maintenance personnel working onsite, visitors and any other person within the Project area.

The following parameters were monitored:

- Methane.
- Oxygen.
- Carbon Dioxide.
- Barometric Pressure.



5.4. MONITORING LOCATION

The area required to be monitored for landfill gas in the reporting period is shown in **Figure 5.1**.



5.5. ACTION AND LIMIT LEVEL

Action and Limit Level are provided in **Table 5.1**.

Table 5.1Action and Limit Level for Landfill Gas Monitoring

Parameters	Action Level	Limit Level					
Oxygen (O ₂)	<19% O ₂	<19% O ₂					
Methane (CH ₄)	>10% LEL	>20% LEL					
Carbon Dioxide (CO ₂)	>0.5% CO ₂	>1.5% CO ₂					

5.6. MONITORING EQUIPMENT

The monitoring equipment used in the reporting period could be referring to Section 5.10 - 5.11 of the Monthly EM&A Report.

5.7. MONITORING RESULTS AND OBSERVATIONS

In this reporting period, 207 times of landfill gas monitoring were recorded at Wan Po Road (Ch0+390 – Ch0+780). No exceedance of action and limit levels for methane, oxygen and carbon dioxide was observed. Monitoring was conducted during excavations at 1m depth or more within the consultation zone and whenever workers entered the excavation on the day. The Location Map for Landfill Gas Monitoring at TKO Area 137 are shown in **Figure 5.2** and **5.3**.





Figure 5.2 Location Map for Landfill Gas Monitoring at TKO Area 137 (-0+440 – -0+760)



Figure 5.3 Location Map for Landfill Gas Monitoring at TKO Area 137 (-0+740 - -1+060) 23



6. SUMMARY OF EXCEEDANCE, COMPLAINT, NOTIFICATION OF SUMMONS AND PROSECUTIONS

The Environmental Complaint Handling Procedure is shown in below **Figure 6.1**:



Figure 6.1 Environmental Complaint Handling Procedures

24



No noise monitoring was conducted during the reporting period since there are no Contractrelated construction activities undertaken within a radius of 300m from the monitoring locations. No Action Level exceedance was recorded during the reporting period.

The EM&A works for water quality were conducted during the reporting period in accordance with the EM&A Manual.

During the reporting period, seventy-seven (77) of the general water quality monitoring results of SS obtained had exceeded the Action Level. Fifty-nine (59) of the general water quality monitoring results of SS obtained during the reporting quarter had exceeded the Limit Level.

After investigation, all exceedances were considered non-project related.

In this reporting period, 207 times of landfill gas monitoring were recorded at Wan Po Road (Ch0+390 – Ch0+780). No exceedance of action and limit levels for methane, oxygen and carbon dioxide was observed. Monitoring was conducted during excavations at 1m depth or more within the consultation zone and whenever workers entered the excavation on the day.

ET will keep closely monitoring the performance of Contractor, implementation of water quality mitigation measure and other contamination issue around the Project site, to ensure the EM&A requirement is properly implemented.

No environmental complaint, notification of summons and prosecution was received in the reporting period.

Statistics on complaints and regulatory compliance are summarized in **Appendix H**.



7. EM&A SITE INSPECTION

Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures under the Contract.

Joint site inspections were also carried out by ET and IEC on 6, 13, 20, and 27 June 2023, 4, 11, 18 and 25 July 2023, and 1, 8, 15, 22 and 29 August 2023.

Minor deficiencies were observed during weekly site inspection. Key observations during the site inspections are summarized below:

- The Contractors are reminded to remove the chemical containers along the haul road of the open channel either proper storage or disposed to avoid possible leakage or contamination.
- Chemical containers found near the Chemical Building shall be stored on a drip tray to prevent leakage.
- The chemical containers found near mechanic workshop, combined Shaft area shall be properly stored or stored on a drip tray.
- The Chemical containers found near the R.O. Building shall be stored on a drip tray or proper storage.
- The chemical containers found near the R.O. Building shall store on a drip tray or provide proper storage to prevent leakage.

The Contractor has rectified the observations identified during environmental site inspections in the reporting period.

According to the EIA Study Report, Environmental Permit, contract documents and EM&A Manual, the mitigation measures detailed in the documents should be implemented as much as practical during the reporting period. An updated Implementation Status of Environmental Mitigation Measures (EMIS) is provided in **Appendix C**.



8. CONCLUSIONS AND RECOMMENDATIONS

This is the 14th Quarterly EM&A Report for the Project which summarizes the key findings of the EM&A programme during the reporting period from 1 June 2023 to 31 August 2023, in accordance with the EM&A Manual and the requirement under FEP-01/503/2015/A.

No noise monitoring was conducted in the reporting period due to the over distant monitoring station from the works location.

During the reporting period, seventy-seven (77) of the general water quality monitoring results of SS obtained had exceeded the Action Level. Fifty-nine (59) of the general water quality monitoring results of SS obtained during the reporting quarter had exceeded the Limit Level.

After investigation, all exceedances were considered non-project related.

In this reporting period, 207 times of landfill gas monitoring were recorded at Wan Po Road (Ch0+390 – Ch0+780). No exceedance of action and limit levels for methane, oxygen and carbon dioxide was observed. Monitoring was conducted during excavations at 1m depth or more within the consultation zone and whenever workers entered the excavation on the day.

Weekly environmental site inspection was conducted during the reporting period. Minor deficiency was observed during site inspection and was rectified. The environmental performance of the project was therefore considered satisfactory.

According to the environmental site inspections performed in the reporting period, the Contractor is reminded to pay attention on maintaining proper materials storage.

No environmental complaint, notification of summons or prosecution was received since commencement of the Contract.

The ET will keep track on the construction works to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.