MJTD

Thilawa Special Economic Zone (Zone A) Development

Environmental Monitoring Report (Operation Phase)

Myanmar Japan Thilawa Development Limited.

October 2017

CONTENTS

Appendix

MJTD

1. Executive Summary

The environmental inspection and compliance monitoring program will be implemented under the direction of Ministry of Natural Resources and Environmental Conservation with oversight by Thilawa SEZ Management Committee.

The monitoring record from April 2017 to September 2017 according to the Environment Monitoring Plan is submitted in conformity with the provision of Chapter 9.1, Table 9.1-2 and 9.2, Table 9.2-2 Content of the EIA Report of Thilawa SEZ Development Project (Zone A).

2. Summary of Monitoring Activities

a) Progress made to date on the implementation of the EMP against the submitted implementation schedule;

We already submitted EMP for TSEZ Zone-A as following table.

Report No.	Description	Phase	Submission
1	Environmental Monitoring Report	Phase-1 Operation Phase	April, 2016
2	Environmental Monitoring Report	Phase-1 Operation Phase	October, 2016
3	Environmental Monitoring Report	Phase-1 & 2 Operation Phase	April, 2017

Report (No.4) is submitted this day attached with Operation Phase implementation schedule. Subsequent Operation Phase reports will be submitted on Bi-Annually.

b) Difficulties encountered in implementing of the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties;

Required clear guideline for the reference and target standard of water (such as surface water, wastewater, ground water etc.) in order to report TSEZ discharging impact.

c) Number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation;

No.	Parameter	Type of Non-Compliance	Remedial Measures	Remarks
1	Suspended Solids	Exceed target value	Discussed with environmental consultant and expert for the monitoring points sources to analysis the effect and impact	Refer to the attached report of water and wastewater quality report in appendix
2	Total Coliform	Exceed target value		
3	Mercury	Exceed target	Investigating in progress	

d) **Accidents or incidents relating to the occupational and community health and safety, and the environment:**

There was seven cases of minor traffic accidents and no major traffic accident happened during monitoring period at Thilawa SEZ common area. Each tenant's accidents will report directly to Environmental Section, One Stop Service Center, Thilawa SEZ Management Committee.
There was one environmental related issue that is exceeding the mercury in the discharging water from the TSEZ Zone-A. The investigation process is implementing by expert consultant and will attached the detail investigation report in next environmental monitoring report after finalizing the investigation report.

e) **Monitoring data on environmental parameters and conditions as committed in the EMP or otherwise required.**
Please refer to the attached Environmental Monitoring Form.

3. Monitoring Result

Environmental Monitoring Plan report for Operation Phase implemented according to the following table, reference on Table 4.2-2, Chapter 4, EIA report.

Monitoring Plan (Operation Phase)

Category	Item	Location	Frequency	Remark
Air Quality	NO_2, SO_2, CO, TSP, PM_{10}	Representative one point inside of TSEZ Zone-A area	1 week each in dry and wet season	August 2017, Air quality monitoring report (Bi-Annually)
Water Quality	Water temperature, pH, SS, DO, BOD, COD, T-coliform T-N, T-P, Color and odor, HS, HCN, Oil and grease, Formaldehyde, Phenols, Cresols Free Chlorine, Zinc, Chromium, Arsenic, Copper, Mercury, Cadmium, Barium, Selenium, Lead and Nickel	Discharging points and reference points (7 points) which including outflow of retention pond to the river (1 point) Well in the Monastery (1 point)	Bi-monthly for water temperature, pH, SS, DO, BOD, COD, T-Colform, T-N, T-P, Color and odor Bi-annually for all parameters	April and August 2017, Water and waste water quality monitoring report (Bi-Monthly) June 2017, Water and wastewater quality monitoring report (Bi-Annually)
Waste	Status of non-hazardous waste management Status of hazardous waste management	Each tenant	Twice/ year (Submission of environmental reports by tenants	General waste disposal record (Waste generated from common area of TSEZ and Admin complex)
Noise and Vibration	Noise level at the monastery and residences to check effect of buffer zone for sound proofing to	Each tenant	One time in each dry and wet season (First 3 years after operation stage)	July 2017, Noise and vibration Monitoring Report (Bi-Annually)
Ground Subsidence	Ground elevation Consumption of ground water amount	Representative site (1 point)	Weekly	Refer to Environmental Monitoring form
Offensive Odor	Status offensive odor control by tenants	Each tenant	Twice/ year (Submission of environmental report by tenants)	Refer to Environmental Monitoring form

Category	Item	Location	Frequency	Remark
Bottom Sediment	Combined with water quality monitoring	Same as water quality monitoring	Same as water quality monitoring	Refer to Environmental Monitoring Form
Hydrological situation	Combined with ground subsidence monitoring	Same as ground subsidence monitoring	Same as ground subsidence monitoring	Refer to Environmental Monitoring Form
Risk for infectious disease such as AIDS/HIV	Status of measures of infectious disease	Each tenant	Twice/year (Submission of environmental report by tenants)	Refer to Environmental Monitoring Form
Working conditions (including occupational safety)	Prehension of condition of occupational safety and health Prehension of infectious disease	Work site	Twice/year (Submission of environmental report by tenants)	
Accident	Existence of accident	Work site	As occasion arise	Refer to Environmental Monitoring Form

*Remark: Each locator will report their monitoring result directly to Environmental Section, One Stop Service Center, Thilawa SEZ Management Committee.

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MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

Thilawa Special Economic Zone (Zone A)
Development Project (Operation Phase)

Environment Monitoring Form

Environment Monitoring Form

The latest results of the below monitoring items shall be submitted to Authorities on once at Pre-construction phase and on quarterly basis at Construction Phase, and on bi-annually base at Operation Phase. The items, standards to be applied, measurement points, and frequency for each monitoring parameter are established based on the EIA Report for Thilawa Special Economic Zone Development Project (Zone A). Should there be any changes to the original plan, such change shall be reviewed and evaluated by environmental expert.

(1) General

1) Phase of the Project

- Please mark the current phase.

□ Pre-Construction Phase □ Construction Phase ☑ Operation Phase

2) Obtainment of Environmental Permits (Not Applicable)

Name of permits	Expected issuance date	Actual issuance date	Concerned authority	Remarks (Conditions, etc.)
Confirming report of Environmental Impact Assessment		3rd December 2013	Thilawa SEZ Management Committee	
Attached approval letter: The case confirming report of Environmental Impact Assessment in First phase of Thilawa Specific Zone.				

3) Response/Actions to Comments and Guidance from Government Authorities and the Public (Not Applicable)

Monitoring Item	Monitoring Results during Report Period	Duration of Report Period	Frequency
Number and contents of formal comments made by the public		Same timing of submission of Monitoring Report	Upon receipt of comments/complaints
Number and contents of responses from Government agencies			

(2) Monitoring Results

1) Ambient/ Air Quality – August 2017

NO_2, SO_2, CO, TSP, PM10

Location	Item	Unit	Measured Value (Mean)	Measured Value (Min~Max.)	Country's Standard	Target value to be applied	*Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
Centralized Sewage treatment plant area	NO_2	ppm	0.032	0.002~0.077	Refer to NEQG	< 0.06	Japan	1 week each in dry and wet season	HAZSCANNER, EPAS	
	SO_2	ppm	0.008	0.000~0.026		< 0.04	Japan		HAZSCANNER, EPAS	
	CO	ppm	0.031	0.000~0.199		< 10	Japan		HAZSCANNER, EPAS	
	TSP	mg/m³	0.038	0.003~0.149		< 0.33	Thailand		HAZSCANNEIR, EPAS	
	PM10	mg/m³	0.014	0.001~0.054		< 0.12	Thailand		HAZSCANNER, EPAS	

*Remark: Referred to the Japan and Thailand Standard (EIA Report, Table 6.4-1)

Complains from Residents

- Are there any complains from residents regarding air quality in this monitoring period? □ Yes, ☑No

If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Complaints from Residents	Countermeasures

2)(a) Water Quality – April 2017

Measuring Point: Effluent of Wastewater (Thilawa SEZ discharging point which need to be monitored according to EIA are SW-1, SW-5 and SW-6. SW-2, SW-3 and SW-4 natural creek water which are combine all the wastewater from the Local industrial water and domestic water from existing living environment are attach as reference points only. GW-1 is also as reference point for monitoring of existing tube well located in the Monastery compound.)

- Are there any effluents to water body in this monitoring period? ☑ Yes, ☐ No

If yes, please attach "Analysis Record" and fill in the items not to comply with Refereed International Standard.

Location	Item	Unit	Measured Value	Country's Standard*3	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-1	pH	-	6.9	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	ppm	150.00	50	Max.30			APHA 2540D Method	
	DO	ppm	6.27	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	ppm	16.2	250	Max.70			APHA 5220D Method	
	BOD	ppm	8.14	50	Max.20			APHA 5210B Method	
	T-N	ppm	5.6	-	Max.80		Once in two months	HACH Method 10072	
	T-P	ppm	0.19	2	-			APHA 4500-PE	
	Color	Co.Pt	10.00	-	-			APHA 2120C	
	Odor	Co.Pt	1	-	-			APHA 2150B	
	Total coliforms*4	MPN/100ml	>1600000	400	Max.400	7.3*10³		APHA 9221B	
SW-5	pH	-	There is no water to sampling	6-9	5.0-9.0			Instrument Analysis Method	
	SS	ppm		50	Max.30	>=4	Once in two months	APHA 2540D Method	
	DO	ppm		-	-			Instrument Analysis Method	
	COD(Cr)	ppm		250	Max.70			APHA 5220D Method	

Location	Item	Unit	Measured Value	Country's Standard*a	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-5	BOD	ppm	There is no water	50	Max.20	7.5×10³		APHA-5210B Method	
	T-N	ppm		-	Max.80			HACH Method 10072	
	T-P	ppm		2	-			APHA 4500-PE	
	Color	Co.Pt		-	-			APHA 2120C	
	Odor	Co.Pt		-	-			APHA 2150B	
	Total coliforms	MPN/100ml		400	Max.400			APHA 9221B	
SW-6	pH	-	6.3	6-9	5.0-9.0	>=4	Once in two months	Instrument Analysis Method	
	SS	ppm	6.00	50	Max.30			APHA 2540D Method	
	DO	ppm	7.19	-	-			Instrument Analysis Method	
	COD(Cr)	ppm	9.8	250	Max.70			APHA 5220D Method	
	BOD	ppm	0.00	50	Max.20			APHA-5210B Method	
	T-N	ppm	8.2	-	Max.80			HACH Method 10072	
	T-P	ppm	<0.05	2	-			APHA 4500-PE	
	Color	Co.Pt	2.39	-	-			APHA 2120C	
	Odor	Co.Pt	1	-	-			APHA 2150B	
	Total coliforms	MPN/100ml	<1.8	400	Max.400	7.5×10³		APHA 9221B	

Location	Item	Unit	Measured Value	Country's Standard*3	Target value to be applied	*4Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-2 (Reference Point)	pH	-	7.0	6-9	5.0-9.0			Instrument Analysis Method	
	SS*1	ppm	156.00	50	Max.30			APHA 2540D Method	
	DO	ppm	8.57	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	ppm	19.5	250	Max.70			APHA 5220D Method	
	BOD	ppm	11.60	50	Max.20		Once in two months	APHA-5210B Method	
	T-N	ppm	2.6	-	Max.80			HACH Method 10072	
	T-P	ppm	0.24	2	-			APHA 4500-PE	
	Color	Co.Pt	19.20	-	-			APHA 2120C	
	Odor	Co.Pt	1	-	-			APHA 2150B	
	Total coliforms*2	MPN/100ml	>160000	400	Max.400			APHA 9221B	
SW-3 (Reference Point)	pH	-	6.8	6-9	5.0-9.0			Instrument Analysis Method	
	SS*1	ppm	412	50	Max.30			APHA 2540D Method	
	DO	ppm	7.76	-	-			Instrument Analysis Method	
	COD(Cr)	ppm	13.2	250	Max.70	>=4		APHA 5220D Method	
	BOD	ppm	6.72	50	Max.20			APHA-5210B Method	
	T-N	ppm	4.0	-	Max.80		Once in two months	HACH Method 10072	
	T-P	ppm	0.57	2	-			APHA 4500-PE	
	Color	Co.Pt	17.04	-	-			APHA 2120C	
	Odor	Co.Pt	1	-	-			APHA 2150B	
	Total coliforms*2	MPN/100ml	35000	400	Max.400			APHA 9221B	

Location	Item	Unit	Measured Value	Country's Standard*5	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-4 (Reference Point)	pH	-	6.8	6-9	5.0-9.0			Instrument Analysis Method	
	SS*5	ppm	302	50	Max.30			APHA 2540D Method	
	DO	ppm	7.38	-	-			Instrument Analysis Method	
	COD(Cr)	ppm	14.6	250	Max.70			APHA 5220D Method	
	BOD	ppm	8.00	50	Max.20	>=4	Once in two months	APHA-5210B Method	
	T-N	ppm	2.6	-	Max.60			HACH Method 10072	
	T-P	ppm	0.43	2	-			APHA 4500-PE	
	Color	Co.Pt	20.00	-	-			APHA 2120C	
	Odor	Co.Pt	1	-	-			APHA 2150B	
	Total coliforms*5	MPN/100ml	54000	400	Max.400			APHA 9221B	
GW-1 (Reference Point)	pH	-	7.3	None (Available Guideline value determined by MONREC)	None (Available Guideline Value determined by MOI)	5.5~9.0	Once in two months	Instrument Analysis Method	
	SS	ppm	8.00			50		APHA 2540D Method	
	DO	ppm	6.91			>=4		Instrument Analysis Method	
	COD(Cr)	ppm	4.6			60		APHA 5220D Method	
	BOD	ppm	3.69			15		APHA-5210B Method	
	T-N	ppm	1.4			0.1		HACH Method 10072	
	T-P	ppm	0.07			0.04		APHA 4500-PE	
	Color	Co.Pt	1.45			7.5×10³		APHA 2120C	
	Odor	Co.Pt	1					APHA 2150B	
	Total coliforms	MPN/100ml	23					APHA 9221B	

*1Remark: Referred to the Vietnam Standard (EIA Report), Reference to the Water Quality Monitoring Report, September 2016.

[7]Remark: In SW-1, suspended solids are higher than the standard due to the expected reason- surface water run-off from bare land in Zone A and influence by water from the downstream of the retention pond (SW-1) due to flow back by tide fluctuation. The result at the outlet or effluent of centralized wastewater treatment plant (SW-6) is complied with the standard and effluent from each locator were treated well by the centralized wastewater treatment plant.

[8]Remark: For reference monitoring points (SW-2, SW-3 and SW-4), the result of suspended solids is higher than the standard due to two expected reason: i) delivered from upstream area such as natural origin and wastewater from the local industrial zone which outside of Thilawa SEZ and ii) delivered from downstream area by tidal effect.

[9]Remark: In SW-1, Total coliform are higher than the standard due to the expected reason- i) the biggest expected reason might natural bacteria existed in all area of Zone A because there are various kinds of vegetation and creature such as birds, and small animals in and along the retention canals and retention ponds and ii) the second suspect might be influence by water from the downstream of retention pond (SW-1) due to flow back by tidal fluctuation. The result at the outlet or effluent of centralized wastewater treatment plant (SW-6) is complied with the standard and effluent from each locator were treated well by the centralized wastewater treatment plant.

[10]Remark: For reference monitoring points (SW-2, SW-3 and SW-4), the result of total coliforms is higher than the standard due to two expected reason: i) runoff of animal waste from the undeveloped area and delivered from local industrial zone and illegal dumping site from outside of Thilawa SEZ in the upstream area, and ii) delivered from downstream area by tidal effect.

[11]Remarks: There is no current country standard but refer from Ministry of Natural Recourses and Environmental Conservation submitted the National Emission Quality Guidelines (NEQG) for environmental guidelines.

2)(b) Water Quality – June 2017

Measuring Point: Effluent of Wastewater

- Are there any effluents to water body in this monitoring period? ☑ Yes, ☐ No

If yes, please attach "Analysis Record" and fill in the items not to comply with Refereed International Standard.

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1)Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-1	Temperature	°C	28.6	< 3 (increase)	Max 40			Instrument Analysis Method	
	pH	-	7.2	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	mg/l	90	50	Max 30			APHA 2540D Method	
	DO	mg/l	7.38	-	-	>=4		Instrument Analysis Method	
	BOD	mg/l	0.00	50	Max 20			APHA-5210B Method	
	COD(Cr)	mg/l	9.0	250	Max 70*			APHA 5220D Method	
	Total Coliform*3	MPN/100ml	160000	400	Max 400	7.5×10^3		APHA-9221B Method	
	T-N	mg/l	2.4	-	Max 80		Twice in one	HACH Method 10072	
	T-P	mg/l	<0.05	2	-		year	APHA 4500-P E Method	
	Color	Co Pt	3.50	-	Max 150			APHA-2120C Method	
	Odor	Co Pt	1	-	-			APHA-2150B Method	
	H_2S*4	mg/l	-	1	Max 1			HACH 8131 Method	
	Oil and Grease*5	mg/l	<3.1	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.120	-	Max 1			USEPA Method 420.1 Method	
	Phenols	mg/l	<0.002	0.5	Max 1			APHA 5120B	
	Free Chlorine*6	mg/l	1.9	0.2	Max 1			HACH 8131	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-1	Zinc	mg/l	0.06	2	Max 5			APHA-3120B Method	
	Chromium	mg/l	≤0.002	0.5	Max 0.5			APHA-3120B Method	
	Arsenic	mg/l	0.016	0.1	Max 0.25			APHA-3120B Method	
	Copper	mg/l	0.006	0.5	Max 1			APHA-3120B Method	
	Mercury*9	mg/l	0.006	0.01	Max 0.005			APHA-3120B Method	
	Cadmium	mg/l	≤0.001	0.1	Max 0.03		Twice in one	APHA-3120B Method	
	Barium	mg/l	0.038	-	Max 1		year	APHA-3120B Method	
	Selenium	mg/l	≤0.01	0.1	Max 0.02			APHA-3120B Method	
	Lead	mg/l	0.012	0.1	Max 0.2			APHA-3120B Method	
	Nickel	mg/l	0.036	0.5	Max 0.2			HACH 8037 Method	
	Cyanide*9	mg/l	0.018	1	Max 1			APHA 4500 CL G Method	
SW-3	Temperature	℃	30.0	< 3 (increase)	Max 40			Instrument Analysis Method	
	pH	-	7.9	6-9	5.0-9.0			Instrument Analysis Method	
	SS*3	mg/l	120	50	Max 30			APHA 2540D Method	
	DO	mg/l	6.59	-	-	>=4		Instrument Analysis Method	
	BOD	mg/l	0.00	50	Max 20			APHA-5210B Method	
	COD(Cr)	mg/l	9.0	250	Max 70*7		Twice in one	APHA 5220D Method	
	Total Coliform*3	MPN/100ml	>1x10000	400	Max 400	7.5x10³	year	APHA-9221B Method	
	T-N	mg/l	3.8	-	Max 80			HACH Method 10072	
	T-P	mg/l	<0.05	2	-			APHA 4500-P E Method	
	Color	Co/Pt	7.64	-	Max 150			APHA-2120C Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
	Odor	Co Pt	1	-	-			APHA-2150B Method	
SW-5	HS	mg/l	-	1	Max 1			HACH 8131 Method	
	Oil and Grease	mg/l	<3.1	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.165	-	Max 1			USEPA Method 420.1 Method	
	Phenols	mg/l	<0.002	0.5	Max 1			APHA 3120B	
	Free Chlorine**	mg/l	2.4	0.2	Max 1			HACH 8131	
	Zinc	mg/l	0.048	2	Max 5			APHA-3120B Method	
	Chromium	mg/l	≤0.002	0.5	Max 0.5			APHA-3120B Method	
	Arsenic	mg/l	0.02	0.1	Max 0.25		Twice in one	APHA-3120B Method	
	Copper	mg/l	0.104	0.5	Max 1		year	APHA-3120B Method	
	Mercury**	mg/l	0.008	0.01	Max 0.005			APHA-3120B Method	
	Cadmium	mg/l	≤0.001	0.1	Max 0.03			APHA-3120B Method	
	Barium	mg/l	0.05	-	Max 1			APHA-3120B Method	
	Selenium	mg/l	≤0.01	0.1	Max 0.02			APHA-3120B Method	
	Lead	mg/l	0.018	0.1	Max 0.2			APHA-3120B Method	
	Nickel	mg/l	0.046	0.5	Max 0.2			HACH 8027 Method	
	Cyanide	mg/l	0.027	1	Max 1			APHA 4500 CL G Method	
SW-6	Temperature	°C	28.7	< 3 (increase)	Max 40			Instrument Analysis Method	
	pH	-	7.3	6-9	5.0-9.0			Instrument Analysis Method	
	SS	mg/l	4	50	Max 30		Twice in one	APHA 2540D Method	
	DO	mg/l	6.80	-	-	>=4	year	Instrument Analysis Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-6	BOD	mg/l	3.41	50	Max 20			APHA-5210B Method	
	COD(Cr)	mg/l	6.1	250	Max 70*			APHA 5220D Method	
	Total Coliform	MPN/100ml	<1.8	400	Max 400	7.5×10³		APHA-9221B Method	
	T-N	mg/l	4.4	-	Max 80			HACH Method 10072	
	T-P	mg/l	<0.05	2	-			APHA 4500-P E Method	
	Color	Co.Pt	2.10	-	Max 150			APHA-2120C Method	
	Odor	-	1	-	-			APHA-2130B Method	
	HS	mg/l	-	1	Max 1			HACH 8131 Method	
	Oil and Grease	mg/l	<1.1	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	<0.003	-	Max 1			USEPA Method 420.1 Method	
	Phenols	mg/l	0.017	0.5	Max 1		Twice in one year	APHA 3120B	
	Free Chlorine	mg/l	0.1	0.2	Max 1			HACH 8131	
	Zinc	mg/l	≤0.002	2	Max 5			APHA-3120B Method	
	Chromium	mg/l	≤0.002	0.5	Max 0.5			APHA-3120B Method	
	Arsenic	mg/l	≤0.01	0.1	Max 0.25			APHA-3120B Method	
	Copper	mg/l	≤0.002	0.5	Max 1			APHA-3120B Method	
	Mercury	mg/l	≤0.002	0.01	Max 0.005			APHA-3120B Method	
	Cadmium	mg/l	≤0.001	0.1	Max 0.01			APHA-3120B Method	
	Barium	mg/l	0.018	-	Max 1			APHA-3120B Method	
	Selenium	mg/l	≤0.01	0.1	Max 0.02			APHA-3120B Method	
	Lead	mg/l	≤0.002	0.1	Max 0.2			APHA-3120B Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-6	Nickel	mg/l	0.002	0.5	Max 0.2			HACH 8027 Method	
	Cyanide	mg/l	0.004	1	Max 1			APHA 4500 CL G Method	
SW-2 (Reference Point)	Temperature	°C	26.8	< 3 (increase)	Max 40			Instrument Analysis Method	
	pH	-	7.3	6-9	5.0-9.0			Instrument Analysis Method	
	SS*3	mg/l	38	50	Max 30			APHA 2540D Method	
	DO	mg/l	4.43	-	-	>=4		Instrument Analysis Method	
	BOD	mg/l	1.71	50	Max 20			APHA-5210B Method	
	COD(Cr)	mg/l	21.5	250	Max 70*4			APHA 5220D Method	
	Total Coliform*3	MPN/100ml	92000	400	Max 400	7.5×10³		APHA-9221B Method	
	T-N	mg/l	1.9	-	Max 80			HACH Method 10072	
	T-P	mg/l	<0.05	2	-			APHA 4500-P E Method	
	Color	Co.Pt	64.79	-	Max 150		Twice in one year	APHA-2120C Method	
	Odor	-	1	-	-			APHA-2150B Method	
	HS	mg/l	-	1	Max 1			HACH 8131 Method	
	Oil and Grease*3	mg/l	4.73	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.052	-	Max 1			USEPA Method 420.1 Method	
	Phenols	mg/l	<0.002	0.5	Max 1			APHA 3120B	
	Free Chlorine	mg/l	0.5	0.2	Max 1			HACH 8131	
	Zinc	mg/l	≤0.002	2	Max 5			APHA-3120B Method	
	Chromium	mg/l	≤0.002	0.5	Max 0.5			APHA-3120B Method	
	Arsenic	mg/l	0.010	0.1	Max 0.25			APHA-3120B Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-2 (Reference Point)	Copper	mg/l	≤0.002	0.5	Max 1		Twice in one year	APHA-3120B Method	
	Mercury	mg/l	≤0.002	0.01	Max 0.005			APHA-3120B Method	
	Cadmium	mg/l	≤0.001	0.1	Max 0.03			APHA-3120B Method	
	Barium	mg/l	0.018	-	Max 1			APHA-3120B Method	
	Selenium	mg/l	≤0.01	0.1	Max 0.02			APHA-3120B Method	
	Lead	mg/l	0.004	0.1	Max 0.2			APHA-3120B Method	
	Nickel	mg/l	0.008	0.5	Max 0.2			HACH 8027 Method	
	Cyanide	mg/l	0.026	1	Max 1			APHA 4500 CL G Method	
SW-3 (Reference Point)	Temperature	°C	27.9	<3 (increase)	Max 40		Twice in one year	Instrument Analysis Method	
	pH	-	6.9	6-9	5.0-9.0			Instrument Analysis Method	
	SS*1	mg/l	70	50	Max 30			APHA 2540D Method	
	DO	mg/l	3.58	-	-	>=4		Instrument Analysis Method	
	BOD	mg/l	0.00	50	Max 20			APHA-5210B Method	
	COD(Cr)	mg/l	11.3	250	Max 70*2			APHA 5220D Method	
	Total Coliform*3	MPN/100ml	35000	400	Max 400	7.5×10³		APHA-9221B Method	
	T-N	mg/l	2.0	-	Max 80			HACH Method 10072	
	T-P	mg/l	<0.05	2	-			APHA 4500-P E Method	
	Color	Co.Pt	27.49	-	Max 150			APHA-2120C Method	
	Odor	-	1	-	-			APHA-2150B Method	
	HS	mg/l	-	1	Max 1			HACH 8131 Method	
	Oil and Grease*3	mg/l	<3.1	10	Max 5	3		APHA-5520B Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-3 (Reference Point)	Formaldehyde	mg/l	0.092	-	Max 1		Twice in one year	USEPA Method 420.1 Method	
	Phenols	mg/l	0.008	0.5	Max 1			APHA 5120B	
	Free Chlorine	mg/l	1.0	0.2	Max 1			HACH 8131	
	Zinc	mg/l	0.012	2	Max 5			APHA-3120B Method	
	Chromium	mg/l	≤0.002	0.5	Max 0.5			APHA-3120B Method	
	Arsenic	mg/l	0.010	0.1	Max 0.25			APHA-3120B Method	
	Copper	mg/l	0.002	0.5	Max 1			APHA-3120B Method	
	Mercury	mg/l	≤0.002	0.01	Max 0.005			APHA-3120B Method	
	Cadmium	mg/l	≤0.001	0.1	Max 0.03			APHA-3120B Method	
	Barium	mg/l	0.028	-	Max 1			APHA-3120B Method	
	Selenium	mg/l	≤0.01	0.1	Max 0.02			APHA-3120B Method	
	Lead	mg/l	0.004	0.1	Max 0.2			APHA-3120B Method	
	Nickel	mg/l	0.016	0.5	Max 0.2			HACH 8027 Method	
	Cyanide	mg/l	0.023	1	Max 1			APHA 4500 CL G Method	
SW-4 (Reference Point)	Temperature	°C	28.2	< 3 (increase)	Max 40		Twice in one year	Instrument Analysis Method	
	pH	-	7.1	6-9	5.0-9.0			Instrument Analysis Method	
	SS*1	mg/l	82	50	Max 30			APHA 2540D Method	
	DO	mg/l	6.86	-	-	>=4		Instrument Analysis Method	
	BOD	mg/l	2.99	50	Max 20			APHA-5210B Method	
	COD(Cr)	mg/l	11.6	250	Max 70*2			APHA 5220D Method	
	Total Coliform*3	MPN/100ml	54000	400	Max 400	7.5×10³		APHA-9221B Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
	T-N	mg/l	1.7	-	Max 80			HACH Method 10072	
	T-P	mg/l	<0.05	2	-			APHA 4500-P E Method	
	Color	Co.Pt	26.75	-	Max 150			APHA-2120C Method	
	Odor	-	1	-	-			APHA-2150B Method	
	HS	mg/l	-	1	Max 1			HACH 8131 Method	
	Oil and Grease	mg/l	<3.1	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.088	-	Max 1			USEPA Method 420.1 Method	
SW-4	Phenols	mg/l	<0.002	0.5	Max 1			APHA 5120B	
(Reference	Free Chlorine*1	mg/l	1.3	0.2	Max 1		Twice in one	HACH 8131	
Point)	Zinc	mg/l	0.004	2	Max 5		year	APHA-3120B Method	
	Chromium	mg/l	≤0.002	0.5	Max 0.5			APHA-3120B Method	
	Arsenic	mg/l	≤0.01	0.1	Max 0.25			APHA-3120B Method	
	Copper	mg/l	0.002	0.5	Max 1			APHA-3120B Method	
	Mercury	mg/l	≤0.002	0.01	Max 0.005			APHA-3120B Method	
	Cadmium	mg/l	≤0.001	0.1	Max 0.03			APHA-3120B Method	
	Barium	mg/l	0.024	-	Max 1			APHA-3120B Method	
	Selenium	mg/l	≤0.01	0.1	Max 0.02			APHA-3120B Method	
	Lead	mg/l	0.004	0.1	Max 0.2			APHA-3120B Method	
	Nickel	mg/l	0.016	0.5	Max 0.2			HACH 8027 Method	
	Cyanide	mg/l	0.021	1	Max 1			APHA 4500 CL G Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
GW-1	Temperature	℃	32.5	None	Max 40			Instrument Analysis Method	
(Reference	pH	-	7.9	(Available	5.0-9.0			Instrument Analysis Method	
Point)	SS	mg/l	6	Guideline	Max 30			APHA 2540D Method	
	DO	mg/l	7.08	value	-	>=4	Twice in one	Instrument Analysis Method	
	BOD	mg/l	2.75	determined by	Max 20		year	APHA-5210B Method	
	COD(Cr)	mg/l	6.4	MONREC)	Max 70*			APHA 5220D Method	
	Total Coliform	MPN/100ml	240		Max 400	7.5×10^3		APHA-9221B Method	
	T-N	mg/l	1.5		Max 80			HACH Method 10072	
	T-P	mg/l	0.804		-			APHA 4500-P E Method	
	Color	Co.Pt	2.76		Max 150			APHA-2120C Method	
	Odor	-	1		-			APHA-2150B Method	
	HS	mg/l	-		Max 1			HACH 8131 Method	
	Oil and Grease	mg/l	<0.1		Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	<0.005		Max 1			USEPA Method 420.1 Method	
	Phenols	mg/l	<0.002		Max 1			APHA 5120B	
	Free Chlorine	mg/l	0.1		Max 1			HACH 8131	
	Zinc	mg/l	≤0.002		Max 5			APHA-3120B Method	
	Chromium	mg/l	≤0.002		Max 0.5			APHA-3120B Method	
	Arsenic	mg/l	≤0.01		Max 0.25			APHA-3120B Method	
	Copper	mg/l	≤0.002		Max 1			APHA-3120B Method	
	Mercury	mg/l	≤0.002		Max 0.005			APHA-3120B Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
GW-1	Cadmium	mg/l	≤0.001		Max 0.03		Twice in one	APHA-3120B Method	
(Reference	Barium	mg/l	0.078		Max 1		year	APHA-3120B Method	
Point)	Selenium	mg/l	≤0.01		Max 0.02			APHA-3120B Method	
	Lead	mg/l	≤0.002		Max 0.2			APHA-3120B Method	
	Nickel	mg/l	≤0.002		Max 0.2			HACH 8037 Method	
	Cyanide	mg/l	0.004		Max 1			APHA 4500 CL G Method	

*1Remark: Referred to the Vietnam Standard (EIA Report), Reference to the Water Quality Monitoring Report, October 2016.

*2Remark: In SW-1 and SW-5, suspended solids are higher than the standard due to the expected reason- surface water run-off from bare land in Zone A and influence by water from the downstream of retention pond (SW-1) and retention canal (SW-5) due to flow back by tidal fluctuation. The result at the outlet or effluent of centralized wastewater treatment plant (SW-6) is complied with the standard and effluent from each locator were treated well by the centralized wastewater treatment plant.

*3Remark: For reference monitoring points (SW-2, SW-3 and SW-4), the result of suspended solid are higher than the standard due to two expected reason: i) delivered from upstream area such as natural origin and wastewater from the other industrial area outside of Thilawa SEZ and ii) delivered from downstream area by tidal effect.

*4Remark: In SW-1 and SW-5, Total coliform are higher than the standard due to the expected reason- i) the biggest expected reason might natural bacteria existed in all area of Zone A because there are various kinds of vegetation and creature such as birds and small animals in and along the retention canals and retention pond and the second suspect might be influence by water from the downstream of retention pond (SW-1) and retention canal (SW-5) due to flow back by tidal fluctuation.

*5Remark: For reference monitoring points (SW-2, SW-3 and SW-4), the result of total coliform is higher than the standard due to two expected reason: i) runoff of animal waste from the undeveloped area ad delivered from industrial from local industrial zone and illegal dumping site from outside of Thilawa SEZ in the upstream area and ii) delivered from downstream area by tidal effect.

*6Remark: In SW-1 and SW-5, Free chlorine is higher than the standard due to the expected reason - the result of the free chlorine has a possibility of positive interference from foreign substances in sample. If the water sample containing high turbidity, color and oil and grease, the analysis of free chlorine might be affected as positive interference. The analysis methods commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results.

Remark: For reference monitoring points (SW-4), the result of free chlorine is higher than the standard due to the expected reason- the possibility of positive interference from foreign substances in sample. If the water sample contained high level of turbidity, color and oil and grease, the analysis of free chlorine might be affected as positive interference. These analysis methods commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results.

*1Remark: In SW-1 and SW-5, Mercury is higher than the standard due to the expected reason – i) some factories in Thilawa SEZ Zone-A might be utilized products using mercury and might be spillage to the retention canal and retention pond accidentally, ii) mercury contaminated soil might be existing and might be eluted by rainwater and iii) any error in the water analysis process. The detail investigation process on going for official report to submit separately.

2)(c) Water Quality – August 2017

Measuring Point: Effluent of Wastewater

- Are there any effluents to water body in this monitoring period? ☑ Yes, □ No

If yes, please attach "Analysis Record" and fill in the items not to comply with Refereed International Standard.

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-1	pH	-	8.1	6-9	5.0-9.0			Instrument Analysis Method	
	SS*1	ppm	284	50	Max.50			APHA 2540D Method	
	DO	ppm	4.4	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	ppm	8.5	250	Max.70			APHA 5220D Method	
	BOD	ppm	15.20	50	Max.20		Once in two month	APHA-5210B Method	
	T-N	ppm	14.0	-	Max.80			HACH Method 10072	
	T-P	ppm	0.132	2	-			APHA 4500-P E Method	
	Color	Co.Pt	4.55	-	-	7.5×10^{5}		APHA 2120C Method	
	Odor	Co.Pt	1	-	-			APHA 2150B Method	
	Total coliforms*1	MPN/100ml	>160000	400	Max.400			APHA 9221B Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-5	pH*	-	9.9	6-9	5.0-9.0			Instrument Analysis Method	
	SS*	ppm	1506	50	Max.30			APHA 2540D Method	
	DO	ppm	4.3	-	-			Instrument Analysis Method	
	COD(Cr)	ppm	35.0	250	Max.70			APHA 5220D Method	
	BOD	ppm	14.49	50	Max.20	>=4	Once in two month	APHA-5210B Method	
	T-N	ppm	8.9	-	Max.80			HACH Method 10072	
	T-P	ppm	0.166	2	-			APHA 4500-P E Method	
	Color	Co.Pt	18.53	-	-			APHA 2120C Method	
	Odor	Co.Pt	1	-	-			APHA 2150B Method	
	Total coliforms*	MPN/100ml	160000	400	Max.400	7.5×10^3		APHA 9221B Method	
SW-6	pH	-	7.3	6-9	5.0-9.0			Instrument Analysis Method	
	SS	ppm	8	50	Max.30			APHA 2540D Method	
	DO	ppm	5.2	-	-			Instrument Analysis Method	
	COD(Cr)	ppm	2.4	250	Max.70			APHA 5220D Method	
	BOD	ppm	0.00	50	Max.20	>=4	Once in two month	APHA-5210B Method	
	T-N	ppm	6.8	-	Max.80			HACH Method 10072	
	T-P	ppm	<0.05	2	-			APHA 4500-P E Method	
	Color	Co.Pt	0.00	-	-			APHA 2120C Method	
	Odor	Co.Pt	1.4	-	-			APHA 2150B Method	
	Total coliforms	MPN/100ml	<1.8	400	Max.400	7.5×10^3		APHA 9221B Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-2 (Reference Point)	pH	-	7.2	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	ppm	100	50	Max.30			APHA 2540D Method	
	DO	ppm	4.2	-	-			Instrument Analysis Method	
	COD(Cr)	ppm	12.4	250	Max.70			APHA 5220D Method	
	BOD	ppm	2.32	50	Max.20	>=4	Once in two month	APHA-5210B Method	
	T-N	ppm	1.1	-	Max.80			HACH Method 10072	
	T-P	ppm	0.086	2	-			APHA 4500-P E Method	
	Color	Co.Pt	21.41	-	-			APHA 2120C Method	
	Odor	Co.Pt	1	-	-			APHA 2150B Method	
	Total coliforms*3	MPN/100ml	>160000	400	Max.400			APHA 9221B Method	
SW-3 (Reference Point)	pH	-	7.2	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	ppm	110	50	Max.30			APHA 2540D Method	
	DO	ppm	4.6	-	-			Instrument Analysis Method	
	COD(Cr)	ppm	7.1	250	Max.70	>=4		APHA 5220D Method	
	BOD	ppm	10.36	50	Max.20			APHA-5210B Method	
	T-N	ppm	2.3	-	Max.80		Once in two month	HACH Method 10072	
	T-P	ppm	0.188	2	-			APHA 4500-P E Method	
	Color	Co.Pt	15.63	-	-			APHA 2120C Method	
	Odor	Co.Pt	1	-	-			APHA 2150B Method	
	Total coliforms*3	MPN/100ml	>160000	400	Max.400			APHA 9221B Method	

Location	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-4 (Reference Point)	pH	-	7.4	6-9	5.0-9.0			Instrument Analysis Method	
	SS*1	ppm	138	50	Max.50			APHA 2540D Method	
	DO	ppm	4.6	-	-			Instrument Analysis Method	
	COD(Cr)	ppm	8.1	250	Max.70			APHA 5220D Method	
	BOD	ppm	3.86	50	Max.20	>=4	Once in two month	APHA-5210B Method	
	T-N	ppm	1.7	-	Max.80			HACH Method 10072	
	T-P	ppm	0.26	2	-			APHA 4500-P E Method	
	Color	Co.Pt	11.9	-	-			APHA 2120C Method	
	Odor	Co.Pt	1	-	-			APHA 2150B Method	
	Total coliforms*1	MPN/100ml	>160000	400	Max.400			APHA 9221B Method	
GW-1 (Reference Point)	pH	-	8.1	None (Available Guideline value determined by MONREC)	None (Available Guideline Value determined by MOI)	5.5-9.0	Once in two month	Instrument Analysis Method	
	SS	ppm	10			50		APHA 2540D Method	
	DO	ppm	5.13			>=4		Instrument Analysis Method	
	COD(Cr)	ppm	4.8			60		APHA 5220D Method	
	BOD	ppm	2.36			15		APHA-5210B Method	
	T-N	ppm	1.7			-		HACH Method 10072	
	T-P	ppm	0.125			-		APHA 4500-P E Method	
	Color	Co.Pt	2.72			-		APHA 2120C Method	
	Odor	Co.Pt	1			-		APHA 2150B Method	
	Total coliforms*	MPN/100ml	160000			7.5*10³		APHA 9221B Method	

*Remark: Referred to the Vietnam Standard (EIA Report).

*Remark: In SW-1 and SW-5, suspended solids are higher than the standard due to the expected reason- surface water run-off from bare land in Zone A and influence by water from the downstream of retention pond (SW-1) and retention canal (SW-5) due to flow back by tidal fluctuation. The result at the outlet or effluent of centralized wastewater treatment plant (SW-6) is complied with the standard and effluent from each locator were treated well by the sewage treatment plant.

*Remark: For reference monitoring points (SW-2, SW-3 and SW-4), the result of suspended solids is higher than the standard due to two expected reason: i) delivered from upstream area such as natural origin and wastewater from the local industrial zone which outside of Thilawa SEZ and ii) delivered from downstream area by tidal effect.

*Remark: In SW-1 and SW-5, Total coliform are higher than the standard due to the expected reason- i) the biggest expected reason might natural bacteria existed in all area of Zone-A because there are various kinds of vegetation and creature such as birds and small animals in and along the retention canals and retention ponds and ii) the second suspect might be influence by water from the downstream of retention pond (SW-1) and retention canal (SW-5) due to flow back by tidal fluctuation. The result at the outlet or effluent of centralized wastewater treatment plant (SW-6) is complied with the standard and effluent from each locator were treated well by the sewage treatment plant.

*Remark: For reference monitoring points (SW-2, SW-3 and SW-4), the result of total coliforms is higher than the standard due to two expected reason: i) runoff of animal waste from the undeveloped area and delivered from local industrial zone and illegal dumping site from outside of Thilawa SEZ in the upstream area and ii) delivered from downstream area by tidal effect.

*Remark: For reference monitoring point (GW-1), the result of total coliform is higher than the standard due to expected reason for exceeding is infiltration of wastewater from toilet wastewater and/or animal waste.

*Remark: In SW-5, pH is higher than the standard due to the expected reason- i) might be rainwater polluted with concrete washout water discharge from construction sites of Zone-A, ii) might be domestic wastewater discharge that contains detergents and soap-based products and iii) might be due to natural origin.

3) Soil Contamination (only operation phase)

Situations environmental report from tenants

- Are there any serious issues regarding soil contamination in this monitoring period? □ Yes, ☑No

If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Issues on Soil Contamination	Countermeasures

*Remark: There is soil contamination issue and make regular monitoring the soil contamination survey in attached report of January 2017.

4) Noise

Remarks: According to EIA report, Chapter 4- Table 4-2.2, monitoring plan is one time each in dry and wet season (First 3 years after operation stage). In the environmental monitoring report (Phase-1, operation phase) No.1, one time noise and vibration monitoring survey is finished as a record and there is no excess the standard in all of survey points. There is not much operation stage industry in current and monitoring will start after consult with environmental expert.

Noise Level (Along the Thilawa Development Road)

Location	Item	Unit	Measured Value (Mean)	Measured Value (Min~Max)	Country's Standard	Target value to be applied	*Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
NV-1	Leq (day)	dB(A)	61	58~63	N/A	75		One time each in dry and wet season	Sound Level Meter	
	Leq(eve)	dB(A)	55	52~58		70				

*Remark: Referred to the Target Noise Standard (Thilawa SEZ Zone-A EIA Report).

Noise Level (Living Environment)

Location	Item	Unit	Measured Value (Mean)	Measured Value (Min~Max)	Country's Standard	*Target value to be applied	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
NV-2	Leq (day)	dB(A)	58	53~62	N/A	70		One time each in dry and wet season	Sound Level Meter	
	Leq(eve)	dB(A)	51	49~53		65				
	Leq(night)	dB(A)	52	47~59		60				
NV-3	Leq(day)	dB(A)	48	44~52	N/A	70			Sound level Meter	
	Leq(eve)	dB(A)	50	50~51		65				
	Leq(night)	dB(A)	48	47~49		60				

*Remark: Referred to the Target Noise Standard (Thilawa SEZ Zone-A EIA Report).

Complains from Residents

- Are there any complains from residents regarding noise in this monitoring period? □ Yes, ☑ No

If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Complains from Residents	Countermeasures

5) Solid Waste (Disposal from admin complex compound)

Measuring Point: Construction Site (Construction Phase), Storage for Sludge (Operation Phase)

- Are there any wastes of sludge in this monitoring period? ☑ Yes, □ No

If yes, please report the amount of sludge and fill in the results of solid waste management Activities.

No.	Date	Description	No. of Kgs	Remarks
1	April 2017	General Waste Disposal	960	Golden Dowa Eco-system Myanmar Co.,Ltd
2	May 2017	General Waste Disposal	1940	Golden Dowa Eco-system Myanmar Co.,Ltd
3	June 2017	General Waste Disposal	1800	Golden Dowa Eco-system Myanmar Co.,Ltd
4	July 2017	General Waste Disposal	1180	Golden Dowa Eco-system Myanmar Co.,Ltd
5	August 2017	General Waste Disposal	2020	Golden Dowa Eco-system Myanmar Co.,Ltd
6	September 2017	General Waste Disposal	1180	Golden Dowa Eco-system Myanmar Co.,Ltd

Remark: Attached general waste disposal record (Admin Complex Compound) in appendix.

Remark: Admin complex compound waste disposal reported in the Operation phase, Environmental Monitoring Report because the waste from common area of Thilawa SEZ is storing in the admin complex trash storage. Each locator will submit according to ECPP approval for the waste disposal record directly to the Environmental Section, One Stop Service Center, Thilawa SEZ Management Committee.

6) (a) Ground Subsidence and Hydrology- April 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
7-Apr-17	-	m3/week	+7.128	m	Once a week	
21-Apr-17	-	m3/week	+7.126	m		
28-Apr-17	-	m3/week	+7.126	m		

* Remarks: Attached ground subsidence monitoring status (Operation Phase) in appendix. There is no ground water consumption in Zone-A industrial area and will the water consumption quantity if any.

(b) Ground Subsidence and Hydrology- May 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
5-May-17	-	m3/week	+7.126	m	Once a week	
12-May-17	-	m3/week	+7.129	m		
19-May-17	-	m3/week	+7.131	m		
26-May-17	-	m3/week	+7.135	m		

* Remarks: Attached ground subsidence and ground water usage monitoring status (Construction Monthly Progress Report) in appendix.

(c) Ground Subsidence and Hydrology- June 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
9-Jun-17	-	m3/week	+7.135	m	Once a week	
16-Jun-17	-	m3/week	+7.134	m		
23-Jun-17	-	m3/week	+7.134	m		
30-Jun-17	-	m3/week	+7.136	m		

* Remarks: Attached ground subsidence monitoring status (Operation Phase) in appendix.

(d) Ground Subsidence and Hydrology- July 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
7-Jul-17	-	m3/week	+7.136	m	Once a week	
14-Jul-17	-	m3/week	+7.136	m		
21-Jul-17	-	m3/week	+7.138	m		
28-Jul-17	-	m3/week	+7.136	m		

* Remarks: Attached ground subsidence monitoring status (Operation Phase) in appendix.

(e) Ground Subsidence and Hydrology- August 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
3-Aug-17	-	m3/week	+7.136	m	Once a week	
10-Aug-17	-	m3/week	+7.137	m		
17-Aug-17	-	m3/week	+7.136	m		
24-Aug-17	-	m3/week	+7.137	m		

* Remarks: Attached ground subsidence monitoring status (Operation Phase) in appendix.

(f) Ground Subsidence and Hydrology- September 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
1-Sep-17	-	m3/week	+7.136	m	Once a week	
8-Sep-17	-	m3/week	+7.136	m		
15-Sep-17	-	m3/week	+7.136	m		
22-Sep-17	-	m3/week	+7.136	m		
29-Sep-17	-	m3/week	+7.136	m		

* Remarks: Attached ground subsidence monitoring status (Operation Phase) in appendix.

7) Offensive Odor (only operation phase) Not Applicable at Construction Phase Report

Complains from Residents

- Are there any complains from residents regarding offensive odor in this monitoring period? □ Yes, ☑No

If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Complains from Residents	Countermeasures

Situations environmental report from tenants Not Applicable at Construction Phase Report

- Are there any serious issues regarding offensive odor in this monitoring period? □ Yes, ☑No

If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Issues on Soil Contamination	Countermeasures

8) Infectious disease, Working Environment, Accident

Information from contractor (construction phase) or tenants (operation phase)

- Are there any incidents regarding Infectious disease, Working Environment, Accident in this monitoring period? ☑ Yes, □ No

If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Incidents	Countermeasures
An Accident was occurred on 1st July 2017 near main gate. The concrete mixer truck from A1 hit and hook the small vehicle from A19. Nobody got injured and the small vehicle from A19 got a little scratch on side of the body of the car.	MJTD take the action as per following: - Remind to drive carefully in future and explained the traffic rules - Both parties negotiated successfully without police involvement.
An Accident was occurred on 15th July 2017 in front of Plot C-5. The light truck from Kinan site was skidded and fall down to the	MJTD take the action as per following: - Remind to reduce speed and explained the traffic rules

from. Nobody got injured and the light truck front mirror was broken.	- Remind to drive carefully in future
An Accident was occurred on 9th August 2017 near main gate. The motorcycle driver dropped his helmet so he changed his way of driving and didn't noticed the car. He hit the car and made slight scratch.	MJTD take the action as per following: - Remind to reduce speed, drive carefully and explained the traffic rules - Both parties negotiated successfully without police involvement
An Accident was occurred on 9th August 2017 near main gate. The motorcycle is suddenly something wrong and he parked near main gate. After that, motorcycle started getting smoked out and nobody got injured.	MJTD take the action as per following: - Helped and killed the fire - Remind for regular maintenance for vehicle - The fire was extinguished by security guards.
An Accident was occurred on 23th August 2017 near the first junction. A container truck had a collision accident with a small car. There is not much damaged loss and nobody got injured in this case.	MJTD take the action as per following: - Remind to reduce speed - Drive carefully and explained the traffic rules
An Accident was occurred on 20th October 2017 in front of plot B-2. The car from (A1) was over speeding and drove into canal of Thilawa SEZ improperly.	MJTD take the action as per following: - Remind to reduce speed and explained the traffic rules

Note: If emergency incidents are occurred, the information shall be reported to the relevant organizations and authorities immediately.

The above accidents have been reported to One Stop Service Center (OSSC) and Thilawa SEZ Management Committee (TSMC).

End of Document

Thilawa Special Economic Zone (Zone A) Development Project (Operation Phase)

Appendix

Water and Waste Water Monitoring Report

April, 2017

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE A

(OPERATION STAGE)

(Bi-Monthly Monitoring)

April 2017

Myanmar Koei International Ltd.

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CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone A in accordance with the approved Environmental Impact Assessment (EIA) report and Environmental Management Plan (EMP). MJTD has implemented monitoring various environmental items with the specified time frame to know the environmental conditions in and around the area. As for the monitoring of the water quality, total seven sampling points are set for water quality survey, named SW-1, SW-2, SW-3, SW-4, SW-5, SW-6, and GW-1 have been monitored in Thilawa SEZ and its surrounding area in timely manner. Among the seven locations, SW-1, SW-5 are main discharging points of Thilawa SEZ and SW-6 is discharging from centralized Sewage Treatment Plant (STP) which is required to monitor by Environmental Monitoring Plan (EMoP) in EIA report of Thilawa SEZ Zone A. The remaining points SW-2, SW-3 and SW-4 are sampled as a reference monitoring for comparison with discharging points and baseline of discharged creek. Moreover, GW-1 is monitored as a reference of existing tube well which located in the monastery compound. Location of sampling points for water quality monitoring is shown in Figure 1.1-1.

Figure 1.1- 1 Location of Sampling Points of Water Quality Monitoring

CHAPTER 2: WATER QUALITY MONITORING

2.1 Monitoring Items

Sampling points and parameters for water quality monitoring are determined so as to cover the environmental monitoring plan of the EIA report.

Water quality sampling was carried out at seven locations. Among the seven locations, water flow measurement was carried out at three locations (SW-1, SW-4 and SW-6) where can be measured by Current Meter. Monitoring items and sampling points are summarized in Table 2.1-1.

Table 2.1-1 Monitoring Items for Water Quality

No.	Parameters	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	GW-1	Remarks
1	pH	○	○	○	○	○	○	○	On-site measurement
2	Water temperature	○	○	○	○	○	○	○	On-site measurement
3	DO	○	○	○	○	○	○	○	On-site measurement
4	BOD (5)	○	○	○	○	○	○	○	Laboratory analysis
5	COD (Cr)	○	○	○	○	○	○	○	Laboratory analysis
6	Total nitrogen	○	○	○	○	○	○	○	Laboratory analysis
7	Suspended solids	○	○	○	○	○	○	○	Laboratory analysis
8	Total coliform	○	○	○	○	○	○	○	Laboratory analysis
9	Total phosphorous	○	○	○	○	○	○	○	Laboratory analysis
10	Color	○	○	○	○	○	○	○	Laboratory analysis
11	Odor	○	○	○	○	○	○	○	Laboratory analysis
12	Flow Rate	○	-	-	○	-	○	-	On-site measurement

Source: Myanmar Koei International Ltd.

2.2 Description of Sampling Points

The outline of sampling points is mentioned in Table 2.2-1. The photos of conducting field survey at each sampling points are mentioned in Appendix-1.

Table 2.2-1 Outline of Sampling Points

No.	Station	Detailed Information
1	SW-1	**Coordinate**- N-16° 40' 13.5", E- 96° 16' 39.8" **Location** - Outlet of Retention Pond **Survey Item** – Surface water sampling and water flow rate measurement.
2	SW-2	**Coordinate**- N-16° 40' 20.70", E- 96° 17' 18.10" **Location** - Upstream of Shwe Pyauk Creek **Survey Item** – Surface water sampling.
3	SW-3	**Coordinate**- N-16° 40' 05.5", E- 96° 16' 41.6" **Location** - Upstream of Shwe Pyauk Creek, after combining with the disposal discharge from MJTD. **Survey Item** – Surface water sampling.
4	SW-4	**Coordinate**- N-16° 39' 41.00", E- 96° 16' 26.50" **Location** - Downstream of Shwe Pyauk Creek **Survey Item** – Surface water sampling.
5	SW-5	**Coordinate**- N-16° 40' 10.7", E- 96° 16' 22.6" **Location** - Outlet of Retention Canal **Survey Item** – Surface water sampling and water flow rate measurement.
6	SW-6	**Coordinate**- N-16° 40' 26.8", E- 96° 16' 30.7" **Location** - Outlet from STP to Retention Pond **Survey Item** – Surface water sampling and water flow rate measurement.
7	GW-1	**Coordinate**- N-16° 40' 25.1", E- 96° 16' 31.7" **Location** - In Moegyoe Swan Monastery **Survey Item** – Ground Water Sampling

Source: Myanmar Koei International Ltd.

SW-1

SW-1 was collected at the discharge point of retention pond which is located in the east of Moegyoe Swan monastery. This drainage is flowing from north to south and then connected to the Shwe Pyauk creek through earth drain. The water quality of this monitoring point has been influenced by the water from downstream due to flow back by tidal fluctuation. In addition, it seems that a part of wastewater from monastery has reached to the culvert in the SEZ area and discharging to the retention pond.

SW-2 (Reference Point)

SW-2 was collected at the upstream of Shwe Pyauk creek which is flowing from east to west and then entering into the Yangon river. This sampling point is located at the southeast of Zone A area and at the south of Dagon-Thilawa road. The surrounding area are Zone B in the southwest, Local Thilawa Industrial compound in the east and paddy field in the west respectively.

SW-3 (Reference Point)

SW-3 was collected at the upstream of Shwe Pyauk creek which is flowing from east to west and then entering into the Yangon river. It is distance about 60 m downstream of SW-2. This sampling point is located at south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone B in the south, Local Thilawa Industrial compound in the east and paddy field in the south and west respectively.

SW-4 (Reference Point)

SW-4 was collected at the downstream of Shwe Pyauk creek which is flowing from east to west and then entering into the Yangon river. It is distance about 500 m downstream of SW-3. This sampling point is located at southwest of Zone A area and at the south of Dagon-Thilawa road. The surrounding area are Zone B and Local Thilawa Industrial compound in the east and paddy field in the south and west respectively.

SW-5

SW-5 is located at retention canal in front of main gate of Thilawa SEZ. The water sample was not collected because there was no water at the retention canal in this monitoring period. Most of the water collected in this canal is rain water from surrounding. This canal is also connected to the Shwe Pyauk creek.

SW-6

SW-6 was collected at drain outlet of centralized STP which is located in the north of Moegyoe Swan monastery compound and retention pond (SW-1). Then the treated water is flowing to the retention pond.

GW-1 (Reference of Existing Tube Well)

GW-1 was collected from tube well as ground water sample. It is located in the compound of Moegyoe Swan monastery. The surrounding area are Zone A in the west, retention pond in the east and Dagon-Thilawa road in the south respectively.

2.3 Monitoring Method

All water samples were collected with cleaned sampling bottle and analyzed by the following standard method as shown in Table 2.3-1. All samples were kept in iced boxes keeping at 2-4° C and were transported to the laboratory. Among the parameters; water temperature, pH and DO were measured by the on-site instrument "Horiba, U-52" and water flow rate was also conducted by using the on-site instrument "Tamaya Digital Current Meter".

Table 2.3-1 Analytic Method for Water Quality

No.	Parameter	Method
1	Temperature	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
2	pH	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
3	Suspended solids (SS)	APHA 2540D (Dry at 103-105℃ Method)
4	Dissolved oxygen (DO)	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
5	BOD (5)	APHA 5210 B (5 days BOD Test)
6	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)
7	Total coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)
8	Total nitrogen (T-N)	HACH Method 10072(TNT Persulfate Digestion Method)
9	Total phosphorous (T-P)	APHA 4500-P E (Ascorbic Acid Method)
10	Color	APHA 2120C (Spectrophotometric Method)
11	Odor	APHA 2150 B (Threshold Odor Test)
12	Flow Rate	Detection of Electromagnetic Elements (Real-time measurement by UC-200V Digital Current Meters)

Source: Myanmar Koei International Ltd.

2.4 Monitoring Period

Water quality and water flow rate monitoring were conducted on 26th April 2017 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon river, Myanmar on 26th April 2017 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-1	26/4/2017 13:11
2	SW-2	26/4/2017 09:47
3	SW-3	26/4/2017 10:24
4	SW-4	26/4/2017 11:00
5	SW-5	-
6	SW-6	26/4/2017 12:44
7	GW-1	26/4/2017 13:52

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
26/4/2017	04:11	5.79 m	High Tide
	11:54	0.37 m	Low Tide
	16:24	6.09 m	High Tide

Source: Myanma Port Authority, Tide Table for the Yangon River and Elephant Point, 2017.

2.5 Monitoring Results

Results of water quality monitoring are summarized in Table 2.5-1. Analytical results of the laboratory are described in Appendix-2. The results were compared with the target value of effluent water quality discharging to water body stipulated in the EIA report.

2.5.1 Results of Water Quality at the Outlet of Sewage Treatment Plant of Industrial Area of Thilawa SEZ and at the Point before discharging to Creek

As the comparison with the target value, the results of suspended solid (SS) and total coliform were exceeded than the target values. As for the result of SS, the result at the outlet of the centralized STP (SW-6) complied with the target value. It implied that effluents from each locator were treated well by the STP. On the other hand, results at the monitoring points of retention pond (SW-1), exceeded the target value due to the expected reasons; i) surface water run-off from bare land in Zone A and ii) influence by water from the downstream of retention pond (SW-1) due to flow back by tidal fluctuation.

As for the result of total coliform of surface water, the result at the outlet of the centralized STP (SW-6) also complied with the target value. It may prove that effluents from each locator were treated well by the sewage treatment plant. On the other hand, results at the other surface water monitoring points (SW-1) exceeded the target value due to the expected reasons; i) the biggest expected reason might natural bacteria existed in all area of Zone A because there are various kinds of vegetation and creature such as birds, and small animals in and along the retention ponds and ii) the second suspect might be influence by water from the downstream of retention pond (SW-1) due to flow back by tidal fluctuation.

In the first place, the monitoring points of retention pond (SW-1) should be changed to a little upstream where are possible to avoid flow back by tidal fluctuation in order to evaluate the impact on water quality from the industrial area of Zone A to public water body.
On the bases of the above examinations, the following actions shall be taken to control SS and total coliform;

1) To review the location of the monitoring point (SW-1) and change the location to control water quality to public water body through discussions with TSMC;

2) To monitor Escherichia coli (E. Coli) level to identify health impact by coliform bacteria[1]

Perhaps, the possibility that water in the retention pond might include overflowed water from some construction sites with insufficient treatment of coliform should not be excluded from the possible cause.

[1] Since the composition of total coliform include bacteria from natural origin, and even after Total coliform do not affect human health directly, it is recommended that measurement of Escherichia coli (E. Coli) will be added to the water quality monitoring parameters in order to identify health impact by coliform bacteria.

Table 2.5-1 Results of Water Quality Monitoring at Main Discharging Gates and Discharged from Centralized STP

No.	Parameters	Unit	SW-1	SW-5	SW-6	Target Value
1	Temperature	°C	32.3	-	27.2	Max. 40.0
2	pH	-	6.9	-	6.3	5.0-9.0
3	Suspended solid (SS)	mg/L	150	-	6	Max. 30
4	Dissolved oxygen (DO)	mg/L	6.27	-	7.19	-
5	BOD (5)	mg/L	8.14	-	0.00	Max. 20.00
6	COD (Cr)	mg/L	16.2	-	9.8	Max. 70.0
7	Total coliform	MPN/ 100ml	> 160,000	-	< 1.8	Max. 400
8	Total nitrogen (T-N)	mg/L	5.6	-	8.2	80.0
9	Total phosphocous (T-P)	mg/L	0.19	-	< 0.05	-
10	Color	TCU (True Color Unit)	10.00	-	2.39	-
11	Odor	TON (Threshold Odor Number)	1	-	1	-
12	Flow Rate	m^3/s	0.027	-	0.009	-

Source: Myanmar Koei International Ltd.

2.5.2 Results of Reference Monitoring for Comparison with Discharging Points and Baseline of Discharged Creek

Results of water quality survey are summarized in Table 2.5-2. The results were compared with the target value of effluent water quality discharging to water body stipulated in the EIA report.
As the comparison with the target value, the results of SS and total coliform were exceeded than the target value. As for the result of SS, results at the surface water monitoring points (SW-2, SW-3 and SW-4) exceeded the target value due to two expected reasons; i) delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and ii) delivered from surrounding area by tidal effect.

As for the result of total coliform of surface water, results at the other surface water monitoring points (SW-2, SW-3, SW-4) exceeded the target value due to two expected reasons; i) runoff of animal waste from the undeveloped area and delivered from local industrial zone and illegal dumping site from outside of Thilawa SEZ in the upstream area, and ii) delivered from surrounding area by tidal effect.

Table 2.5-2 Result of Water Quality Survey for Reference Monitoring Points for Comparison with Discharging Points and Baseline of Discharged Creek

No.	Parameters	Unit	SW-2	SW-3	SW-4	GW-1	Target Value
1	Temperature	℃	25.2	27.4	27.7	30.1	Max. 40.0
2	pH	-	7.0	6.8	6.8	7.3	5.0-9.0
3	Suspended solid (SS)	mg/L	156	412	302	8.00	Max. 30
4	Dissolved oxygen (DO)	mg/L	8.57	7.76	7.38	6.91	-
5	BOD (5)	mg/L	11.60	6.72	8.00	5.69	Max. 20.00
6	COD (Cr)	mg/L	19.5	13.2	14.6	4.6	Max. 70.0
7	Total coliform	MPN/ 100ml	> 160,000	35,000	54,000	23	Max. 400
8	Total nitrogen (T-N)	mg/L	2.6	4.0	2.6	1.4	80.0
9	Total phosphorous (T-P)	mg/L	0.24	0.57	0.43	0.07	-
10	Color	TCU (True Color Unit)	19.20	17.04	20.00	1.45	-
11	Odor	TON (Threshold Odor Number)	1	1	1	1	-
12	Flow Rate	m^3/s	-	-	0.174	-	-

Source: Myanmar Koei International Ltd.

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As for the result of SS and total coliform, the results at the outlet of the centralized STP (SW-6) complied with the target value of both of them. It may prove that effluent from each locator was treated well by the STP. On the other hand, parameters of SS and total coliform levels at retention pond (SW-1) was exceeded the target values in this period for main discharging gates of Thilawa SEZ Zone A. However, as mentioned in Section 2.5.1, in the first place, the monitoring points of retention pond (SW-1) should be changed to a little upstream where are possible to avoid flow back by tidal fluctuation in order to evaluate the impact on water quality from the industrial area of Zone A to public water body.

As for parameters of SS and total coliform in surface water were exceeded the target values at reference monitoring points. As mentioned in Section 2.5.2, expected reasons for exceeding the target values are by various activities such as livestock, industry, and domestic outside of the industrial area of Zone A. However, it cannot reach to the conclusion of what is the reason to be exceeded the target values, thus the continuous monitoring and seasonal data and yearly trend analysis will be necessary.

As for future subject for main discharging points of Thilawa SEZ Zone A, the following action may be taken to achieve the target levels and appropriate water quality monitoring:

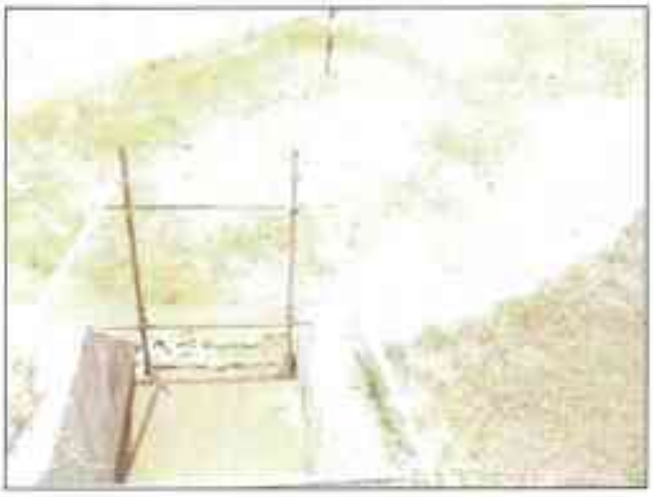
- To review the location of the monitoring points (SW-1) and change the location to control water quality to public water body through discussions with TSMC;
- To monitor Escherichia coli (E. Coli) level to identify health impact by coliform bacteria; and
- To examine the possibility of the overflow water from construction sites.

End of the Document

APPENDIX-1 FIELD SURVEY PHOTOS

FOR DISCHARGING POINTS OF THILAWA SEZ ZONE A

Surface water sampling and onsite measurement at SW-1



There is no water at SW-5

Surface water sampling and onsite measurement at SW-6

FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGING POINTS AND BASELINE OF DISCHARGED CREEK

Surface water sampling and onsite measurement at SW-2

Surface water sampling and onsite measurement at SW-3

Surface water sampling and onsite measurement at SW-4

Ground water sampling and onsite measurement at GW-1

APPENDIX-2 LABORATORY RESULTS

FOR DISCHARGING POINTS AND AFTER CENTRALIZED STP

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-230931, 09 786033144

Report No. : GEM-LAB-201705052
Revision No. : 1
Report Date : 11 May, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-1-0426 Sampling Date : 26 April, 2017
Sample No. : W-1704074 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 26 April, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	150.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	8.14	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	16.2	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	5.6	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.19	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	10.00	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF) "Standard Methods for the Examination of Water and Wastewater, 22nd Edition"

Analysed By :
Ni Ni Aye Lwin
Assistant Supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

THILAWA DEVELOPMENT LIMITED MJTD MYANMAR

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. 11, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051, 09 796031149

Report No. : GEM-LAB-201705055
Revision No. : 1
Report Date : 11 May, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /29, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-E-0426 Sampling Date : 26 April, 2017
Sample No. : W-1704077 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 26 April, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	6.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	0.00	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	9.8	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	8.2	0.0
5	Total Phosphorous	APHA 4500-P.E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	2.39	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	< 1.8	1.8

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

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Approved By :
Tomoya Suzuki
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MJTD
MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGING POINTS AND BASELINE OF DISCHARGED CREEK

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. 31, Thilawa(SEZ)Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309071, 09 796935149

Report No. : GEM-LAB-201705053
Revision No. : 1
Report Date : 11 May, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-2-0426 Sampling Date : 26 April, 2017
Sample No. : W-1704075 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 26 April, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	156.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	11.60	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	19.5	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.5	0.8
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.24	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	19.20	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	3.67	3.1
9	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.006	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA) and the Water Environment Federation (WEF); Standard Methods for the Examination of Water and Wastewater, 22nd Edition

Analyzed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. 13, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309151/09 79035149

Report No. : GEM-LAB-201705054
Revision No. : 1
Report Date : 11 May, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-3-0425
Sample No. : W-1704076
Waste Profile No. : -
Sampling Date : 26 April, 2017
Sampling By : Customer
Sample Received Date : 26 April, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105℃ Method)	mg/l	412.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	6.72	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	12.2	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	4.0	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.57	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	17.04	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	3.33	3.1
9	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	35000	1.8
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.032	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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MYANMA THILAWA DEVELOPMENT LIMITED MJTD

DOWA

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Tel 01-2309051, 09 799525149

Report No. : GEM-LAB-201705056
Revision No. : 1
Report Date : 11 May, 2017
Application No. : 0049-CD01

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-4-0426
Sample No. : W-1704078
Waste Profile No. : -
Sampling Date : 26 April, 2017
Sampling By : Customer
Sample Received Date : 26 April, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	302.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	8.80	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colonmetric Method)	mg/l	14.6	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.6	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.43	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	20.00	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
9	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	54000	1.8
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.016	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA) and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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Approved By :
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MJTD MYANMA THILAWA DEVELOPMENT LIMITED

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1 ,Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel.01-2309301 / 09 7969 151 69

Report No. : GEM-LAB-201705051
Revision No. : 1
Report Date : 11 May, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-GW-1-0426
Sample No. : W-1704073
Waste Profile No. : -

Sampling Date : 26 April, 2017
Sampling By : Customer
Sample Received Date : 26 April, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	8.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.69	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	4.6	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.4	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.07	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	1.45	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	23	1.8

Remark : LOQ - Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :
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Tomoya Suzuki
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MYANMA THILAWA DEVELOPMENT LIMITED MJTD

Thilawa Special Economic Zone (Zone A) Development Project (Operation Phase)

Appendix

Water and Waste Water Monitoring Report

June, 2017

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE A

(OPERATION STAGE)

(Bi-Annually Monitoring)

June 2017

Myanmar Koei International Ltd.

MJTD

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CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone A in accordance with the approved Environmental Impact Assessment (EIA) report and Environmental Management Plan (EMP). MJTD has implemented monitoring various environmental items with the specified time frame to know the environmental conditions in and around the area. As for the monitoring of the water quality, total seven sampling points are set for water quality survey, named SW-1, SW-2, SW-3, SW-4, SW-5, SW-6, and GW-1 have been monitored in Thilawa SEZ and its surrounding area in timely manner. Among the seven locations, SW-1, SW-5 are main discharging points of Thilawa SEZ and SW-6 is discharging from centralized Sewage Treatment Plant (STP) which is required to monitor by Environmental Monitoring Plan (EMoP) in EIA report of Thilawa SEZ Zone A. The remaining points SW-2, SW-3 and SW-4 are sampled as a reference monitoring for comparison with discharging points and baseline of discharged creek. Moreover, GW-1 is monitored as a reference of existing tube well which located in the monastery compound. Location of sampling points for water quality monitoring is shown in Figure 1.1-1.

Figure 1.1- 1 Location of Sampling Points of Water Quality Monitoring

CHAPTER 2: WATER QUALITY MONITORING

2.1 Monitoring Items

Sampling points and parameters for water quality monitoring are determined so as to cover the environmental monitoring plan of the EIA report.

Water quality sampling was carried out at seven locations. Among the seven locations, water flow measurement was carried out at five locations (SW-1, SW-2, SW-4, SW-5 and SW-6) where can be measured by Current Meter. Monitoring items and sampling points are summarized in Table 2.1-1.

Table 2.1-1 Monitoring Items for Water Quality

No.	Parameters	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	GW-1	Remarks
1	pH	O	O	O	O	O	O	O	On-site measurement
2	Water temperature	O	O	O	O	O	O	O	On-site measurement
3	DO	O	O	O	O	O	O	O	On-site measurement
4	BOD (5)	O	O	O	O	O	O	O	Laboratory analysis
5	COD (Cr)	O	O	O	O	O	O	O	Laboratory analysis
6	Total nitrogen	O	O	O	O	O	O	O	Laboratory analysis
7	Suspended solids	O	O	O	O	O	O	O	Laboratory analysis
8	Total coliform	O	O	O	O	O	O	O	Laboratory analysis
9	Total phosphorous	O	O	O	O	O	O	O	Laboratory analysis
10	Color	O	O	O	O	O	O	O	Laboratory analysis
11	Odor	O	O	O	O	O	O	O	Laboratory analysis
12	Oil and Grease	O	O	O	O	O	O	O	Laboratory analysis
13	Mercury	O	O	O	O	O	O	O	Laboratory analysis
14	Zinc	O	O	O	O	O	O	O	Laboratory analysis
15	Arsenic	O	O	O	O	O	O	O	Laboratory analysis
16	Chromium	O	O	O	O	O	O	O	Laboratory analysis
17	Cadmium	O	O	O	O	O	O	O	Laboratory analysis
18	Selenium	O	O	O	O	O	O	O	Laboratory analysis
19	Lead	O	O	O	O	O	O	O	Laboratory analysis
20	Copper	O	O	O	O	O	O	O	Laboratory analysis
21	Barium	O	O	O	O	O	O	O	Laboratory analysis
22	Nickel	O	O	O	O	O	O	O	Laboratory analysis
23	Cyanide	O	O	O	O	O	O	O	Laboratory analysis
24	Free Chlorine	O	O	O	O	O	O	O	Laboratory analysis
25	Sulphide	O	O	O	O	O	O	O	Laboratory analysis
26	Formaldehyde	O	O	O	O	O	O	O	Laboratory analysis
27	Phenol	O	O	O	O	O	O	O	Laboratory analysis
28	Flow Rate	O	O	-	O	O	O	-	On-site measurement

Source: Myanmar Koei International Ltd.

2.2 Description of Sampling Points

The outline of sampling points is mentioned in Table 2.2-1. The photos of conducting field survey at each sampling points are mentioned in Appendix-1.

Table 2.2-1 Outline of Sampling Points

No.	Station	Detailed Information
1	SW-1	**Coordinate**- N-16° 40' 13.5", E- 96° 16' 39.8"
		Location - Outlet of Retention Pond
		Survey Item – Surface water sampling and water flow rate measurement.
2	SW-2	**Coordinate**- N-16° 40' 20.70", E- 96° 17' 18.10"
		Location - Upstream of Shwe Pyauk Creek
		Survey Item – Surface water sampling.
3	SW-3	**Coordinate**- N-16° 40' 05.5", E- 96° 16' 41.6"
		Location - Upstream of Shwe Pyauk Creek, after mixing point of Thilawa SEZ Zone A and Zone B.
		Survey Item – Surface water sampling.
4	SW-4	**Coordinate**- N-16° 39' 41.00", E- 96° 16' 26.50"
		Location - Downstream of Shwe Pyauk Creek
		Survey Item – Surface water sampling.
5	SW-5	**Coordinate**- N-16° 40' 10.7", E- 96° 16' 22.6"
		Location - Outlet of Retention Canal
		Survey Item – Surface water sampling and water flow rate measurement.
6	SW-6	**Coordinate**- N-16° 40' 26.8", E- 96° 16' 30.7"
		Location - Outlet from STP to Retention Pond
		Survey Item – Surface water sampling and water flow rate measurement.
7	GW-1	**Coordinate**- N-16° 40' 25.1", E- 96° 16' 31.7"
		Location - In Moegyoe Swan Monastery
		Survey Item – Ground Water Sampling

Source: Myanmar Koei International Ltd.

SW-1

SW-1 was collected at the discharge point of retention pond which is located in the east of Moegyoe Swan monastery. This drainage is flowing from north to south and then connected to the Shwe Pyauk creek through earth drain. The water quality of this monitoring point has been influenced by the water from downstream due to flow back by tidal fluctuation. In addition, it seems that a part of wastewater from monastery has reached to the culvert in the SEZ area and discharging to the retention pond.

SW-2 (Reference Point)

SW-2 was collected at the upstream of Shwe Pyauk creek. This sampling point is located at the northeast of Zone B area and at the south of Dagon-Thilawa road. The surrounding area are Zone A in the northwest, local industrial zone in the east and paddy field in the west respectively.

SW-3 (Reference Point)

SW-3 was collected at the Shwe Pyauk creek, after mixing point of Zone A and Zone B, which is flowing from east to west and then entering into the Yangon river. The distance is about 1.2 km downstream of SW-2. This sampling point is located at south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone B in the south, local industrial zone in the east and paddy field in the south and west respectively.

SW-4 (Reference Point)

SW-4 was collected at the downstream of Shwe Pyauk creek, after mixing of discharged water from local industrial zone, construction site of Zone B and Zone A, which is flowing from east to west and then entering into the Yangon river. The distance is about 800 m downstream of SW-3. This sampling point is located at southwest of Zone A area and at the south of Dagon-Thilawa road. The surrounding area are Zone B, local industrial zone in the east and paddy field in the south and west respectively.

SW-5

SW-5 was collected at retention canal near main gate of Thilawa SEZ. Most of the water collected in this canal is rain water and domestic wastewater from surrounding. This canal is also connected to the Shwe Pyauk creek. The water quality of this monitoring point may have been influenced by the water from downstream due to flow back by tidal fluctuation.

SW-6

SW-6 was collected at drain outlet of centralized STP which is located in the north of Moegyoe Swan monastery compound and retention pond (SW-1). Then the treated water is flowing to the retention pond.

GW-1 (Reference of Existing Tube Well)

GW-1 was collected from tube well as ground water sample. It is located in the compound of Moegyoe Swan monastery. The surrounding area are Zone A in the west, retention pond in the east and Dagon-Thilawa road in the south respectively.

2.3 Monitoring Method

All water samples were collected with cleaned sampling bottle and analyzed by the following standard method as shown in Table 2.3-1. All samples were kept in iced boxes keeping at 2-4° C and were transported to the laboratory. Among the parameters; water temperature, pH and DO were measured by the on-site instrument "Horiba, U-52" and water flow rate was also conducted by using the on-site instrument "Tamaya Digital Current Meter".

Table 2.3-1 Analytic Method for Water Quality

No.	Parameter	Method
1	Temperature	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
2	pH	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
3	Suspended solids (SS)	APHA 2540D (Dry at 103-105℃ Method)
4	Dissolved oxygen (DO)	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
5	BOD (5)	APHA 5210 B (5 days BOD Test)
6	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)
7	Total coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)
8	Total nitrogen (T-N)	HACH Method 10072(TNT Persulfate Digestion Method)
9	Total phosphorous (T-P)	APHA 4500-P E (Ascorbic Acid Method)
10	Color	APHA 2120C (Spectrophotometric Method)
11	Odor	APHA 2150 B (Threshold Odor Test)
12	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)
13	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
14	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
15	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
16	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
17	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
18	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
19	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
20	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
21	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
22	Nickel	HACH 8027 (Pyridine – Pyrazalone Method)
23	Cyanide	APHA 4500 CL G (DPD Colorimetric Method)
24	Free Chlorine	HACH 8131 (USEPA Methylene Blue Method)
25	Sulphide	HACH 8110 (MBTH Method)
26	Formaldehyde	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP With Distillation))
27	Phenol	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
28	Flow Rate	Detection of Electromagnetic Elements (Real-time measurement by UC-200V Digital Current Meters)

Source: Myanmar Koei International Ltd.

2.4 Monitoring Period

Water quality and water flow rate monitoring were conducted on 27th June 2017 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon river, Myanmar on 27th June 2017 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-1	27/6/2017 13:26
2	SW-2	27/6/2017 9:41
3	SW-3	27/6/2017 11:22
4	SW-4	27/6/2017 12:10
5	SW-5	27/6/2017 15:30
6	SW-6	27/6/2017 12:56
7	GW-1	27/6/2017 16:31

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
27/6/2017	02:10	0.89	Low Tide
	06:29	5.89	High Tide
	13:56	1.08	Low Tide
	18:37	6.24	High Tide

Source: Myanma Port Authority, Tide Table for the Yangon River and Elephant Point, 2017.

2.5 Monitoring Results

Results of water quality monitoring are summarized in Table 2.5-1. Analytical results of the laboratory are described in Appendix-2. The results were compared with the target value of effluent water quality discharging to water body stipulated in the EIA report.

2.5.1 Results of Water Quality at the Outlet of Sewage Treatment Plant of industrial Area of Thilawa SEZ and at the Point before discharging to Creek

As the comparison with the target value, the results of suspended solid (SS), total coliform, mercury and free chlorine were exceeded than the target value. As for the result of SS, the result at the outlet of the centralized STP (SW-6) complied with the target value. It implied that effluents from each locator were treated well by the STP. On the other hand, results at the monitoring points of retention pond (SW-1) and retention canal (SW-5) before discharging to creek, exceeded the target value due to the expected reasons; i) surface water run-off from bare land in Zone A and ii) influence by water from the downstream of retention pond (SW-1) and retention canal (SW-5) due to flow back by tidal fluctuation.

As for the result of total coliform of surface water, the result at the outlet of the centralized STP (SW-6) also complied with the target value. It may prove that effluents from each locator were treated well by the STP. On the other hand, results at the monitoring points of retention pond (SW-1) and retention canal (SW-5) exceeded the target value due to the expected reasons; i) the potential expected reason might natural bacteria existed in all area of Zone A because there are various kinds of vegetation and creature such as birds, and small animals in and along the retention canals and retention ponds and ii) the second suspect

might be influence by water from the downstream of retention pond (SW-1) and retention canal (SW-5) due to flow back by tidal fluctuation.

In the first place, the monitoring points of retention pond (SW-1) and retention canal (SW-5) should be changed to a little upstream where are possible to avoid flow back by tidal fluctuation in order to evaluate the impact on water quality from the industrial area of Zone A to public water body.
On the bases of the above examinations, the following actions shall be taken to control SS and total coliform;

1) To review the location of the monitoring point (SW-1 and SW-5) and change the location to control water quality to public water body through discussions with TSMC;

2) To monitor Escherichia coli (E. Coli) level to identify health impact by coliform bacteria[1]

Perhaps, the possibility that water flowing through the retention canals might include overflowed water from some construction sites with insufficient treatment of coliform should not be excluded from the possible cause.

As for the result of mercury of surface water, the result at the outlet of the centralized STP (SW-6) also complied with the target value. On the other hand, results at the monitoring points of retention pond (SW-1) and retention canal (SW-5) exceeded the target value due to the expected reason; i) some factories in Thilawa SEZ Zone A might be utilized products using mercury, and might be spillage to the retention canal and retention pond accidentally, ii) mercury contaminated soil might be existing and might be eluted by rainwater and iii) any error in the water quality analysis process. However, it cannot reach to the conclusion of what is the reason to be exceeded the target values, thus, in consultation with TSMC, additional investigations will be carried out to grasp the cause of exceeding the target value of mercury level.

As for the result of free chlorine of surface water, the result at the outlet of the centralized STP (SW-6) also complied with the target value. On the other hand, results at the monitoring points of retention pond (SW-1) and retention canal (SW-5) exceeded the target value due to the expected reason; the result of the free chlorine has a possibility of positive interference from foreign substances in sample. If the water sample containing high turbidity and color, the analysis of free chlorine might be affected as positive interference. These analysis methods commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results. One of the possibility to avoid positive interference is to analyze with upgraded method.

[1] Since the composition of total coliform include bacteria from natural origin, and even after Total coliform do not affect human health directly, it is recommended that measurement of Escherichia coli (E. Coli) will be added to the water quality monitoring parameters in order to identify health impact by coliform bacteria.

Table 2.5-1 Results of Water Quality Monitoring at Main Discharging Gates and Discharged from Centralized STP

No.	Parameters	Unit	SW-1	SW-5	SW-6	Target Value
1	Temperature	°C	28.6	30.0	28.7	Max. 40.0
2	pH	-	7.2	7.9	7.1	5.0-9.0
3	Suspended solid (SS)	mg/L	90	120	4	Max. 30
4	Dissolved oxygen (DO)	mg/L	7.38	6.59	6.88	-
5	BOD (5)	mg/L	0.00	0.00	3.41	Max. 20.00
6	COD (Cr)	mg/L	9.0	9.0	6.1	Max. 70.0
7	Total coliform	MPN/ 100ml	160,000	>160,000	< 1.8	Max. 400
8	Total nitrogen (T-N)	mg/L	2.4	3.8	9.4	80.0
9	Total phosphorous (T-P)	mg/L	< 0.05	< 0.05	< 0.05	-
10	Color	TCU (True Color Unit)	3.50	7.64	2.10	-
11	Odor	TON (Threshold Odor Number)	1	1	1	-
12	Oil and Grease	mg/L	< 3.1	< 3.1	< 3.1	Max. 5
13	Mercury	mg/L	0.006	0.008	≤0.002	Max. 0.005
14	Zinc	mg/L	0.060	0.048	≤0.002	Max. 5.000
15	Arsenic	mg/L	0.016	0.02	≤0.01	Max. 0.25
16	Chromium	mg/L	≤0.002	≤0.002	≤0.002	Max. 0.500
17	Cadmium	mg/L	≤0.001	≤0.001	≤0.001	Max. 0.030
18	Selenium	mg/L	≤0.01	≤0.01	≤0.01	Max. 0.02
19	Lead	mg/L	0.012	0.018	≤0.002	Max. 0.200
20	Copper	mg/L	0.006	0.104	≤0.002	Max. 1.000
21	Barium	mg/L	0.038	0.050	0.018	Max. 1.000
22	Nickel	mg/L	0.036	0.046	0.002	Max. 0.200
23	Cyanide	mg/L	0.018	0.027	0.004	Max. 0.200
24	Free Chlorine	mg/L	1.9	2.4	0.1	Max. 1.0
25	Sulphide	mg/L	0.363	0.488	0.010	Max. 1.000
26	Formaldehyde	mg/L	0.120	0.163	< 0.003	Max. 1.000
27	Phenol	mg/L	< 0.002	< 0.002	0.017	Max. 1.000
28	Flow Rate	m^3/s	0.245	0.266	0.799	-

Source: Myanmar Koei International Ltd.

2.5.2 Results of Reference Monitoring for Comparison with Discharging Points and Baseline of Discharged Creek

Results of water quality survey are summarized in Table 2.5-2. The results were compared with the target value of effluent water quality discharging to water body stipulated in the EIA report.

As the comparison with the target value, the results of SS, total coliform and free chlorine were exceeded than the target value. As for the result of SS, results at the surface water monitoring points (SW-2, SW-3 and SW-4) exceeded the target value due to two expected reasons; i) delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and ii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

As for the result of total coliform of surface water, results at the other surface water monitoring points (SW-2, SW-3, SW-4) exceeded the target value due to two expected reasons; i) natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds, and small animals in and along the discharged creek and ii) wastewater from the local industrial zone outside of Thilawa SEZ.

As for the result of free chlorine of surface water, results at the other surface water monitoring point (SW-4) exceeded the target value due to expected reason; the result of the free chlorine has a possibility of positive interference from foreign substances in sample. If the water sample contained high turbidity and color, the analysis of free chlorine might be affected as positive interference. These analysis methods commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results. One of the possibility to avoid positive interference is to analyze with upgraded method.

Table 2.5-2 Result of Water Quality Survey for Reference Monitoring Points for Comparison with Discharging Points and Baseline of Discharged Creek

No.	Parameters	Unit	SW-2	SW-3	SW-4	GW-1	Target Value
1	Temperature	°C	26.8	27.9	28.2	32.5	Max. 40.0
2	pH	-	7.3	6.9	7.1	7.9	5.0–9.0
3	Suspended solid (SS)	mg/L	38	70	82	6	Max. 30
4	Dissolved oxygen (DO)	mg/L	4.43	3.38	6.86	7.08	-
5	BOD (5)	mg/L	1.71	0.00	2.99	2.75	Max. 20.00
6	COD (Cr)	mg/L	21.5	11.3	11.6	6.4	Max. 70.0
7	Total coliform	MPN/ 100ml	92,000	35,000	54,000	240	Max. 400
8	Total nitrogen (T-N)	mg/L	1.9	2.0	1.7	1.5	80.0
9	Total phosphorous (T-P)	mg/L	< 0.05	< 0.05	< 0.05	0.804	-
10	Color	TCU (True Color Unit)	64.79	27.49	26.75	2.76	-
11	Odor	TON (Threshold Odor Number)	1	1	1	1	-
12	Oil and Grease	mg/L	4.73	< 3.10	< 3.10	< 3.10	Max. 5.00
13	Mercury	mg/L	≤0.002	≤0.002	≤0.002	≤0.002	Max. 0.005
14	Zinc	mg/L	≤0.002	0.012	0.004	≤0.002	Max. 5.000
15	Arsenic	mg/L	0.010	0.010	≤0.010	≤0.010	Max. 0.250
16	Chromium	mg/L	≤0.002	≤0.002	≤0.002	≤0.002	Max. 0.500
17	Cadmium	mg/L	≤0.001	≤0.001	≤0.001	≤0.001	Max. 0.030
18	Selenium	mg/L	≤0.01	≤0.01	≤0.01	≤0.01	Max. 0.02
19	Lead	mg/L	0.004	0.004	0.004	≤0.002	Max. 0.200
20	Copper	mg/L	≤0.002	0.002	0.002	≤0.002	Max. 1.000
21	Barium	mg/L	0.018	0.028	0.024	0.078	Max. 1.000
22	Nickel	mg/L	0.008	0.018	0.016	≤0.002	Max. 0.200
23	Cyanide	mg/L	0.026	0.023	0.021	0.004	Max. 0.200
24	Free Chlorine	mg/L	0.5	1.0	1.3	0.1	Max. 1.0
25	Sulphide	mg/L	0.065	0.169	0.218	0.005	Max. 1.000
26	Formaldehyde	mg/L	0.052	0.092	0.088	< 0.003	Max. 1.000
27	Phenol	mg/L	< 0.002	0.008	< 0.002	< 0.002	Max. 1.000
28	Flow Rate	m^3/s	0.25	-	1.81	-	-

Source: Myanmar Koei International Ltd.

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As for the result of SS, total coliform, mercury and free chlorine, the results at the outlet of the centralized STP (SW-6) complied with the target value of both of them. On the other hand, parameters of SS, total coliform, free chlorine and mercury levels at retention pond (SW-1) and retention canal (SW-5) were exceeded the target values in this period for main discharging gates of Thilawa SEZ Zone A. However, as mentioned in Section 2.5.1, in the first place, the monitoring points of retention pond (SW-1) and retention canal (SW-5) should be changed to a little upstream where are possible to avoid flow back by tidal fluctuation in order to evaluate the impact on water quality of SS and total coliform from the industrial area of Zone A to public water body. As for result of free chlorine, it can be concluded that the result which was exceeded the target value as free chlorine at retention pond (SW-1) and retention canal (SW-5) is due to the possibility of positive interference from foreign substances in sample.

As for future subject for main discharging points of Thilawa SEZ Zone A, the following action may be taken to achieve the target levels of SS/total coliform and appropriate water quality monitoring:

- To review the location of the monitoring points (SW-1 and SW-5) and change the location to control water quality to public water body through discussions with TSMC;
- To monitor Escherichia coli (E. Coli) level to identify health impact by coliform bacteria; and
- To examine the possibility of the overflow water from construction sites.

Regarding the result of mercury at retention pond (SW-1) and retention canal (SW-5), these were exceeded the target values but the impact is not expected because the results which exceeding the target values (SW-1:0.006mg/L, SW-5:0.008mg/L) were complied with the National Environmental Quality (Emission) Guidelines value as 0.010mg/L. However, it is better to carry out the additional investigations to grasp the cause of exceeding the target value of mercury level. Therefore, the following additional investigations will be carried out in consultation with TSMC:

- To implement the re-analysis and continuous monitoring for mercury test at exceeding points of target value,
- To implement the soil analysis in Thilawa SEZ Zone A,
- To check the mercury products that might be utilized by locators in Thilawa SEZ Zone A; and
- To cooperate with TSMC for the site inspection of locators.

As for parameters of SS, total coliform and free chlorine in surface water were exceeded the target values at reference monitoring points. As mentioned in Section 2.5.2, expected reasons for SS and total coliform exceeding the target values are by various activities such as livestock, industry, and domestic outside of the industrial area of Zone A. In addition, the expected reason for free chlorine exceeding the target value is due to possibility of positive interference from foreign substances in sample. However, it cannot reach to the conclusion of what is the reason to be exceeded the target values, thus the continuous monitoring and yearly trend analysis will be necessary based on the wet and dry season data.

End of the Document

APPENDIX-1 FIELD SURVEY PHOTOS

FOR DISCHARGING POINTS OF THILAWA SEZ ZONE A

Surface water sampling and onsite measurement at SW-1

Surface water sampling and onsite measurement at SW-5

Surface water sampling and onsite measurement at SW-6

FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGING POINTS AND BASELINE OF DISCHARGED CREEK

Surface water sampling and onsite measurement at SW-2

Surface water sampling and onsite measurement at SW-3

Surface water sampling and onsite measurement at SW-4

Ground water sampling and onsite measurement at GW-1

APPENDIX-2 LABORATORY RESULTS

FOR DISCHARGING POINTS AND AFTER CENTRALIZED STP

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-2017070602
Revision No. : 1
Report Date : 11 July, 2017
Application No. : 0049-0001

Analysis Report

Client Name : Myanmar Kao International LTD (MKI)
Address : No.1A /2B, Mya Thidar Housing, Ward 11, Seuim Dikgkaza
Project Name : -
Sample Description
Sample Name : MKI-SW (-0627
Sample No. : W-1706006
Waste Profile No. : -

Sampling Date : 17 June, 2017
Sampling By : Customer
Sample Received Date : 17 June, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	90.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	7.00	0.10
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	9.0	0.7
4	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	< 3.1	3.1
5	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	180000	1.8
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.9	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	5.50	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.008	0.002
11	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.08	0.002
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.018	0.03
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
16	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.012	0.002
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.006	0.002
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.038	0.001
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.036	0.002
20	Cyanide	HACH 8027 (Pyridine -Pyrazolone Method	mg/l	0.018	0.002
21	Free Chlorine	APHA 4500 Cl G (DPD Colorimetric Method)	mg/l	1.9	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.043	0.003
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.123	0.003
24	Phenol	(DIN Manual 38) - (Measuring Spectrophotometric, Manual steam and Continuous)	mg/l	< 0.002	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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MYANMAR THILAWA DEVELOPMENT LIMITED

DOWA

GOLDEN DEWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GDM-LAB-2017/07004
Revision No. : 1
Report Date : 11 July, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Hyginex Kizai International LTD (HKI)
Address : No.1A /2B, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : HKI-SW-S-0627
Sample No. : W-1706207
Waste Profile No. : -

Sampling Date : 27 June, 2017
Sampling By : Customer
Sample Received Date : 27 June, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	DS	APHA 2540D (Dry at 103-105C Method)	mg/l	120.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	0.69	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	9.0	0.7
4	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	< 3.1	3.1
5	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	3.8	0.8
7	Total Phosphorous	APHA 4500 P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	7.84	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3125 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.000	0.003
11	Zinc	APHA 3125 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.048	0.050
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.02	0.01
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
16	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.010	0.010
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.004	0.002
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.05	0.001
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.048	0.002
20	Cyanide	HACH 8027 (Pyridine - Pyrazolone Method	mg/l	0.027	0.002
21	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	2.4	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.488	0.008
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.185	0.009
24	Phenol	HACH Method 525.2 (Modified Gas Chromatography, Fused Silica and Purge and Trap)	mg/l	< 0.002	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF). Standard Methods for the Examination of Water and Wastewater, 22nd edition

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DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-2017070065
Revision No. : 1
Report Date : 11 July, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Pearlmar Real International LTD (PRI)
Address : No.1A /2B, Myo Thidar Housing, Ward 11, South Dikkalapa
Project Name : -
Sample Description :
Sample Name : PRI-DW-B-1621
Sample No : W-1706108
Waste Profile No. : -
Sampling Date : 27 June, 2017
Sampling By : Customer
Sample Received Date : 27 June, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2340C (Dry at 103-105°C Method)	mg/l	9.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.41	0.00
3	COD (Cr)	APHA 5220C (Close Reflux Colorimetric Method)	mg/l	6.1	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
5	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	< 1.8	1.8
6	Total Nitrogen	HACH Method 10071 (TNT Persulfate Digestion Method)	mg/l	3.4	2.0
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.03	0.03
8	Color	APHA 2120C (Spectrophotometric Method)	PCU	2.10	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.001	0.001
11	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.003	0.003
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
15	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.018	0.001
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.002	0.002
20	Cyanide	HACH 8027 (Pyridine -Pyrazolone Method	mg/l	0.004	0.002
21	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	0.1	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.010	0.005
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	< 0.005	0.005
24	Phenol	HACH Method 8047 (Phenolics Direct Colorimetric, Manual and Automated)	mg/l	0.017	0.002

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd edition

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FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGING POINTS AND BASELINE OF DISCHARGED CREEK

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. 11, Thilawa SEZ Zone A, Kyauk Myaung Village, Kyauk Myaung Village Tract, Thanlyin Township, Yangon Region, The Union of Myanmar
Tel No. 01-8600131-40 Ext 3140

Report No : GEM-LAB-2017/07098
Re-report No : 3
Report Date : 11 July, 2017
Application No : 0049-C(S)

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.14 /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description :
Sample Name : MKI SW 3 0617
Sample No : W 1705209
Waste Profile No. : -
Sampling Date : 27 June, 2017
Sampling By : Customer
Sample Received Date : 27 June, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	28.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	1.71	0.50
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	21.5	0.7
4	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	4.73	3.1
5	Total Coliform	APHA 9221B (Standard Tube Coliform Fermentation Technique)	MPN/100ml	92000	1.8
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.9	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	64.79	0.26
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
11	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.010	0.01
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.003	0.003
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
16	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.006	0.002
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.018	0.001
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.008	0.002
20	Cyanide	HACH 8027 (Pyridine-Pyrazolone Method)	mg/l	0.020	0.002
21	Free Chlorine	APHA 4500 Cl G (DPD Colorimetric Method)	mg/l	0.5	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.005	0.002
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.002	0.002
24	Phenol	HACH Method 8047 (Reactive Quinoneimine, Manual DFR and Vacuvials)	mg/l	< 0.002	0.002

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association, Water Pollution Control Federation (WPCF), and the Water Environment Federation (WEF) Standard Methods for the Examination of Water and Wastewater, 22nd edition

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MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

Report No. : GEM-LAB-2017070967
Revision No. : 1
Report Date : 11 July, 2017
Application No. : 3049-C001

Analysis Report

Client Name : Myanmar Kaw International LTD (MKI)
Address : No.1A /2E, Mya Thidar Housing, Ward 31, South Dekaikpa
Project Name : -
Sample Description
Sample Name : MKI-SW-3-0627
Sample No. : M-1706210
Waste Profile No. : -

Sampling Date : 27 June, 2017
Sampling By : Customer
Sample Received Date : 27 June, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	DS	APHA 2540D (Dry at 103-105C Method)	mg/l	95.00	-
2	BOD (T)	APHA 5210 B (5 Days BOD Test)	mg/l	3.40	0.10
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	11.3	0.1
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 2.1	2.1
5	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	1600	1.8
6	Total Nitrogen	HACH Method 10071 (TNT Persulfate Digestion Method)	mg/l	2.3	0.6
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	27.40	2.20
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
11	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.012	0.002
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.040	0.01
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
16	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.004	0.002
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.003	0.002
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.020	0.001
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.018	0.002
20	Cyanide	HACH 8027 (Pyridine-Pyrazolone Method)	mg/l	0.023	0.002
21	Free Chlorine	APHA 4500 Cl G (DPD Colorimetric Method)	mg/l	1.0	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.169	0.005
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.041	0.001
24	Phenol	USEPA Method 420.1 (Manual Spectrophotometric, Direct MAR and Distillation)	mg/l	0.038	0.002

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association (2012), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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DOWA

Report No. : GEM-LAB-20170706R
Revision No. : 1
Report Date : 11 July, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /2B, Hya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-EM-4-0617
Sample No. : W-1706213
Waste Profile No. : -
Sampling Date : 27 June, 2017
Sampling By : Customer
Sample Received Date : 27 June, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	82.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	2.66	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	11.8	0.7
4	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	< 3.1	3.1
5	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	54000	1.8
6	Total Nitrogen	HACH Method 10072 (TN) Persulfate Digestion Method)	mg/l	0.7	0.0
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	PCU	20.75	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
11	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.004	0.002
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
16	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.004	0.002
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.002	0.000
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.029	0.001
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.015	0.001
20	Cyanide	HACH 8027 (Pyridine -Pyrazolone Method	mg/l	0.013	0.002
21	Free Chlorine	APHA 4500 Cl G (DPD Colorimetric Method)	mg/l	1.3	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.218	0.005
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.088	0.005
24	Phenol	[illegible]	mg/l	< 0.002	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

LAB
GEM

Analysed By
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Approved By
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Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

Report No. : GEM-LAB-2017070071
Revision No. : 1
Report Date : 11 July, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Kian International LTD (MKI)
Address : No.18 /28, Pya Thidar Housing, Ward (1), South Okkalapa.
Project Name : -
Sample Description :
Sample Name : MKI-GW (1)027 Sampling Date : 27 June, 2017
Sample No : W 17062(4 Sampling By : Customer
Kapia Profile No. : - Sample Received Date : 27 June, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105C Method)	mg/l	6.80	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	1.91	0.50
3	COD (Cr)	APHA 5220C (Close Reflux Colorimetric Method)	mg/l	6.4	0.7
4	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	< 3.1	3.1
5	Total Coliform	APHA 9221B (Standard Total Coliform fermentation Technique)	MPN/100ml	240	1.8
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.3	0.6
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.024	0.20
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	2.76	0.20
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.001	0.001
11	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.003	0.003
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
16	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.078	0.001
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
20	Cyanide	HACH 8027 (Pyridine - Pyrazolone Method	mg/l	0.024	0.002
21	Free Chlorine	APHA 4500 Cl- G (DPD Colorimetric Method)	mg/l	0.1	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.035	0.009
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	< 0.003	0.003
24	Phenol	(Light Method 420) (Phenols) (Spectrophotometric, Manual steam distillation)	mg/l	< 0.002	0.002

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association, AWWA : American Water Works Association, EPA : US Environment Federation, HACH : Hach Company, USEPA : United States Environmental Protection Agency, ISO : International Organization for Standardization, ASTM : American Society for Testing and Materials

LAB GEM

Analyzed By :
N. B. Aye Lwin
Assistant Supervisor

Approved By :
Yamato Suzuki
Director

MJTD MYANMA THILAWA DEVELOPMENT LIMITED

Thilawa Special Economic Zone (Zone A) Development Project (Operation Phase)

Appendix

Water and Waste Water Monitoring Report

August, 2017

DRAFT WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE A

(OPERATION STAGE)

(Bi-Monthly Monitoring)

August 2017

Myanmar Koei International Ltd.

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CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone A in accordance with the approved Environmental Impact Assessment (EIA) report and Environmental Management Plan (EMP). MJTD has implemented monitoring various environmental items with the specified time frame to know the environmental conditions in and around the area. As for the monitoring of the water quality, total seven sampling points are set for water quality survey, named SW-1, SW-2, SW-3, SW-4, SW-5, SW-6, and GW-1 have been monitored in Thilawa SEZ and its surrounding area in timely manner. Among the seven locations, SW-1 and SW-5 are main discharging points of Thilawa SEZ and SW-6 is discharging from centralized Sewage Treatment Plant (STP) which is required to monitor by Environmental Monitoring Plan (EMoP) in EIA report of Thilawa SEZ Zone A. The remaining points SW-2, SW-3 and SW-4 are sampled as a reference monitoring for comparison with discharging points and baseline of discharged creek. Moreover, GW-1 is monitored as a reference of existing tube well which located in the monastery compound. Location of sampling points for water quality monitoring is shown in Figure 1.1-1.

Figure 1.1- 1 Location of Sampling Points of Water Quality Monitoring

CHAPTER 2: WATER QUALITY MONITORING

2.1 Monitoring Items

Sampling points and parameters for water quality monitoring are determined so as to cover the environmental monitoring plan of the EIA report.

Water quality sampling was carried out at seven locations. Among the seven locations, water flow measurement was carried out at five locations (SW-1, SW-2, SW-4, SW-5 and SW-6) where can be measured by Current Meter. Monitoring items and sampling points are summarized in Table 2.1-1.

Table 2.1-1 Monitoring Items for Water Quality

No.	Parameters	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	GW-1	Remarks
1	pH	○	○	○	○	○	○	○	On-site measurement
2	Water temperature	○	○	○	○	○	○	○	On-site measurement
3	DO	○	○	○	○	○	○	○	On-site measurement
4	BOD (5)	○	○	○	○	○	○	○	Laboratory analysis
5	COD (Cr)	○	○	○	○	○	○	○	Laboratory analysis
6	Total nitrogen	○	○	○	○	○	○	○	Laboratory analysis
7	Suspended solids	○	○	○	○	○	○	○	Laboratory analysis
8	Total coliform	○	○	○	○	○	○	○	Laboratory analysis
9	Total phosphorous	○	○	○	○	○	○	○	Laboratory analysis
10	Color	○	○	○	○	○	○	○	Laboratory analysis
11	Odor	○	○	○	○	○	○	○	Laboratory analysis
12	Escherichia Coli (Self-monitoring)	○	○	○	○	○	○	○	Laboratory analysis
13	Flow Rate	○	○	–	○	○	○	–	On-site measurement

Source: Myanmar Koei International Ltd.

2.2 Description of Sampling Points

The outline of sampling points is mentioned in Table 2.2-1. The photos of conducting field survey at each sampling points are mentioned in Appendix-1.

Table 2.2-1 Outline of Sampling Points

No.	Station	Detailed Information
1	SW-1	**Coordinate**- N-16° 40' 13.5", E- 96° 16' 39.8" **Location** - Outlet of Retention Pond **Survey Item** – Surface water sampling and water flow rate measurement.
2	SW-2	**Coordinate**- N-16° 40' 20.70", E- 96° 17' 18.70" **Location** - Upstream of Shwe Pyauk Creek **Survey Item** – Surface water sampling and water flow rate measurement.
3	SW-3	**Coordinate**- N-16° 40' 5.50", E- 96° 16' 41.60" **Location** - Upstream of Shwe Pyauk Creek, after mixing point of Thilawa SEZ Zone A and Zone B. **Survey Item** – Surface water sampling.
4	SW-4	**Coordinate**- N-16° 39' 41.00", E- 96° 16' 26.50" **Location** - Downstream of Shwe Pyauk Creek **Survey Item** – Surface water sampling and water flow rate measurement.
5	SW-5	**Coordinate**- N-16° 40' 10.7", E- 96° 16' 22.6" **Location** - Outlet of Retention Canal **Survey Item** – Surface water sampling and water flow rate measurement.
6	SW-6	**Coordinate**- N-16° 40' 26.8", E- 96° 16' 30.7" **Location** - Outlet from STP to Retention Pond **Survey Item** – Surface water sampling and water flow rate measurement.
7	GW-1	**Coordinate**- N-16° 40' 25.10", E- 96° 16' 31.70" **Location** - In Moegyoe Swan Monastery **Survey Item** – Ground Water Sampling

Source: Myanmar Koei International Ltd.

SW-1

SW-1 was collected at the discharge point of retention pond which is located in the east of Moegyoe Swan monastery. This drainage is flowing from north to south and then connected to the Shwe Pyauk creek through earth drain. The water quality of this monitoring point has been influenced by the water from downstream due to flow back by tidal fluctuation. In addition, it seems that a part of wastewater from monastery has reached to the culvert in the SEZ area and discharging to the retention pond.

SW-2 (Reference Point)

SW-2 was collected at the upstream of Shwe Pyauk creek. This sampling point is located at the southeast of Zone A area and at the south of Dagon-Thilawa road. The surrounding area are Zone B in the southwest, local industrial zone in the east and paddy field in the west respectively.

SW-3 (Reference Point)

SW-3 was collected at the upstream of Shwe Pyauk creek after mixing point of Zone A and Zone B, which is flowing from east to west and then entering into the Yangon river. The distance is about 1.2 km downstream of SW-2. This sampling point is located at south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone B in the south, local industrial zone in the east and paddy field in the south and west respectively.

SW-4 (Reference Point)

SW-4 was collected at the downstream of Shwe Pyauk creek, after mixing of discharge water from local industrial zone, construction site of Zone B and Zone A, which is flowing from east to west and then entering into the Yangon river. The distance is about 800 m downstream of SW-3. This sampling point is located at southwest of Zone A area and at the south of Dagon-Thilawa road. The surrounding area are Zone B and local industrial zone in the east and paddy field in the south and west respectively.

SW-5

SW-5 was collected at retention canal near main gate of Thilawa SEZ. Most of the water collected in this canal is rain water and domestic wastewater from surrounding. This canal is also connected to the Shwe Pyauk creek. The water quality of this monitoring point may have been influenced by the water from downstream due to flow back by tidal fluctuation.

SW-6

SW-6 was collected at drain outlet of centralized STP which is located in the north of Moegyoe Swan monastery compound and retention pond (SW-1). Then the treated water is flowing to the retention pond.

GW-1 (Reference of Existing Tube Well)

Previous tube well GW-1, the water sample could not have collected because well water pump was broken and under reparing. Therefore, GW-1 water sample was collected from the nearest tube well as ground water sample. The depth of the tube well is about 62 m below ground level and same depth with previous tube well GW-1. It is located in the compound of Moegyoe Swan monastery. The surrounding area are Zone A in the west, retention pond in the east and Dagon-Thilawa road in the south respectively.

2.3 Monitoring Method

All water samples were collected with cleaned sampling bottle and analyzed by the following standard method as shown in Table 2.3-1. All samples were kept in iced boxes keeping at 2-4° C and were transported to the laboratory. Among the parameters; water temperature, pH and DO were measured by the on-site instrument "Horiba, U-52" and water flow rate was also conducted by using the on-site instrument "Tamaya Digital Current Meter".

Table 2.3-1 Analytic Method for Water Quality

No.	Parameter	Method
1	Water Temperature	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
2	pH	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
3	Dissolved oxygen (DO)	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
4	BOD (5)	APHA 5210 B (5 days BOD Test)
5	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)
6	Total nitrogen (T-N)	HACH Method 10072(TNT Persulfate Digestion Method)
7	Suspended solids (SS)	APHA 2540D (Dry at 103-105℃ Method)
8	Total coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)
9	Total phosphorous (T-P)	APHA 4500-P E (Ascorbic Acid Method)
10	Color	APHA 2120C (Spectrophotometric Method)
11	Odor	APHA 2150 B (Threshold Odor Test)
12	Escherichia Coli	APHA 9221 F (Escherichia Coli Procedure Using Fluorogenic Substrate)
13	Flow Rate	Detection of Electromagnetic Elements (Real-time measurement by UC-200V Digital Current Meters)

Source: Myanmar Koei International Ltd.

2.4 Monitoring Period

Water quality and water flow rate monitoring were conducted on 22nd August 2017 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon river, Myanmar on 22nd August 2017 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-1	22/8/2017 14:41
2	SW-2	22/8/2017 12:27
3	SW-3	22/8/2017 11:52
4	SW-4	22/8/2017 13:07
5	SW-5	22/8/2017 15:17
6	SW-6	22/8/2017 15:00
7	GW-1	22/8/2017 15:59

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
22/8/2017	00:18	1.25	Low Tide
	04:30	6.14	High Tide
	12:17	1.40	Low Tide
	16:32	6.43	High Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2017

2.5 Monitoring Results

Results of water quality monitoring are summarized in Table 2.5-1. Analytical results of the laboratory are described in Appendix-2. The results were compared with the target value of effluent water quality discharging to water body stipulated in the EIA report.

2.5.1 Results of Water Quality at the Outlet of Sewage Treatment Plant of industrial Area of Thilawa SEZ and at the Point before discharging to Creek

As the comparison with the target value, the results of suspended solid (SS), total coliform and pH were exceeded than the target values. As for the result of SS, the result at the outlet of the centralized STP (SW-6) complied with the target value. It implied that effluents from each locator were treated well by the STP. On the other hand, results at the monitoring points of retention pond (SW-1) and retention canal (SW-5) before discharging to creek, exceeded the target value due to the expected reasons; i) surface water run-off from bare land in Zone A and ii) influence by water from the downstream of retention pond (SW-1) and retention canal (SW-5) due to flow back by tidal fluctuation.

As for the result of total coliform of surface water, the result at the outlet of the centralized STP (SW-6) also complied with the target value. It may prove that effluents from each locator was treated well by the STP. On the other hand, results at the monitoring points of retention pond (SW-1) and retention canal (SW-5) exceeded the target value due to the expected reasons; i) the potential expected reason might natural bacteria existed in all area of Zone A because there are various kinds of vegetation and creature such as birds, and small animals in and along the retention canals and retention ponds and ii) the second suspect might be influence by water from the downstream of retention pond (SW-1) and retention canal (SW-5) due to flow back by tidal fluctuation.
Since the composition of the total coliform include bacteria from natural origin, and even after Total Coliform do not affect human health directly, self-monitoring for E. Coli analysis was carried out to identify health impact by coliform bacteria. As for the result of E. Coli of surface water, all of results were under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of retention pond (SW-1) and retention canal (SW-5), but it is considered that there is no significant impact on human health.

In the first place, the monitoring points of retention pond (SW-1) and retention canal (SW-5) should be changed to a little upstream where are possible to avoid flow back by tidal fluctuation in order to evaluate the impact on water quality from the industrial area of Zone A to public water body.

On the bases of the above examinations, the following actions shall be taken to control SS and total coliform;

-To continue the self-monitoring for E. Coli level to identify health impact by coliform bacteria (While result of Total Coliform are exceeded the target value)

Perhaps, the possibility that water in the retention pond might include overflowed water from some construction sites with insufficient treatment of coliform should not be excluded from the possible cause.

As for the result of pH, the result at the outlet of the centralized STP (SW-6) complied with the target value. It implied that effluents from each locator were treated well by the STP. On the other hand, result at the monitoring points of retention canal (SW-5) before discharging to creek, exceeded the target value due to the expected reason; i) might be rainwater polluted with concrete washout water discharge from construction sites of Zone A, (ii) might be domestic wastewater discharge that contains detergents and soap-based products, (iii) might be due to natural origin.

Table 2.5-1 Results of Water Quality Monitoring at Main Discharging Gates and Discharged from Centralized STP

No.	Parameters	Unit	SW-1	SW-5	SW-6	Target Value (Reference Value for Self-Monitoring)
1	Temperature	°C	33.6	33.4	31.9	Max. 40.0
2	pH	-	8.1	9.9	7.3	5.0-9.0
3	Suspended solid (SS)	mg/L	284	1506	8	Max. 30
4	Dissolved oxygen (DO)	mg/L	4.4	4.3	5.2	-
5	BOD (5)	mg/L	15.20	14.49	0.00	Max. 20.00
6	COD (Cr)	mg/L	8.5	35.0	2.4	Max. 70.0
7	Total coliform	MPN/ 100ml	>160,000	160,000	< 1.8	Max. 400
8	Total nitrogen (T-N)	mg/L	14.0	8.9	6.8	80.0
9	Total phosphorous (T-P)	mg/L	0.152	0.166	< 0.05	-
10	Color	TCU (True Color Unit)	4.55	18.53	0.00	-
11	Odor	TON (Threshold Odor Number)	1	1	1.4	-
12	Escherichia Coli	MPN/100ml(SW)	920.0	140.0	< 1.8	(1,000)* (CFU/100ml)
13	Flow Rate	m³/s	0.201	0.128	0.048	-

Note: Red colors means exceeded value than target value.

*Note: Based on the water utilization at discharged creek, water quality C of quality standard for water baths in Japan, (Ministry of Environment, 1997) is set as a reference value for self-monitoring of E. coli for surface water monitoring. However, due to limitation of capacity for analytical laboratory in Myanmar, the method to analyze the "Colony Forming Unit (CFU)" is not available in Myanmar. Therefore, the results of "Most Probable Number (MPN)" are assumed similar to CFU values and compared with reference values. Once the method to analyze the CFU will be available in Myanmar, the analytical method will be changed.

According to the quality standard for water baths in Japan, (Ministry of Environment, 1997), in case of E.Coli result is exceeding 1,000 CFU/100 ml, since it is assumed unsafety, it is considered unsuitable for water baths.

Source: Myanmar Koei International Ltd.

2.5.2 Results of Reference Monitoring for Comparison with Discharging Points and Baseline of Discharged Creek

Results of water quality monitoring are summarized in Table 2.5-2. The results were compared with the target value of effluent water quality discharging to water body stipulated in the EIA report.

As the comparison with the target value, the results of SS and total coliform were exceeded than the target value. As for the result of SS, results at the surface water monitoring points (SW-2, SW-3 and SW-4) exceeded the target value due to two expected reasons; i) delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and ii) delivered from surrounding area by tidal effect.

As for the result of total coliform of surface water, results at the other surface water monitoring points (SW-2, SW-3, SW-4) exceeded the target value due to two expected reasons; i) runoff of animal waste from the undeveloped area and delivered from local industrial zone and illegal dumping site from outside of Thilawa SEZ in the upstream area, and ii) delivered from surrounding area by tidal effect. In addition, the result of E. Coli of surface water, all of results were under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of SW-2, SW-3 and SW-4, but it is considered that there is no significant impact on human health.

As for the result of total coliform in ground water, result at GW-1 (ground water in Moegyoe Swan monastery) exceeded the target value. The expected reason for exceeding the target value is infiltration of wastewater from toilet wastewater and /or animal waste. However, the result of E.Coli at GW-1 was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of GW-1, but it is considered that there is no significant impact on human health.

Table 2.5-2 Result of Water Quality Monitoring for Reference Monitoring Points for Comparison with Discharging Points and Baseline of Discharged Creek

No.	Parameters	Unit	SW-2	SW-3	SW-4	GW-1	Target Value (Reference Value for Self-Monitoring)
1	Temperature	°C	31.8	32.5	33.1	32.5	Max. 40.0
2	pH	-	7.2	7.2	7.4	8.1	5.0~9.0
3	Suspended solid (SS)	mg/L	100	110	138	10	Max. 30
4	Dissolved oxygen (DO)	mg/L	4.2	4.6	4.6	5.12	-
5	BOD (5)	mg/L	2.32	10.36	3.86	2.36	Max. 20.00
6	COD (Cr)	mg/L	12.4	7.1	8.1	4.8	Max. 70.0
7	Total coliform	MPN/100ml	>160,000	>160,000	>160,000	160,000	Max. 400
8	Total nitrogen (T-N)	mg/L	1.1	2.3	1.7	1.7	80.0
9	Total phosphorous (T-P)	mg/L	0.086	0.188	0.26	0.125	-
10	Color	TCU (True Color Unit)	21.41	15.63	11.99	2.72	-
11	Odor	TON (Threshold Odor Number)	1	1	1	1	-
12	Escherichia Coli	MPN/100ml* (SW)	8.1	24.0	26.0		(1,000)* (CFU/100ml)
		MPN/100ml** (GW)				15.0	(100)** (MPN/100ml)
13	Flow Rate	m³/s	0.36	-	0.56	-	-

Note: Red colors means exceeded value than target value.

*Note: Based on the water utilization at discharged creek, water quality C of quality standard for water baths in Japan, (Ministry of Environment, 1997) is set as a reference value of self-monitoring for surface water monitoring. However, due to limitation of capacity for analytical laboratory in Myanmar, the method to analyze the "Colony Forming Unit (CFU)" is not available in Myanmar. Therefore, the results of "Most Probable Number (MPN)" are assumed similar to CFU values and compared with reference values. Once the method to analyze the CFU will be available in Myanmar, the analytical method will be changed.

According to the quality standard for water baths in Japan, (Ministry of Environment, 1997), in case of E.Coli result is exceeding 1,000 CFU/100 ml, since it is assumed unsafety, it is considered unsuitable for water baths.

**Note: Based on the water utilization at monitoring point for ground water, B1(Irrigation water) of National Technical Regulation on Surface Water Quality in Vietnam (No. QCVN 08: 2008/BTNMT) is set as a reference value of self-monitoring for ground water monitoring.

Source: Myanmar Koei International Ltd.

2.5.2 Results of Reference Monitoring for Comparison with Discharging Points and Baseline of Discharged Creek

Results of water quality monitoring are summarized in Table 2.5-2. The results were compared with the target value of effluent water quality discharging to water body stipulated in the EIA report.

As the comparison with the target value, the results of SS and total coliform were exceeded than the target value. As for the result of SS, results at the surface water monitoring points (SW-2, SW-3 and SW-4) exceeded the target value due to two expected reasons; i) delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and ii) delivered from surrounding area by tidal effect.

As for the result of total coliform of surface water, results at the other surface water monitoring points (SW-2, SW-3, SW-4) exceeded the target value due to two expected reasons; i) runoff of animal waste from the undeveloped area and delivered from local industrial zone and illegal dumping site from outside of Thilawa SEZ in the upstream area, and ii) delivered from surrounding area by tidal effect. In addition, the result of E. Coli of surface water, all of results were under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of SW-2, SW-3 and SW-4, but it is considered that there is no significant impact on human health.

As for the result of total coliform in ground water, result at GW-1 (ground water in Moegyoe Swan monastery) exceeded the target value. However, the result of E.Coli at GW-1 was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of GW-1, but it is considered that there is no significant impact on human health.

Table 2.5-2 Result of Water Quality Monitoring for Reference Monitoring Points for Comparison with Discharging Points and Baseline of Discharged Creek

No.	Parameters	Unit	SW-2	SW-3	SW-4	GW-1	Target Value (Reference Value for Self-Monitoring)
1	Temperature	°C	31.8	32.5	33.1	32.5	Max. 40.0
2	pH	-	7.2	7.2	7.4	8.1	5.0~9.0
3	Suspended solid (SS)	mg/L	100	110	138	10	Max. 30
4	Dissolved oxygen (DO)	mg/L	4.2	4.6	4.6	5.13	-
5	BOD (5)	mg/L	2.32	10.36	3.86	2.36	Max. 20.00
6	COD (Cr)	mg/L	12.4	7.4	8.1	4.8	Max. 70.0
7	Total coliform	MPN/100ml	>160,000	>160,000	>160,000	160,000	Max. 400
8	Total nitrogen (T-N)	mg/L	1.1	2.3	1.7	1.7	80.0
9	Total phosphorous (T-P)	mg/L	0.086	0.188	0.26	0.125	-
10	Color	TCU (True Color Unit)	21.41	15.63	11.99	2.72	-
11	Odor	TON (Threshold Odor Number)	1	1	1	1	-
12	Escherichia Coli	MPN/100ml* (SW)	8.1	24.0	26.0		(1,000)* (CFU/100ml)
		MPN/100ml** (GW)				15.0	(100)** (MPN/100ml)
13	Flow Rate	m^3/s	0.76	-	0.56	-	-

Note: Red colors means exceeded value than target value.

*Note: Based on the water utilization at discharged creek, water quality C of quality standard for water baths in Japan, (Ministry of Environment, 1997) is set as a reference value of self-monitoring for surface water monitoring. However, due to limitation of capacity for analytical laboratory in Myanmar, the method to analyze the "Colony Forming Unit (CFU)" is not available in Myanmar. Therefore, the results of "Most Probable Number (MPN)" are assumed similar to CFU values and compared with reference values. Once the method to analyze the CFU will be available in Myanmar, the analytical method will be changed.
According to the quality standard for water baths in Japan, (Ministry of Environment, 1997), in case of E.Coli result is exceeding 1,000 CFU/100 ml, since it is assumed unsafety, it is considered unsuitable for water baths.

**Note: Based on the water utilization at monitoring point for ground water, B1(Irrigation water) of National Technical Regulation on Surface Water Quality in Vietnam (No. QCVN 08: 2008/BTNMT) is set as a reference value of self-monitoring for ground water monitoring.

Source: Myanmar Koei International Ltd.

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As for the result of SS and total coliform the results at the outlet of the centralized STP (SW-6) complied with the target value of both of them. It may prove that effluent from each locator was treated well by the STP. On the other hand, parameters of SS and total coliform at retention pond (SW-1) and parameters of SS, total coliform and pH at retention canal (SW-5) were exceeded the target values in this period for main discharging points of Thilawa SEZ Zone A. However, as mentioned in Section 2.5.1, in the first place, the monitoring points of retention pond (SW-1) and retention canal (SW-5) should be changed to a little upstream where are possible to avoid flow back by tidal fluctuation in order to evaluate the impact on water quality from the industrial area of Zone A to public water body. In addition, according to the result of self-monitoring of E. Coli at retention pond (SW-1) and retention canal (SW-5), results were under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point SW-1 and SW-5, but it is considered that there is no significant impact on human health.

As for parameters of SS and total coliform in surface water were exceeded the target values at reference monitoring points. As for the parameter of total coliform in ground water was exceeded the target value at reference tube well in monastery. As mentioned in Section 2.5.2, the result of self-monitoring of E. Coli at SW-2, SW-3, SW-4 and GW-1 were under the reference value. Therefore, although the target value of total coliform was exceeded at reference monitoring point, but it is considered that there is no significant impact on human health. The expected reasons for exceeding the target values of Total coliform are by natural origin (natural bacteria existed). However, it cannot reach to the conclusion of what is the reason to be exceeded the target values, thus the continuous monitoring and yearly trend analysis will be necessary based on the wet and dry season data.

As for future subject for main discharging points of Thilawa SEZ Zone A, the following action may be taken to achieve the target levels and appropriate water quality monitoring:

- To monitor Escherichia coli (E. Coli) level to identify health impact by coliform bacteria; and
- To examine the possibility of the overflow water from construction sites.
- To examine the possibility of the domestic wastewater from construction sites.

End of the Document

APPENDIX-1 FIELD SURVEY PHOTOS

FOR DISCHARGING POINTS OF THILAWA SEZ ZONE A

Surface water sampling and onsite measurement at SW-1

Surface water sampling and onsite measurement at SW-5

Surface water sampling and onsite measurement at SW-6

FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGING POINTS AND BASELINE OF DISCHARGED CREEK

Surface water sampling and onsite measurement at SW-2

Surface water sampling and onsite measurement at SW-3

Surface water sampling and onsite measurement at SW-4

Ground water sampling and onsite measurement at GW-1

APPENDIX-2 LABORATORY RESULTS

FOR DISCHARGING POINTS AND AFTER CENTRALIZED STP

DOWA

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Report No. : GEM-LAB-201709013
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-1-0822
Sample No. : W-1708215
Waste Profile No. : -
Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	284.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	15.29	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	8.5	6.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	14.0	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.132	0.85
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	4.55	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-

Remark : LOQ - Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analyzed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

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Report No. : GEM-LAB-201709014
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Kaei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-S-0822 — Sampling Date : 22 August, 2017
Sample No. : W-1708216 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	1500.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	14.40	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	35	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	8.9	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.166	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	18.52	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF). Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :
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Assistant supervisor

Approved By :
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Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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Report No. : GEM-LAB-201709015
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Kaeil International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-6-0822 Sampling Date : 22 August, 2017
Sample No. : W-1708217 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	6.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	0.00	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	2.4	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	0.8	0.0
5	Total Phosphorous	APHA 4500 P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	< 1.8	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	0.00	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1.4	-

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :
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Approved By :
Tomoya Suzuki
Director

MJTD

FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGING POINTS AND BASELINE OF DISCHARGED CREEK

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
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Report No. : GEM-LAB-2017090018
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Kiwi International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-2 0822 — Sampling Date : 22 August, 2017
Sample No. : W-1708218 — Sampling By : Customer
Waste Profile No : - — Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	100.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	2.32	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	12.8	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.1	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.086	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	21.41	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	3	-
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-2017090017
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Dakalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-3-0822
Sample No. : W-1708219
Waste Profile No. : -
Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	DS	APHA 2540D (Dry at 103-105°C Method)	mg/l	110.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	10.36	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	7.1	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.3	0.0
5	Total Phosphorous	APHA 4500-P.E (Ascorbic Acid Method)	mg/l	0.188	0.05
6	Total Coliform	APHA 9221B (Standard Total Confirm Fermentation Technique)	mpn/100ml	> 160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	15.63	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
9	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002

Remark : LOQ - Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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Report No. : GEM-LAB-201709018
Revision No. : 1
Report Date : 8 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Kosei International LTD (MKT)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-4-0822
Sample No : W-1708220
Waste Profile No. : -
Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	138.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.86	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	8.3	0.7
4	Total Nitrogen	HACH Method 10071 (TNT Persulfate Digestion Method)	mg/l	1.7	0.0
5	Total Phosphorus	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.26	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	11.99	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
[illegible]

Report No. : GEM-LAB-201709021
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description :
Sample Name : MKI GW-1-0822
Sample No. : W-1708223
Waste Profile No. : -
Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	10.00	-
2	BOD (E)	APHA 5210 B (5 Days BOD Test)	mg/l	2.36	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	4.8	0.7
4	Total Nitrogen	HACH Method 10072 (Nit Persulfate Digestion Method)	mg/l	1.7	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.125	0.05
6	Total Coliform	APHA 9221B (Standard Tube Coliform Fermentation Technique)	MPN/100ml	160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	2.72	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA) and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :
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Tomoya Suzuki
Director

APPENDIX-3 LABORATORY RESULT OF ESCHERICHIA COLI (SELF-MONITORING)

FOR DISCHARGING POINTS AND AFTER CENTRALIZED STP

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-2017090802
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Kaki International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-1-0822
Sample No. : W-1708204
Waste Profile No. : -

Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	920	1.8

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF). Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :
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MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-2017090003
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Kian International LTD (MKI)
Address : No 1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-S-0822
Sample No. : W-1708205
Waste Profile No. : -

Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Bacteria/Khe Coli	APHA 9222 F Membrane Coli Procedure Using Fluorogenic Substrate	MPN/100ml	1/0	1.8

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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DOWA

GOLDEN DOWA ECOSYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-2017090004
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 3049-C001

Analysis Report

Client Name : Myanmar Kaei International LTD (MKI)
Address : No.1A /2B, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description :
Sample Name : MKI-SW-6-0822 Sampling Date : 22 August, 2017
Sample No. : W-1708208 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	< 1.8	1.8

Remark : LOQ - Limit of Quantitation
APHA - American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :
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FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGING POINTS AND BASELINE OF DISCHARGED CREEK

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
[illegible]

Report No. : GEM-LAB-2017090035
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-2-0822
Sample No. : M-1709207
Waste Profile No. : -
Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	0.1	1.8

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 23rd edition

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Report No. : GEM-LAB-2017090306
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /2B, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description

Sample Name : MKI-SW-3-0822
Sample No. : W-1708208
Waste Profile No. : -
Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	24.0	1.8

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM (MYANMAR) CO., LTD.

Report No. : GEM-LAB-201709007
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Kian Intenational LTD (MKI)
Address : No (A /28, Mya Thidar Housing, Ward 11, South Dikkilaoe
Project Name : -
Sample Description :
Sample Name : MKI-SW-A-0811 Sampling Date : 22 August, 2017
Sample No. : N-1708209 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	28.8	1.8

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

MJTD MYANMA THILAWA DEVELOPMENT LIMITED

DOWA

GEM DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-2017/09018
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Kaw International LTD (MKI)
Address : No.1A /28, Myo Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-GW-1-0822
Sample No. : W-1708212
Waste Profile No. : -

Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	13.0	1.8

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association (APHA), the American Water Works Association (AWWA), and the Water Environment Federation (WEF) Standard Methods for the Examination of Water and Wastewater, 23rd edition

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Approved By :
Tomoya Satsuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Thilawa Special Economic Zone (Zone A) Development Project (Operation Phase)

Appendix

Air Quality Monitoring Report

August, 2017

AIR QUALITY MONITORING

REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE A

(OPERATION STAGE)

(BI-ANNUALLY MONITORING)

August 2017

Myanmar Koei International Ltd.

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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

Thilawa Special Economic Zone (TSEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular environmental monitoring in the industrial area of Zone A in accordance with the approved Environmental Impact Assessment (EIA) report with Environmental Management Plan (EMP). MJTD has implemented monitoring various environmental items with the specified time frame to know the environmental conditions in and around the area.

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the operation of industrial area in and around Thilawa SEZ Zone A, Air quality had been monitored from 8th Aug 2017 – 15th Aug 2017 as follows;

Table 1.2-1 Outlines of Air Quality Monitoring Plan

Monitoring Date	Monitoring Item	Parameters	Number of Point	Duration	Monitoring Methodology
From 8th Aug- 15th Aug, 2017	Air Quality	CO, NO_2, TSP, PM_{10}, and SO_2	1	7 Days	On site measurement by Haz-Scanner Environmental Perimeter Air Station (EPAS)

CHAPTER 2: AIR QUALITY MONITORING

2.1 Monitoring Item

The parameters for air quality monitoring were CO, NO_2, TSP, PM_{10}, and SO_2.

2.2 Monitoring Location

The air quality measurement equipment, "Haz-Scanner Environmental Perimeter Air Station (EPAS) was set up inside the centralized Sewage Treatment Plant (STP) compound which is southeast of the Thilawa SEZ Zone A, N: 16°40'28.38", E: 96°16'34.71", surrounded by the factories of Thilawa SEZ Zone A, north of Dagon Thilawa road and northeast of Moegyoe Swan monastery respectively. Possible emission sources are dust emissions from construction activities and exhaust gas emissions from surrounded factories. The location of air quality monitoring is shown in the Figure 2.2-1.

Figure 2.2-1 Location of Air Quality Monitoring Point

2.3 Monitoring Period

Air quality monitoring was conducted seven consecutive days from 8th August – 15th August, 2017.

2.4 Monitoring Method

Monitoring of CO, NO_2, TSP, PM_{10}, and SO_2 were conducted by referring to the recommendation of the United States Environmental Protection Agency (U.S. EPA). The Haz-Scanner EPAS was used to collect ambient air pollutants. The EPAS measures automatically every one minute and directly read and recorded onsite for CO, NO_2, TSP, PM_{10}, and SO_2. Due to the limitation of the analytical equipment in Myanmar, TSP results was calculated as predicted value which is based on the results of PM_{10}. Therefore, the result of TSP was evaluated using the estimated TSP concentration values. The state of air quality monitoring is shown in Figure 2.4-1.

Figure 2.4-1 Status of Air Quality Monitoring Point

2.5 Monitoring Results

The daily average value of air quality monitoring results of CO, NO_2, TSP, PM_{10}, and SO_2 are described in Table 2.5-1. Comparing with the target value of CO, NO_2, TSP, PM_{10}, and SO_2 prescribed in EIA report for Thilawa SEZ development project Zone A, all of results are under the target value.
Regarding the calculation of predicted TSP concentration, the correlation value between PM_{10} and TSP of ambient air quality guideline value in Thailand as below;

330 $\mu g/m^3$ (TSP standard value in Thailand) / 120 $\mu g/m^3$ (PM_{10} standard value in Thailand) = 2.75 (Correlation value)

Table 2.5-1 Air Quality Monitoring Result (Daily Average)

Date	CO	NO_2	TSP	PM_{10}	SO_2
	ppm	ppm	mg/m^3	mg/m^3	ppm
08 ~09 Aug. 2017	0.024 (0.027 mg/m^3)	0.037 (0.070 mg/m^3)	0.038	0.014	0.006 (0.016 mg/m^3)
09 ~10 Aug. 2017	0.030 (0.034 mg/m^3)	0.032 (0.060 mg/m^3)	0.045	0.016	0.008 (0.021 mg/m^3)
10 ~11 Aug. 2017	0.054 (0.062 mg/m^3)	0.031 (0.058 mg/m^3)	0.040	0.015	0.009 (0.024 mg/m^3)
11 ~12 Aug. 2017	0.026 (0.030 mg/m^3)	0.027 (0.051 mg/m^3)	0.032	0.012	0.009 (0.024 mg/m^3)
12 ~13 Aug. 2017	0.029 (0.033 mg/m^3)	0.028 (0.053 mg/m^3)	0.029	0.011	0.007 (0.018 mg/m^3)
13 ~14 Aug. 2017	0.032 (0.037 mg/m^3)	0.033 (0.062 mg/m^3)	0.043	0.016	0.010 (0.026 mg/m^3)
14 ~15 Aug. 2017	0.025 (0.029 mg/m^3)	0.033 (0.062 mg/m^3)	0.041	0.015	0.008 (0.021 mg/m^3)
7 Days Average Value	0.031 (0.036 mg/m^3)	0.032 (0.060 mg/m^3)	0.038	0.014	0.008 (0.021 mg/m^3)
Target Value	10.000 (11.45 mg/m^3)	< 0.06 (0.11 mg/m^3)	< 0.33	< 0.12	< 0.04 (0.11 mg/m^3)

Note: The target value of CO, NO_2 and SO_2 were converted to ppm units from mg/m^3.

CHAPTER 3: CONCLUSION AND ISSUES TO BE SOLVED

The result of air quality for CO, NO_2, TSP, PM_{10}, and SO_2 in each day were lower than the target value for one day. (Referred to Section 2.5)

In conclusion of this environmental monitoring, there are no specific air quality impacts to the surrounding area of industrial area of Thilawa SEZ Zone A during this monitoring period.

APPENDIX - HOURLY AIR RESULT

Date	Time	CO	NO_2	TSP	PM_{10}	SO_2
		ppm	ppm	mg/m^3	mg/m^3	ppm
		Hourly	Hourly	Hourly	Hourly	Hourly
08 Aug, 2017	11:00 ~ 11:59	0.014	0.048	0.079	0.029	0.001
08 Aug, 2017	12:00 ~ 12:59	0.000	0.044	0.064	0.023	0.001
08 Aug, 2017	13:00 ~ 13:59	0.005	0.036	0.011	0.004	0.003
08 Aug, 2017	14:00 ~ 14:59	0.010	0.037	0.005	0.002	0.005
08 Aug, 2017	15:00 ~ 15:59	0.017	0.031	0.013	0.005	0.002
08 Aug, 2017	16:00 ~ 16:59	0.007	0.032	0.022	0.008	0.002
08 Aug, 2017	17:00 ~ 17:59	0.043	0.035	0.031	0.011	0.006
08 Aug, 2017	18:00 ~ 18:59	0.051	0.035	0.019	0.007	0.004
08 Aug, 2017	19:00 ~ 19:59	0.070	0.034	0.013	0.005	0.001
08 Aug, 2017	20:00 ~ 20:59	0.028	0.041	0.019	0.007	0.002
08 Aug, 2017	21:00 ~ 21:59	0.057	0.038	0.029	0.011	0.009
08 Aug, 2017	22:00 ~ 22:59	0.010	0.039	0.075	0.027	0.004
08 Aug, 2017	23:00 ~ 23:59	0.023	0.041	0.012	0.004	0.018
09 Aug, 2017	0:00 ~ 0:59	0.006	0.039	0.083	0.030	0.007
09 Aug, 2017	1:00 ~ 1:59	0.016	0.038	0.030	0.011	0.002
09 Aug, 2017	2:00 ~ 2:59	0.019	0.038	0.007	0.003	0.003
09 Aug, 2017	3:00 ~ 3:59	0.021	0.037	0.018	0.007	0.011
09 Aug, 2017	4:00 ~ 4:59	0.009	0.035	0.025	0.009	0.015
09 Aug, 2017	5:00 ~ 5:59	0.020	0.035	0.045	0.016	0.013
09 Aug, 2017	6:00 ~ 6:59	0.048	0.037	0.043	0.016	0.013
09 Aug, 2017	7:00 ~ 7:59	0.020	0.034	0.106	0.038	0.002
09 Aug, 2017	8:00 ~ 8:59	0.014	0.035	0.027	0.010	0.002
09 Aug, 2017	9:00 ~ 9:59	0.020	0.030	0.113	0.041	0.013
09 Aug, 2017	10:00 ~ 10:59	0.038	0.035	0.026	0.009	0.006

Max	0.070 (0.080 mg/m^3)	0.048 (0.090 mg/m^3)	0.113	0.041	0.018 (0.047 mg/m^3)
Avg	0.024 (0.027 mg/m^3)	0.037 (0.070 mg/m^3)	0.038	0.014	0.006 (0.016 mg/m^3)
Min	0.000 (0.000 mg/m^3)	0.030 (0.056 mg/m^3)	0.005	0.002	0.001 (0.003 mg/m^3)

Date	Time	CO	NO_2	TSP	PM_{10}	SO_2
		ppm	ppm	mg/m^3	mg/m^3	ppm
		Hourly	Hourly	Hourly	Hourly	Hourly
09 Aug. 2017	11:00 ~ 11:59	0.047	0.038	0.003	0.001	0.011
09 Aug. 2017	12:00 ~ 12:59	0.037	0.037	0.018	0.007	0.006
09 Aug. 2017	13:00 ~ 13:59	0.040	0.039	0.047	0.017	0.001
09 Aug. 2017	14:00 ~ 14:59	0.023	0.037	0.126	0.046	0.004
09 Aug. 2017	15:00 ~ 15:59	0.005	0.030	0.094	0.034	0.009
09 Aug. 2017	16:00 ~ 16:59	0.038	0.029	0.025	0.009	0.003
09 Aug. 2017	17:00 ~ 17:59	0.021	0.030	0.028	0.010	0.004
09 Aug. 2017	18:00 ~ 18:59	0.102	0.034	0.006	0.002	0.007
09 Aug. 2017	19:00 ~ 19:59	0.028	0.029	0.009	0.003	0.001
09 Aug. 2017	20:00 ~ 20:59	0.002	0.036	0.018	0.007	0.008
09 Aug. 2017	21:00 ~ 21:59	0.040	0.035	0.025	0.009	0.006
09 Aug. 2017	22:00 ~ 22:59	0.027	0.034	0.042	0.015	0.004
09 Aug. 2017	23:00 ~ 23:59	0.039	0.035	0.043	0.015	0.007
10 Aug. 2017	0:00 ~ 0:59	0.021	0.036	0.018	0.007	0.011
10 Aug. 2017	1:00 ~ 1:59	0.015	0.035	0.036	0.013	0.015
10 Aug. 2017	2:00 ~ 2:59	0.023	0.031	0.043	0.016	0.011
10 Aug. 2017	3:00 ~ 3:59	0.008	0.030	0.021	0.008	0.004
10 Aug. 2017	4:00 ~ 4:59	0.011	0.034	0.026	0.010	0.011
10 Aug. 2017	5:00 ~ 5:59	0.060	0.029	0.068	0.025	0.015
10 Aug. 2017	6:00 ~ 6:59	0.122	0.035	0.143	0.052	0.020
10 Aug. 2017	7:00 ~ 7:59	0.011	0.034	0.114	0.041	0.011
10 Aug. 2017	8:00 ~ 8:59	0.001	0.026	0.073	0.027	0.004
10 Aug. 2017	9:00 ~ 9:59	0.001	0.021	0.022	0.008	0.007
10 Aug. 2017	10:00 ~ 10:59	0.003	0.018	0.024	0.009	0.009

Max	0.122 (0.140 mg/m^3)	0.039 (0.073 mg/m^3)	0.143	0.052	0.020 (0.052 mg/m^3)
Avg	0.030 (0.034 mg/m^3)	0.032 (0.060 mg/m^3)	0.045	0.016	0.008 (0.021 mg/m^3)
Min	0.001 (0.001 mg/m^3)	0.018 (0.034 mg/m^3)	0.003	0.001	0.001 (0.003 mg/m^3)

Date	Time	CO	NO_2	TSP	PM_{10}	SO_2
		ppm	ppm	mg/m^3	mg/m^3	ppm
		Hourly	Hourly	Hourly	Hourly	Hourly
10 Aug, 2017	11:00 ~ 11:59	0.039	0.033	0.013	0.005	0.008
10 Aug, 2017	12:00 ~ 12:59	0.079	0.045	0.005	0.002	0.000
10 Aug, 2017	13:00 ~ 13:59	0.024	0.027	0.041	0.015	0.005
10 Aug, 2017	14:00 ~ 14:59	0.001	0.038	0.009	0.003	0.005
10 Aug, 2017	15:00 ~ 15:59	0.023	0.032	0.024	0.009	0.005
10 Aug, 2017	16:00 ~ 16:59	0.013	0.032	0.007	0.003	0.008
10 Aug, 2017	17:00 ~ 17:59	0.089	0.033	0.014	0.005	0.012
10 Aug, 2017	18:00 ~ 18:59	0.078	0.032	0.042	0.015	0.002
10 Aug, 2017	19:00 ~ 19:59	0.106	0.038	0.047	0.017	0.002
10 Aug, 2017	20:00 ~ 20:59	0.199	0.037	0.042	0.015	0.005
10 Aug, 2017	21:00 ~ 21:59	0.159	0.034	0.041	0.015	0.009
10 Aug, 2017	22:00 ~ 22:59	0.093	0.034	0.055	0.020	0.012
10 Aug, 2017	23:00 ~ 23:59	0.010	0.033	0.038	0.014	0.014
11 Aug, 2017	0:00 ~ 0:59	0.009	0.029	0.080	0.029	0.010
11 Aug, 2017	1:00 ~ 1:59	0.020	0.026	0.018	0.006	0.010
11 Aug, 2017	2:00 ~ 2:59	0.002	0.034	0.030	0.011	0.005
11 Aug, 2017	3:00 ~ 3:59	0.004	0.033	0.020	0.007	0.005
11 Aug, 2017	4:00 ~ 4:59	0.014	0.032	0.035	0.013	0.016
11 Aug, 2017	5:00 ~ 5:59	0.076	0.036	0.050	0.018	0.014
11 Aug, 2017	6:00 ~ 6:59	0.131	0.035	0.111	0.040	0.028
11 Aug, 2017	7:00 ~ 7:59	0.119	0.025	0.149	0.054	0.011
11 Aug, 2017	8:00 ~ 8:59	0.010	0.020	0.068	0.025	0.005
11 Aug, 2017	9:00 ~ 9:59	0.000	0.018	0.020	0.007	0.005
11 Aug, 2017	10:00 ~ 10:59	0.000	0.019	0.009	0.003	0.013

Max	0.199 (0.228 mg/m^3)	0.045 (0.085 mg/m^3)	0.149	0.054	0.028 (0.073 mg/m^3)
Avg	0.054 (0.062 mg/m^3)	0.031 (0.058 mg/m^3)	0.040	0.015	0.009 (0.024 mg/m^3)
Min	0.000 (0.000 mg/m^3)	0.018 (0.034 mg/m^3)	0.005	0.002	0.000 (0.000 mg/m^3)

Date	Time	CO	NO_2	TSP	PM_{10}	SO_2
		ppm	ppm	mg/m^3	mg/m^3	ppm
		Hourly	Hourly	Hourly	Hourly	Hourly
11 Aug. 2017	11:00 ~ 11:59	0.002	0.018	0.023	0.008	0.017
11 Aug. 2017	12:00 ~ 12:59	0.009	0.025	0.019	0.007	0.007
11 Aug. 2017	13:00 ~ 13:59	0.012	0.029	0.022	0.008	0.003
11 Aug. 2017	14:00 ~ 14:59	0.070	0.077	0.008	0.003	0.009
11 Aug. 2017	15:00 ~ 15:59	0.092	0.027	0.003	0.001	0.008
11 Aug. 2017	16:00 ~ 16:59	0.018	0.028	0.005	0.002	0.005
11 Aug. 2017	17:00 ~ 17:59	0.063	0.026	0.024	0.009	0.015
11 Aug. 2017	18:00 ~ 18:59	0.035	0.024	0.042	0.015	0.009
11 Aug. 2017	19:00 ~ 19:59	0.029	0.030	0.035	0.013	0.009
11 Aug. 2017	20:00 ~ 20:59	0.034	0.031	0.035	0.013	0.005
11 Aug. 2017	21:00 ~ 21:59	0.063	0.034	0.053	0.019	0.003
11 Aug. 2017	22:00 ~ 22:59	0.005	0.033	0.049	0.018	0.004
11 Aug. 2017	23:00 ~ 23:59	0.023	0.032	0.028	0.010	0.012
12 Aug. 2017	0:00 ~ 0:59	0.008	0.026	0.016	0.006	0.013
12 Aug. 2017	1:00 ~ 1:59	0.004	0.028	0.008	0.003	0.005
12 Aug. 2017	2:00 ~ 2:59	0.001	0.028	0.012	0.004	0.002
12 Aug. 2017	3:00 ~ 3:59	0.013	0.026	0.051	0.018	0.017
12 Aug. 2017	4:00 ~ 4:59	0.011	0.031	0.048	0.017	0.009
12 Aug. 2017	5:00 ~ 5:59	0.042	0.028	0.040	0.015	0.013
12 Aug. 2017	6:00 ~ 6:59	0.045	0.029	0.071	0.026	0.011
12 Aug. 2017	7:00 ~ 7:59	0.030	0.023	0.106	0.038	0.013
12 Aug. 2017	8:00 ~ 8:59	0.004	0.010	0.038	0.014	0.006
12 Aug. 2017	9:00 ~ 9:59	0.001	0.002	0.013	0.005	0.007
12 Aug. 2017	10:00 ~ 10:59	0.000	0.013	0.032	0.012	0.012

Max	0.092 (0.105 mg/m^3)	0.077 (0.145 mg/m^3)	0.106	0.038	0.017 (0.044 mg/m^3)
Avg	0.026 (0.030 mg/m^3)	0.027 (0.051 mg/m^3)	0.032	0.012	0.009 (0.024 mg/m^3)
Min	0.000 (0.000 mg/m^3)	0.002 (0.004 mg/m^3)	0.003	0.001	0.002 (0.005 mg/m^3)

Date	Time	CO	NO_2	TSP	PM_{10}	SO_2
		ppm	ppm	mg/m³	mg/m³	ppm
		Hourly	Hourly	Hourly	Hourly	Hourly
12 Aug, 2017	11:00 ~ 11:59	0.000	0.028	0.004	0.002	0.009
12 Aug, 2017	12:00 ~ 12:59	0.033	0.033	0.045	0.016	0.006
12 Aug, 2017	13:00 ~ 13:59	0.005	0.022	0.024	0.009	0.004
12 Aug, 2017	14:00 ~ 14:59	0.034	0.032	0.031	0.011	0.006
12 Aug, 2017	15:00 ~ 15:59	0.017	0.030	0.022	0.008	0.004
12 Aug, 2017	16:00 ~ 16:59	0.025	0.032	0.048	0.018	0.009
12 Aug, 2017	17:00 ~ 17:59	0.101	0.043	0.015	0.005	0.011
12 Aug, 2017	18:00 ~ 18:59	0.049	0.025	0.014	0.005	0.004
12 Aug, 2017	19:00 ~ 19:59	0.022	0.034	0.003	0.001	0.003
12 Aug, 2017	20:00 ~ 20:59	0.027	0.035	0.040	0.015	0.005
12 Aug, 2017	21:00 ~ 21:59	0.036	0.035	0.055	0.020	0.008
12 Aug, 2017	22:00 ~ 22:59	0.021	0.039	0.036	0.013	0.003
12 Aug, 2017	23:00 ~ 23:59	0.009	0.039	0.036	0.013	0.003
13 Aug, 2017	0:00 ~ 0:59	0.014	0.036	0.040	0.014	0.007
13 Aug, 2017	1:00 ~ 1:59	0.016	0.032	0.034	0.012	0.003
13 Aug, 2017	2:00 ~ 2:59	0.005	0.029	0.017	0.006	0.003
13 Aug, 2017	3:00 ~ 3:59	0.018	0.027	0.018	0.007	0.006
13 Aug, 2017	4:00 ~ 4:59	0.053	0.027	0.013	0.005	0.010
13 Aug, 2017	5:00 ~ 5:59	0.050	0.024	0.020	0.007	0.014
13 Aug, 2017	6:00 ~ 6:59	0.101	0.022	0.074	0.027	0.015
13 Aug, 2017	7:00 ~ 7:59	0.036	0.019	0.081	0.029	0.011
13 Aug, 2017	8:00 ~ 8:59	0.007	0.010	0.016	0.006	0.009
13 Aug, 2017	9:00 ~ 9:59	0.005	0.014	0.008	0.003	0.005
13 Aug, 2017	10:00 ~ 10:59	0.003	0.016	0.009	0.003	0.009

Max	0.101 (0.116 mg/m³)	0.043 (0.081 mg/m³)	0.081	0.029	0.015 (0.039 mg/m³)
Avg	0.029 (0.033 mg/m³)	0.028 (0.053 mg/m³)	0.029	0.011	0.007 (0.018 mg/m³)
Min	0.000 (0.000 mg/m³)	0.010 (0.019 mg/m³)	0.003	0.001	0.003 (0.008 mg/m³)

Date	Time	CO	NO_2	TSP	PM_{10}	SO_2
		ppm	ppm	mg/m³	mg/m³	ppm
		Hourly	Hourly	Hourly	Hourly	Hourly
13 Aug, 2017	11:00 – 11:59	0.063	0.044	0.042	0.015	0.008
13 Aug, 2017	12:00 – 12:59	0.034	0.034	0.020	0.007	0.009
13 Aug, 2017	13:00 – 13:59	0.000	0.016	0.035	0.013	0.007
13 Aug, 2017	14:00 – 14:59	0.036	0.041	0.011	0.004	0.003
13 Aug, 2017	15:00 – 15:59	0.019	0.022	0.018	0.006	0.011
13 Aug, 2017	16:00 – 16:59	0.014	0.037	0.024	0.009	0.003
13 Aug, 2017	17:00 – 17:59	0.105	0.060	0.008	0.003	0.015
13 Aug, 2017	18:00 – 18:59	0.026	0.042	0.077	0.028	0.003
13 Aug, 2017	19:00 – 19:59	0.064	0.035	0.044	0.016	0.014
13 Aug, 2017	20:00 – 20:59	0.019	0.037	0.056	0.021	0.008
13 Aug, 2017	21:00 – 21:59	0.021	0.034	0.015	0.006	0.009
13 Aug, 2017	22:00 – 22:59	0.002	0.035	0.031	0.011	0.010
13 Aug, 2017	23:00 – 23:59	0.005	0.032	0.101	0.037	0.009
14 Aug, 2017	0:00 – 0:59	0.006	0.036	0.065	0.024	0.010
14 Aug, 2017	1:00 – 1:59	0.042	0.034	0.022	0.008	0.010
14 Aug, 2017	2:00 – 2:59	0.008	0.033	0.024	0.009	0.011
14 Aug, 2017	3:00 – 3:59	0.021	0.034	0.058	0.021	0.010
14 Aug, 2017	4:00 – 4:59	0.016	0.034	0.044	0.016	0.014
14 Aug, 2017	5:00 – 5:59	0.026	0.033	0.054	0.020	0.016
14 Aug, 2017	6:00 – 6:59	0.192	0.036	0.089	0.032	0.036
14 Aug, 2017	7:00 – 7:59	0.036	0.030	0.117	0.042	0.006
14 Aug, 2017	8:00 – 8:59	0.006	0.021	0.036	0.013	0.012
14 Aug, 2017	9:00 – 9:59	0.002	0.020	0.019	0.007	0.007
14 Aug, 2017	10:00 – 10:59	0.009	0.021	0.016	0.006	0.009

Max	0.192 (0.220 mg/m³)	0.060 (0.113 mg/m³)	0.117	0.042	0.036 (0.094 mg/m³)
Avg	0.032 (0.037 mg/m³)	0.033 (0.062 mg/m³)	0.043	0.016	0.010 (0.026 mg/m³)
Min	0.000 (0.000 mg/m³)	0.016 (0.030 mg/m³)	0.008	0.003	0.003 (0.008 mg/m³)

Date	Time	CO	NO_2	TSP	PM_{10}	SO_2
		ppm	ppm	mg/m^3	mg/m^3	ppm
		Hourly	Hourly	Hourly	Hourly	Hourly
14 Aug, 2017	11:00 ~ 11:59	0.002	0.020	0.037	0.013	0.009
14 Aug, 2017	12:00 ~ 12:59	0.002	0.015	0.010	0.004	0.013
14 Aug, 2017	13:00 ~ 13:59	0.000	0.020	0.026	0.009	0.007
14 Aug, 2017	14:00 ~ 14:59	0.000	0.018	0.007	0.002	0.008
14 Aug, 2017	15:00 ~ 15:59	0.017	0.019	0.037	0.014	0.005
14 Aug, 2017	16:00 ~ 16:59	0.044	0.034	0.023	0.009	0.002
14 Aug, 2017	17:00 ~ 17:59	0.074	0.041	0.021	0.007	0.004
14 Aug, 2017	18:00 ~ 18:59	0.020	0.039	0.019	0.007	0.002
14 Aug, 2017	19:00 ~ 19:59	0.030	0.044	0.011	0.004	0.008
14 Aug, 2017	20:00 ~ 20:59	0.037	0.041	0.016	0.006	0.012
14 Aug, 2017	21:00 ~ 21:59	0.059	0.039	0.017	0.006	0.009
14 Aug, 2017	22:00 ~ 22:59	0.013	0.034	0.098	0.036	0.009
14 Aug, 2017	23:00 ~ 23:59	0.002	0.039	0.093	0.034	0.011
15 Aug, 2017	0:00 ~ 0:59	0.015	0.036	0.035	0.013	0.008
15 Aug, 2017	1:00 ~ 1:59	0.011	0.035	0.020	0.007	0.008
15 Aug, 2017	2:00 ~ 2:59	0.008	0.032	0.037	0.013	0.006
15 Aug, 2017	3:00 ~ 3:59	0.012	0.032	0.034	0.012	0.006
15 Aug, 2017	4:00 ~ 4:59	0.023	0.036	0.019	0.007	0.008
15 Aug, 2017	5:00 ~ 5:59	0.037	0.039	0.031	0.011	0.008
15 Aug, 2017	6:00 ~ 6:59	0.026	0.039	0.060	0.022	0.010
15 Aug, 2017	7:00 ~ 7:59	0.054	0.036	0.078	0.028	0.010
15 Aug, 2017	8:00 ~ 8:59	0.094	0.030	0.100	0.036	0.017
15 Aug, 2017	9:00 ~ 9:59	0.014	0.029	0.096	0.035	0.008
15 Aug, 2017	10:00 ~ 10:59	0.015	0.032	0.055	0.020	0.013

Max	0.094 (0.108 mg/m^3)	0.044 (0.083 mg/m^3)	0.100	0.036	0.017 (0.044 mg/m^3)
Avg	0.025 (0.029 mg/m^3)	0.033 (0.062 mg/m^3)	0.041	0.015	0.008 (0.021 mg/m^3)
Min	0.000 (0.000 mg/m^3)	0.015 (0.028 mg/m^3)	0.007	0.002	0.002 (0.005 mg/m^3)

Thilawa Special Economic Zone (Zone A) Development Project (Operation Phase)

Appendix

Noise and Vibration Monitoring Report

July, 2017

NOISE AND VIBRATION

MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE A

(OPERATION STAGE)

(BI-ANNUALLY MONITORING)

August 2017

Myanmar Koei International Ltd.

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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

Thilawa Special Economic Zone (TSEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular environmental monitoring in the industrial area of Zone A in accordance with the approved Environmental Impact Assessment (EIA) report with Environmental Management Plan (EMP). MJTD has implemented monitoring various environmental items with the specified time frame to know the environmental conditions in and around the area.

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the operation of industrial area in and around Thilawa SEZ Zone A, noise and vibration levels had been monitored from 8th August 2017 – 11th August 2017 as follows;

Table 1.2-1 Outlines of Noise and Vibration Level Monitoring

Monitoring Date	Monitoring Item	Parameters	Number of Points	Duration	Monitoring Methodology
From 8th August–9th August, 2017	Noise Level	L_{Aeq}(dB)	1 (NV1)	24 hours	On-site measurement by "Rion NL-42 sound level meter"
From 9th August–10th August, 2017	Noise Level	L_{Aeq}(dB)	1 (NV2)	24 hours	On-site measurement by "Rion NL-42 sound level meter"
From 10th August–11th August, 2017	Noise Level	L_{Aeq}(dB)	1 (NV3)	24 hours	On-site measurement by "Rion NL-42 sound level meter"
From 8th August–9th August, 2017	Vibration Level	L_{v10} (dB)	1 (NV1)	24 hours	On-site measurement by "Vibration Level Meter- VM-53A"
From 9th August–10th August, 2017	Vibration Level	L_{v10} (dB)	1 (NV2)	24 hours	On-site measurement by "Vibration Level Meter- VM-53A"
From 10th August–11th August, 2017	Vibration Level	L_{v10} (dB)	1 (NV3)	24 hours	On-site measurement by "Vibration Level Meter- VM-53A"

CHAPTER 2: NOISE AND VIBRATION LEVEL MONITORING

2.1 Monitoring Item

The noise and vibration level monitoring items are shown in Table 2.1-1.

Table 2.1-1 Monitoring Parameters for Noise and Vibration Level

No.	Item	Parameter
1	Noise	A-weighted loudness equivalent (L_{Aeq})
2	Vibration	Vibration level, vertical, percentile (L_{V10})

2.2 Monitoring Location

Noise and vibration levels were measured in front of administrative building, Thilawa SEZ Zone A, monitoring point (NV-1); N: 16°40'11.50", E: 96°16'32.00" for traffic noise concerned, at the east of the Thilawa SEZ Zone A, monitoring point (NV-2); N: 16°40'52.50", E: 96°16'55.50", and at the west of the Thilawa SEZ Zone A, monitoring point (NV-3); N: 16°40'46.20" , E: 96°15'30.10", where is the nearest to the residential houses of Alwan sok village. The location of the noise and vibration monitoring points are shown in Figure 2.2-1.

Figure 2.2-1 Location of Noise and Vibration Level Monitoring Points

NV-1

NV-1 is located in front of administrative building, Thilawa SEZ and next to Dagon-Thilawa road which is paved with moderate to highly traffic volume during the day and night by passing of loader vehicles and dump trucks. Possible sources of noise and vibration is generated from vehicle traffic during the daytime and night.

NV-2

NV-2 is located at the east of the Thilawa SEZ Zone A, Thilawa dam in west and construction of factories in Thilawa SEZ Zone A in northwest. Possible sources of noise and vibration is generated from construction activities from Zone A's locators and road traffic. There is an access road situated east of NV-2.

NV-3

NV-3 is located at the west of the Thilawa SEZ Zone A, surrounded by the residential houses of Alwan sok village in north and northwest and garment factory in northeast, construction of factories in Thilawa SEZ Zone A in east respectively. Possible sources of noise and vibration is generated from daily human activities nearby Alwan sok village and road traffic. There is an access road situated northeast of NV-3.

2.3 Monitoring Method

Noise level was measured by "Rion NL-42 sound level meter" and automatically recorded every 10 minutes in a memory card. The vibration level meter was, VM-53A (Rion Co. Ltd., Japan), accompanied by a 3-axis accelerometer PV-83C (Rion Co. Ltd.) was placed on solid soil ground. Vertical vibration (Z axis), L_v, was measured every 10 minutes within the adaptable range of (10-70) dB at NV-1, (10-70) dB at NV-2, and (10-70) dB at NV-3 and recorded to a memory card.
The measurement period of noise and vibration was 24 hours for each monitoring point. The status of the noise and vibration level monitoring on NV-1, NV-2 and NV-3 are shown in Figure 2.3-1.

Figure 2.3-1 Status of Noise and Vibration Level Monitoring at NV-1, NV-2 and NV-3

2.4 Monitoring Results

Noise Monitoring Results

Noise monitoring results are separated daytime (6:00 AM to 10:00 PM), night time (10:00 PM to 6:00 AM) time frames for NV-1, daytime (7:00 AM to 7:00 PM), evening time (7:00 PM to 10:00 PM), and night time (10:00 PM to 7:00 AM) time frames respectively for NV-2 and NV-3. Noise measurement was carried out for one location on a 24-hour basis. The monitoring results are summarized in Table 2.4-1, Table 2.4-2, and Table 2.4-3. Comparing with the target value of noise level in operation stage prescribed in EIA report for Thilawa SEZ development project Zone A, all results were under the target values at NV-1, NV-2 and NV-3.

Table 2.4-1 Results of Noise Levels (L_{Aeq}) Monitoring at NV-1

Date	(Traffic Noise Level) Equivalent Noise Level (L_{Aeq} dB)	
	Day Time (6:00 AM – 10:00 PM)	Night Time (10:00 PM – 6:00 AM)
8th August – 9th August, 2017	61	55
Target Value	75	70

Note: Target value is applied to the noise standard along main road stipulated in the Noise Regulation Law (Japan) (Law No. 98 of 1968, Latest Amendment by Law No.91 of 2000).

Table 2.4-2 Results of Noise Levels (L_{Aeq}) Monitoring at NV-2

Date	(Commercial and Industrial Areas) Equivalent Noise Level (L_{Aeq} dB)		
	Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
9th August – 10th August, 2017	58	51	52
Target Value	70	65	60

Note: Target value is applied to the noise level during the operation stage in the EIA Report for Thilawa SEZ Development Project (Industrial Area of Zone A).

Table 2.4-3 Results of Noise Levels (L_{Aeq}) Monitoring at NV-3

Date	(Commercial and Industrial Areas) Equivalent Noise Level (L_{Aeq} dB)		
	Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
20th June – 21st June, 2017	48	50	48
Target Value	70	65	60

Note: Target value is applied to the noise level during the operation stage in the EIA Report for Thilawa SEZ Development Project (Industrial Area of Zone A).

Table 2.4-4 Hourly Noise Level (LAeq) Monitoring Results at NV-1

Date	Time	(L_{Aeq} dB)	(L_{Aeq} dB) Each Category	(L_{Aeq} dB) Target Value
8th August – 9th August, 2017	6:00-7:00	60	61	75
	7:00-8:00	60		
	8:00-9:00	60		
	9:00-10:00	60		
	10:00-11:00	61		
	11:00-12:00	61		
	12:00-13:00	60		
	13:00-14:00	60		
	14:00-15:00	61		
	15:00-16:00	60		
	16:00-17:00	62		
	17:00-18:00	63		
	18:00-19:00	61		
	19:00-20:00	60		
	20:00-21:00	58		
	21:00-22:00	59		
	22:00-23:00	58	55	70
	23:00-24:00	57		
	24:00-1:00	55		
	1:00-2:00	55		
	2:00-3:00	54		
	3:00-4:00	52		
	4:00-5:00	53		
	5:00-6:00	56		

Table 2.4-5 Hourly Noise Level (L_{Aeq}) Monitoring Results at NV-2

Date	Time	(L_{Aeq} dB)	(L_{Aeq} dB) Each Category	(L_{Aeq} dB) Target Value
9th August – 10th August, 2017	7:00-8:00	60	58	70
	8:00-9:00	59		
	9:00-10:00	57		
	10:00-11:00	59		
	11:00-12:00	54		
	12:00-13:00	54		
	13:00-14:00	57		
	14:00-15:00	56		
	15:00-16:00	55		
	16:00-17:00	62		
	17:00-18:00	58		
	18:00-19:00	53		
	19:00-20:00	50	51	65
	20:00-21:00	53		
	21:00-22:00	49	52	60
	22:00-23:00	51		
	23:00-24:00	49		
	24:00-1:00	50		
	1:00-2:00	48		
	2:00-3:00	49		
	3:00-4:00	49		
	4:00-5:00	47		
	5:00-6:00	50		
	6:00-7:00	59		

Table 2.4-6 Hourly Noise Level (L_{Aeq}) Monitoring Results at NV-3

Date	Time	(L_{Aeq} dB)	(L_{Aeq} dB) Each Category	(L_{Aeq} dB) Target Value
10th August – 11th August, 2017	7:00-8:00	46	48	70
	8:00-9:00	46		
	9:00-10:00	45		
	10:00-11:00	46		
	11:00-12:00	44		
	12:00-13:00	52		
	13:00-14:00	46		
	14:00-15:00	46		
	15:00-16:00	47		
	16:00-17:00	48		
	17:00-18:00	50		
	18:00-19:00	49		
	19:00-20:00	51	50	65
	20:00-21:00	50		
	21:00-22:00	50		
	22:00-23:00	49	48	60
	23:00-24:00	49		
	24:00-1:00	49		
	1:00-2:00	49		
	2:00-3:00	49		
	3:00-4:00	49		
	4:00-5:00	47		
	5:00-6:00	47		
	6:00-7:00	47		

Figure 2.4-1 Results of Noise Levels (L_{Aeq}) Monitoring at NV-1

Figure 2.4-2 Results of Noise Levels (L_{Aeq}) Monitoring at NV-2

Figure 2.4-3 Results of Noise Levels (L_{Aeq}) Monitoring at NV-3

Vibration Monitoring Results

The results of vibration level are shown in Table 2.4-7, Table 2.4-8, and Table 2.4-9. By comparing with the target vibration level in operation stage in EIA report for Thilawa SEZ development project Zone A, all of results were under the target values.

Table 2.4-7 Results of Vibration Levels (L_{v10}) Monitoring at NV-1

Location	Date	(Office, commercial facilities, and factories) Equivalent Vibration Level (L_{v10}, dB)		
		Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
NV-1	8th – 9th August, 2017	43	41	39
Target Value		70	65	65

Note: Target value is applied to the noise level during the operation stage in the EIA Report for Thilawa SEZ Development Project (Industrial Area of Zone A).

Table 2.4-8 Results of Vibration Levels (L_{v10}) Monitoring at NV-2

Location	Date	(Office, commercial facilities, and factories) Equivalent Vibration Level (L_{v10}, dB)		
		Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
NV-2	9th – 10th August, 2017	31	24	24
Target Value		70	65	65

Note: Target value is applied to the noise level during the operation stage in the EIA Report for Thilawa SEZ Development Project (Industrial Area of Zone A).

Table 2.4-9 Results of Vibration Levels (L_{v10}) Monitoring at NV-3

25Location	Date	(Office, commercial facilities, and factories) Equivalent Vibration Level (L_{v10}, dB)		
		Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
NV-2	10th – 11th June, 2017	25	22	20
Target Value		70	65	65

Note: Target value is applied to the noise level during the operation stage in the EIA Report for Thilawa SEZ Development Project (Industrial Area of Zone A).

Table 2.4-10 Results of Hourly Vibration Levels (L_{v10}) Monitoring at NV-1

Date	Time	(L_{Aeq} dB)	(L_{Aeq} dB) Each Category	(L_{Aeq} dB) Target Value
8th August – 9th August, 2017	7:00-8:00	41	43	70
	8:00-9:00	42		
	9:00-10:00	44		
	10:00-11:00	42		
	11:00-12:00	43		
	12:00-13:00	43		
	13:00-14:00	42		
	14:00-15:00	45		
	15:00-16:00	47		
	16:00-17:00	43		
	17:00-18:00	43		
	18:00-19:00	43		
	19:00-20:00	41	41	65
	20:00-21:00	41		
	21:00-22:00	40	39	65
	22:00-23:00	40		
	23:00-24:00	37		
	24:00-1:00	36		
	1:00-2:00	38		
	2:00-3:00	39		
	3:00-4:00	34		
	4:00-5:00	36		
	5:00-6:00	40		
	6:00-7:00	42		

Table 2.4-11 Results of Hourly Vibration Levels (L_{v10}) Monitoring at NV-2

Date	Time	(L_{Aeq} dB)	(L_{Aeq} dB) Each Category	(L_{Aeq} dB) Target Value
9th August – 10th August, 2017	7:00-8:00	32	31	70
	8:00-9:00	33		
	9:00-10:00	31		
	10:00-11:00	31		
	11:00-12:00	30		
	12:00-13:00	29		
	13:00-14:00	28		
	14:00-15:00	30		
	15:00-16:00	31		
	16:00-17:00	33		
	17:00-18:00	33		
	18:00-19:00	27		
	19:00-20:00	25	24	65
	20:00-21:00	24		
	21:00-22:00	24	24	65
	22:00-23:00	23		
	23:00-24:00	22		
	24:00-1:00	23		
	1:00-2:00	16		
	2:00-3:00	20		
	3:00-4:00	23		
	4:00-5:00	15		
	5:00-6:00	24		
	6:00-7:00	31		

Table 2.4-12 Results of Hourly Vibration Levels (L_{v10}) Monitoring at NV-3

Date	Time	(L_{v10}, dB)	(L_{v10}, dB) Each Category	(L_{v10}, dB) Target Value
10th August – 11th August, 2017	7:00-8:00	32	25	70
	8:00-9:00	33		
	9:00-10:00	31		
	10:00-11:00	31		
	11:00-12:00	30		
	12:00-13:00	29		
	13:00-14:00	28		
	14:00-15:00	30		
	15:00-16:00	31		
	16:00-17:00	33		
	17:00-18:00	33		
	18:00-19:00	27		
	19:00-20:00	25	22	65
	20:00-21:00	24		
	21:00-22:00	24		
	22:00-23:00	23	20	65
	23:00-24:00	22		
	24:00-1:00	25		
	1:00-2:00	16		
	2:00-3:00	20		
	3:00-4:00	23		
	4:00-5:00	15		
	5:00-6:00	24		
	6:00-7:00	31		

Figure 2.4-4 Results of Vibration Levels (L_{v10}) Monitoring at NV-1

Figure 2.4-5 Results of Vibration Levels (Lv10) Monitoring at NV-2

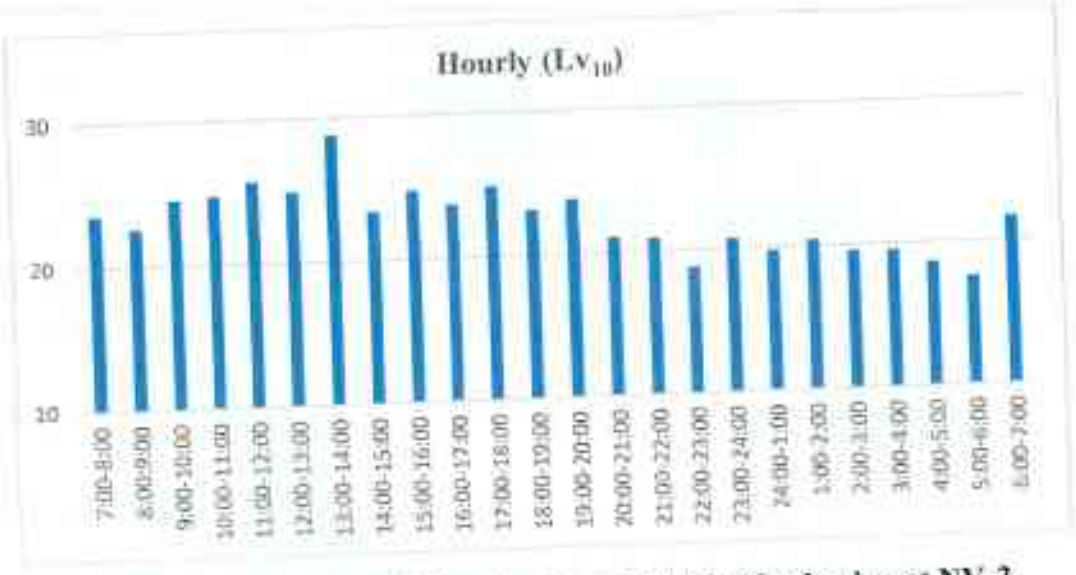

Figure 2.4-6 Results of Vibration Levels (Lv10) Monitoring at NV-3

CHAPTER 3: CONCLUSION AND RECOMMENDATION

By comparing with the target noise and vibration level in operation stage in EIA report for Thilawa SEZ development project Zone A, all results were under the target values at NV-1, NV-2, and NV-3. (Referred to section 2.4)

In conclusion of this environmental monitoring, there are no specific noise and vibration impacts to the surrounding area of industrial area of Thilawa SEZ Zone A during this monitoring period.

Thilawa Special Economic Zone (Zone A) Development Project (Operation Phase)

Appendix

General Waste Disposal Record

(Admin Complex Compound- April 2017 to September 2017)

MJTD

Waste Disposal Record

Location : Admin Complex Compound (Trash Room)

Disposal Site : Golden DOWA Eco-system Myanmar Co.,Ltd

Type of Waste : Waste from common area of Thilawa SEZ and Admin complex compound

No	Year	Month	Date	Waste Disposal Time	Weight(Kg)	Total Weight/month
1	2016	March	14-Mar-16	1	320	320
2	2016	April	7-Apr-16	1	600	600
3	2016	June	29-Jun-16	1	1380	1380
4	2016	July	28-Jul-16	1	1000	1000
5	2016	August	31-Aug-16	1	1220	1220
6	2016	October	3-Oct-16	1	1160	2780
7	2016	October	25-Oct-16	1	1620	
8	2016	November	30-Nov-16	1	1120	1120
9	2017	January	5-Jan-17	1	1060	1060
10	2017	February	9-Feb-17	1	680	1440
11	2017	February	10-Feb-17	1	760	
12	2017	March	16-Mar-17	1	960	1680
13	2017	March	17-Mar-17	1	720	
14	2017	April	10-Apr-17	1	960	960
15	2017	May	25-May-17	1	1000	1940
16	2017	May	26-May-17	1	940	
17	2017	June	28-Jun-17	1	1140	1800
18	2017	June	28-Jun-17	1	660	
19	2017	July	25-Jul-17	1	1180	1180
20	2017	August	25-Aug-17	1	1640	2020
21	2017	August	29-Aug-17	1	380	
22	2017	September	20-Sep-17	1	1180	1180

MJTD

Manifest	. E-Slip	*Waste service company to Waste Generator

Date of issuance	(Day Month, Year)	Issuer	(Name&Sign)
Number of issuance			
Contractors	Waste generator	Transportation company	Waste service company
Company Name			
Tel			

Waste	Kind	Name	Style of packing
	☐Non-Hazardous		
	☐Hazardous	Quantity(Unit)	Remark
	☐Others		

Customer code		Waste Profile code	

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign)	(Day Month, Year)
Waste service company	(Name&Sign)	(Day Month, Year)

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

Manifest — C-Slip

*Transportation company to Waste Generator

Date of issuance (Day Month Year)	25 - May - 17	Issuer (Name&Sign)	Myo Min Thein
Number of issuance	9999 1705 0104		

Contractors	Waste generator	Transportation company	Waste service company
Company Name	Myanmar Japan Tobacco Development Ltd	GEM	GEM
Tel			

Waste	Kind	Name	Style of packing
	☐Non-Hazardous	General Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	1000 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Kyaw Tun Mya 3K/8896	(Day Month Year) 25. 5. 2017
Waste service company	(Name&Sign)	(Day Month Year) 25. 5. 2017

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

Manifest — C-Slip

*Transportation company to Waste Generator

Date of issuance (Day Month Year)	25 - May - 17	Issuer (Name&Sign)	Myo Min Thein
Number of issuance	9999 1705 0108		

Contractors	Waste generator	Transportation company	Waste service company
Company Name	Myanmar Japan Tobacco Development Ltd	GEM	GEM
Tel			

Waste	Kind	Name	Style of packing
	☐Non-Hazardous	General Waste & Production Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	940 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Kyaw Tun Mya 3K/8896	(Day Month Year) 25. 5. 2017
Waste service company	(Name&Sign)	(Day Month Year) 26. 5. 17

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

28.6.2017

Manifest

E-Slip

*Waste service company to Waste Generator

Date of issuance	(Day Month, Year)	Issuer	(Name&Sign)
Number of issuance			

Contractors	Waste generator	Transportation company	Waste service company
Company Name			
Tel			

Waste	Kind	Name	Style of packing
	☐Non-Hazardous		
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	1140 kg	

Customer code		Waste Profile code	

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign)	(Day Month, Year) 10-7-2017
Waste service company	(Name&Sign)	(Day Month, Year)

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

28.6.2017

Manifest

E-Slip

*Waste service company to Waste Generator

Date of issuance	(Day Month, Year)	Issuer	(Name&Sign) Myo Min Thein
Number of issuance			

Contractors	Waste generator	Transportation company	Waste service company
Company Name			
Tel			

Waste	Kind	Name	Style of packing
	☐Non-Hazardous		
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	660 kg	

Customer code		Waste Profile code	

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign)	(Day Month, Year) 10-7-20
Waste service company	(Name&Sign)	(Day Month, Year)

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

MJTD

Manifest	E-Slip	*Waste service company to Waste Generator

Date of issuance (Day Month, Year)	25 · July 17	Issuer (Name&Sign)	
Number of issuance			

Contractors	Waste generator	Transportation company	Waste service company
Company Name			
Tel			

Waste	Kind	Name	Style of packing
	☐Non-Hazardous		
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	1180kg	

Customer code		Waste Profile code	

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign)	(Day Month, Year) 3.8.2017
Waste service company	(Name&Sign)	(Day Month, Year)

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

Manifest	C-Slip	*Transportation company to Waste Generator

Date of issuance	(Day Month, Year) 25 August 17	Issuer	(Name&Sign) Myo Min Thein 25.8.17
Number of issuance	9999 1708 0126		
Contractors	Waste generator	Transportation company	Waste service company
Company Name	Yparmar Japan Thilawa Development Ltd	GEM	GEM
Tel			

Waste	Kind	Name	Style of packing
	☐Non-Hazardous	General Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	1640 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Kyaw Tun Mya 31 8896 25.8.17	(Day Month, Year)
Waste service company	(Name&Sign)	(Day Month, Year)

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

Manifest	C-Slip	*Transportation company to Waste Generator

Date of issuance	(Day Month, Year) 29 Oct. 17	Issuer	(Name&Sign)
Number of issuance	1799 1102 0192		
Contractors	Waste generator	Transportation company	Waste service company
Company Name	Yamaha Motor Japan Thilawa Development Ltd	GEM	GEM
Tel			

Waste	Kind	Name	Style of packing
	☑Non-Hazardous	General Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	980 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Myo Min Thein 31 8896	(Day Month, Year)
Waste service company	(Name&Sign)	(Day Month, Year)

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

MJTD

Manifest

C-Slip

*Transportation company to Waste Generator

Date of issuance	(Day Month, Year) 20 09 17	Issuer	(Name&Sign) Myo Min Thein
Number of issuance	1997 1209 0072		

Contractors	Waste generator	Transportation company	Waste service company
Company Name	Myanmar Japan Eco-System Development Ltd	GEM	GEM
Tel			

	Kind	Name	Style of packing
Waste	☐Non-Hazardous	General Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	1180 kg	

Customer code	0001	Waste Profile code	A0013

Trace	P/C(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Kyaw Tun Myo 2N 6752 20-9-17	(Day Month, Year)
Waste service company	(Name&Sign)	(Day Month, Year)

Designed by GOLDEN WUWA ECO-SYSTEM MYANMAR CO., LTD.

Thilawa Special Economic Zone (Zone A) Development Project (Operation Phase)

Appendix

Sewage Treatment Plant Monitoring Record

April 2017 to September 2017

Monitoring Parameters Result for STP(Phase-1)

Month	Date	Daily Parameters								Weekly Parameters						Monthly Parameters																							
		pH	ORP	DO	EC	TDS	Turbidity	COD	Temp	BOD	T-Coli	T-N	T-P	O&G	SS	Cyanide	Chromium	Arsenic	Mercury	Cadmium	Selenium	Lead	Nickel	Silver	Zinc	Copper	Barium	Metal	Pesticide	Total Chlorine	Formaldehyde	Sulfide	Iron	Detergents	Hexavalent Chromium(Cr6+)	Fluoride	Total Chlorine	Phenols
Permissible		5.5-9.0		Not < 4.0				Not > 250		Not > 30	Not > 400			Not > 10	Not > 100																							
Unit		-	mv	mg/L	µs/cm	ppm	FNU	ppm	°C	ppm	MPN/100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Jun	01-Jun-17	Effluent Tube sealing at open with 0.8 mm SS wire and marked according to Drawing No.																																			
Jun	02-Jun-17	6.83	203.6	5.19	512	195	330	92.8	28.28																													
Jun	03-Jun-17		409.4	5.1	502	241	347		28.88																													
Jun	07-Jun-17	6.84	366.7	5.7	502	241	347	108	28.45	68.8	220	13.3	0.11	40.8	40.8																							
Jun	08-Jun-17	6.83	363.7	4.87	508	245	351.7	80	28.88																													
Jun	09-Jun-17	6.86	324.3	5.35	511	245	354	82	28.83																													
Jun	10-Jun-17																																					
Jun	11-Jun-17																																					
Jun	12-Jun-17		381	4.11	513	317	71	121	30.34																													
Jun	13-Jun-17		283.5	5.16	513	256	209	80	30.47																													
Jun	14-Jun-17		277.7	4.83	509	245	177	77	29.88	7	23	5.3	2.19	0.87	96	0.113	<0.003	<0.01	<0.001	<0.003	<0.01	<0.005	7.53	0	0.08	<0.002	0.029	0.07	0.026	0.2	0.046						0.015
Jun	15-Jun-17		268.7	4.8	510	245	245.8	83	29.86																													
Jun	16-Jun-17		306	5	518	308		114																													
Jun	17-Jun-17																																					
Jun	18-Jun-17																																					
Jun	19-Jun-17	6.83	259.6	4.71	507	324	31.8	68	30.31																													
Jun	20-Jun-17	6.8	318.1	5.44	497	249	33.8	54	30.07																													
Jun	21-Jun-17	6.83	176.2	5.25	514	257	33.8	58	30	12.5	1600000	4.7	2.79	0.8	84																							
Jun	22-Jun-17		340.8	4.98	507	369	28.5	74	30.39																													
Jun	23-Jun-17		157.7	5.35	518	311	30.8	126	30.31																													
Jun	24-Jun-17																																					
Jun	25-Jun-17																																					
Jun	26-Jun-17		322.1	5.22	508	322	40.8	117	30.08																													
Jun	27-Jun-17		428	4.74	520	327	71.8	118	30.1																													
Jun	28-Jun-17		344.5	4.95	571	366	29.5	88	30.1	14.5	1600000	14.5	3.048	0.8	88																							
Jun	29-Jun-17		438	5.14	445	335	40.2	227	30.49																													
Jun	30-Jun-17		402.4	4.91	518	339	84.1	76	29.99																													
Jul	01-Jul-17																																					
Jul	02-Jul-17																																					
Jul	03-Jul-17	6.8	433.4	5.14	521	338	72.8	92	29.87																													
Jul	04-Jul-17	6.85	446.7	5.19	533	28.3		72																													
Jul	05-Jul-17	6.81	418	11.81	476	307	102.8	165	28.28	58.3	23	11.9	0.393	0.8	95	0.519	0.158	<0.01	<0.001	<0.003	<0.01	<0.005	11.8	7.4	0.068	<0.002	0.029	0.08	0.031	0.2	0.313						0.033
Jul	06-Jul-17		309.6	5.48	548	359	85.6	256	28.96																													
Jul	07-Jul-17		443.3	5.29	538	354	77.8	54	28.6																													
Jul	08-Jul-17																																					
Jul	09-Jul-17																																					
Jul	10-Jul-17		454.8	7.28	810	572	42.1	58	29.55																													
Jul	11-Jul-17		472	6.68	825	572	12.8	14	29.57																													
Jul	12-Jul-17	6.81	395.1	6.72	818	568	19.9	83	29.58	16	1600000	13.7	2.52	0.8	76																							
Jul	13-Jul-17		378.1	6.83	863	599	57.2	53	29.75																													
Jul	14-Jul-17		387	6.48	851	421	100	231	30.26																													
Jul	15-Jul-17																																					
Jul	16-Jul-17																																					
Jul	17-Jul-17		362.8	6.61	838	589	110	61	30.54																													
Jul	18-Jul-17		377.8	6.66	840	588	47.2	120	29.79	57.4	1600000	24.5	1.98	0.8	180																							
Jul	19-Jul-17																																					
Jul	20-Jul-17		362.8	7.05	838	587	44.2	72	30.16																													
Jul	21-Jul-17		378.6	7.05	840	591	45.8	61	29.7																													
Jul	22-Jul-17																																					
Jul	23-Jul-17																																					
Jul	24-Jul-17	6.83	338.6	7.2	833	582	8.8	204	29.21																													
Jul	25-Jul-17		445	6.82	878	582	46.8	111	28.87																													
Jul	26-Jul-17		466.2	7.23	844	573	115	96	29.08	12.5	1600000	9	2.145	0.8	58																							
Jul	27-Jul-17		429.2	7.23	834	573	55.5	91	29.39																													
Jul	28-Jul-17		423.2	7.31	818	553	78.2	78	29.11																													
Jul	29-Jul-17																																					
Jul	30-Jul-17																																					
Jul	31-Jul-17		387.7	8.2	921	634	57.7	57	29.67																													
Aug	01-Aug-17		390.1	11.27	923	635	29.8	45	29.6																													
Aug	02-Aug-17		424.1	8.67	923	635	51.8	84	29.83	9.7	1600000	5.1	1.246	0.8	34	0.224	<0.003	<0.01	<0.001	<0.003	<0.01	<0.005	5.31	0.27	1.6	0.084	<0.002	0.034	0.29	0.31	0.1	0.034						0.043
Aug	03-Aug-17	6.84	419.3	7.45	923	635	51.8	74	29.58																													
Aug	04-Aug-17		377.4	8.01	870	605	76.1	74	29.53																													
Aug	05-Aug-17																																					
Aug	06-Aug-17																																					
Aug	07-Aug-17	6.83	328.3	5.04	514	317	98.8	36	29.72																													
Aug	08-Aug-17		501.3	7.08	808	516	37.8	5.4	29.89																													
Aug	09-Aug-17		442.5	6.02	804	514	37.8	50.4	29.61	9.66	1600000	5.7	2.31	0.8	30																							
Aug	10-Aug-17	6.8	462.2	6.08	800	510	36.8	70	29.7																													
Aug	11-Aug-17		423.2	6.18	803	513	113	50	29.64																													
Aug	12-Aug-17																																					
Aug	13-Aug-17		50	11.8	810	518	113	30	29.61																													
Aug	14-Aug-17		415.8	6.7	823	526	39.8	69	29.82																													
Aug	15-Aug-17		424.3	6.7	822	526	37.8	60	29.79	9.5	1600000	6.1	2.43	0.8	44																							
Aug	16-Aug-17		401.8	6.71	838	540	37.8	48	29.69																													
Aug	17-Aug		464.4	6.41	879	540	63.7	80	29.67																													
Aug	18-Aug-17																																					
Aug	19-Aug-17		464.4	6.82	846	550	35.8	82	29.58																													
Aug	20-Aug-17		448.8	6.81	844	549	74.8	96	29.58																													
Aug	21-Aug-17	6.84	448.8	10.08	868	576	48	72	29.48	9	1600000	7.8	3.065	0.8	32																							
Aug	22-Aug-17	6.82	396	7.45	868	570	71.8	85	29.53																													
Aug	23-Aug-17	6.81	329.8	6.85	838	569	58	61	29.58																													
Aug	24-Aug-17																																					
Aug	25-Aug-17	6.81	466.2	6.81	891	589	113	90	29.61																													
Aug	26-Aug		482	6.82	897	589	46.2	86	29.58																													
Aug	27-Aug-17		389	6.7	858	570	41.8	128	29.62	34.4	1600000	12.2	3.042	0.8	90																							
Aug	28-Aug-17		370.8	6.71	838	556	74.8	61	29.62																													
Aug	29-Aug-17		337.6	6.26	889	62	102	51	29.3																													
Aug	30-Aug-17																																					
Aug	31-Aug-17																																					
Sep	01-Sep-17		360	6.61	805	40	25	56	29.12																													
Sep	02-Sep-17		464.8	6.81	850	567	29.5	117	29.82																													
Sep	03-Sep-17		381	6.16	856	570	17.2	91	29.5	11.8	1600000	6	3.477	0.8	24	0.213	<0.003	<0.01	<0.001	<0.003	<0.01	<0.005	11.49	5	0.084	<0.002	0.03	0.08	0.028	0.2	0.139						0.034
Sep	04-Sep-17		428	6.66	882	588	24.5	87	29.66																													
Sep	05-Sep-17		429	6.64	882	588	41.8	124	29.15																													
Sep	06-Sep-17																																					
Sep	07-Sep-17																																					
Sep	08-Sep-17																																					
Sep	09-Sep-17																																					
Sep	10-Sep-17																																					
Sep	11-Sep-17		423.2	5.98	842	551	32.8	5	29.72																													
Sep	12-Sep-17		427.7	5.99	899	576	17.8	16	29.24																													
Sep	13-Sep-17																																					
Sep	14-Sep-17		398.5	5.72	878	566	12.8	51	29.65	11.7	1600000	7.5	1.48	<0.1	15																							
Sep	15-Sep-17		360.5	5.96	876	570	34.8	140	29.2																													
Sep	16-Sep-17																																					
Sep	17-Sep-17																																					
Sep	18-Sep-17		357.8	5.51	866	559	11.8	44	29.77																													
Sep	19-Sep-17		398.5	5.7	884	571	10.2	44	29.67																													
Sep	20-Sep-17		456.2	5.79	894	580	8.2	65	29.8	11.7	1600000	6	3.49	0.8	18																							
Sep	21-Sep-17		367	5.71	903	582	30.4	170	29.55																													
Sep	22-Sep-17		377.5	5.79	902	591	28.2	121	29.5																													
Sep	23-Sep-17																																					
Sep	24-Sep-17																																					
Sep	25-Sep-17		357	5.72	902	584	32.8	131	29.55																													
Sep	26-Sep-17		372.2	5.79	902	576	112	78	29.64																													
Sep	27-Sep-17		378	5.84	903	591	113	74	29.61																													
Sep	28-Sep-17		357.2	5.69	902	591	112.8	72	29.64																													
Sep	29-Sep-17		378	6.24	904	592	81.2	101	29.65																													
Sep	30-Sep-17																																					

Monitoring Parameters Result for STP(Phase-1)

Month	Date	Daily Parameters								Hourly Parameters						Monthly Parameters																					
		pH	SWP	DO	BOD	TDS	Turbidity	COD	Temp	BOD	T.Coli	T.N	T.P	O&G	Oil	Cadmium	Chromium	Arsenic	Mercury	Cadmium	Selenium	Lead	Cyanide	Odour	Zinc	Copper	Nickel	Residue	Free Chlorine	Formaldehyde	Silver	Iron	Ammonia	Dissolved Oxygen(DO)	Fluoride	Total Chromium	Phenols
Parameters		6.5 - 9.0							Max 35	Max 30	Max 400	Max 10	Max 1.0	Max 10	Max 2.0	Max 0.1	Max 2.0	Max 0.2	Max 0.01	Max 0.1	Max 1.0	Max 0.1	Max 0.05	Max 1.0	Max 1.0	Max 5.0	Max 3.0	Max 1.0	Max 2.0	Max 1.0	Max 0.1	Max 1.0	Max 1.0	Max 50	Min 4.0	Max 2.0	Max 0.1	Max 1.0
Unit		-	Ntu	mg/L	µmho/s	ppm	FNU	ppm	°C	ppm	MNP/100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	-	-	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Jul	09-Jul-17																																				
Jul	10-Jul-17	7.16	214.8	8.9	535	356	643	4.8	29.47																												
Jul	11-Jul-17	6.84	284.1	6.98	656	356	8.8	2.3	29.52																												
Jul	12-Jul-17	7.02	274.8	6.84	594	199	6.1	6.3	29.58	1.6	< 1.8	0	0.19	< 0.1	0																						
Jul	13-Jul-17	6.85	162.3	6.56	374	187	13.2	2.7	29.28																												
Jul	14-Jul-17	6.6	164.7	5.79	402	219	11.3	4.6	29.78																												
Jul	15-Jul-17																																				
Jul	16-Jul-17																																				
Jul	17-Jul-17	6.94	170	9.01	408	264	2.4	1.8	29.7																												
Jul	18-Jul-17	6.96	898.6	5.29	467	249	3.4	2.8	30.12																												
Jul	19-Jul-17	6.98	210.1	6.17	670	248	4	4.6	29.98	0	< 1.8	0.6	< 0.08	< 0.1	0	0.002	≤0.002	≤0.01	≤0.002	≤0.001	≤0.01	≤0.01	≤0.002	1.08	1.4	0.038	≤0.002	0.04	0.01	0.002	0.2	0.018					0.05
Jul	20-Jul-17	6.98	221	6.87	678	250	1.8	1.8	30.1																												
Jul	21-Jul-17	6.98	207.7	6.72	645	236	2.1	1.6	30.22																												
Jul	22-Jul-17																																				
Jul	23-Jul-17																																				
Jul	24-Jul-17	6.79	276	8.13	631	261	0	1.8	29.4																												
Jul	25-Jul-17	6.87	237.8	5.74	642	321	14.5	3.4	30.14																												
Jul	26-Jul-17	7	214.4	5.89	612	302	4.2	3.8	30.85	0	< 1.8	0.8	0.17	< 0.1	0																						
Jul	27-Jul-17	6.88	466.5	5.49	990	295	1.3	3.8	30.38																												
Jul	28-Jul-17	6.79	222.4	6.61	649	294	56.1	3.8	29.98																												
Jul	29-Jul-17																																				
Jul	30-Jul-17																																				
Jul	31-Jul-17	6.91	284	6.82	642	271	11.5	3.4	29.98																												
Aug	01-Aug-17	6.71	125.2	5.98	408	219	3.9	4.2	29.98																												
Aug	02-Aug-17	6.29	388	5.5	612	308	1.13	5.2	29.98	0	0.8	4.2	0.27	< 0.1	0																						
Aug	03-Aug-17	6.24	512.9	10.46	812	304	1	4.2	30.05																												
Aug	04-Aug-17	6.19	395	6.49	642	316	3.8	2.8	30.05																												
Aug	05-Aug-17																																				
Aug	06-Aug-17																																				
Aug	07-Aug-17	6.75	522.8	10.11	812	236	3.8	3.1	31.43																												
Aug	08-Aug-17	7.1	468.5	8.98	734	243	60.8	3.4	29.89																												
Aug	09-Aug-17	7.59	660.3	7.84	962	141	197	3.8	30.89	1.84	< 1.8	0.8	0.27	< 0.1	18	0.008	≤0.002	≤0.01	≤0.002	≤0.001	≤0.01	≤0.002	0.08	1.4	≤0.002	≤0.002	0.04	≤0.002	0.014	0.2	0.03					0.002
Aug	10-Aug-17	6.46	527	8.53	778	386	2	4.1	29.84																												
Aug	11-Aug-17	6.51	576.9	7.79	744	370	2.2	2.1	29.88																												
Aug	12-Aug-17																																				
Aug	13-Aug-17																																				
Aug	14-Aug-17	7.14	527.8	10.27	782	376	1.8	4.1	30.12																												
Aug	15-Aug-17	6.91	592.1	8.72	882	396	0.9	3.1	29.89																												
Aug	16-Aug-17	6.58	601.2	8.86	872	436	1.3	3.8	29.91	1.28	< 1.8	1.8	0.07	< 0.1	18																						
Aug	17-Aug-17	6.42	544.3	8.68	876	396	0.8	3.8	29.88																												
Aug	18-Aug-17	7.15	552.1	7.96	818	408	1.8	3.8	29.84																												
Aug	19-Aug-17																																				
Aug	20-Aug-17																																				
Aug	21-Aug-17	6.79	594.8	11.42	946	274	20.9	3	29.91																												
Aug	22-Aug-17	6.42	624.3	7.56	921	261	6.7	4.4	29.91	1.56	< 1.8	0.8	0.07	< 0.1	18																						
Aug	23-Aug-17																																				
Aug	24-Aug-17	6.8	602.8	9.12	828	368	1.8	4.2	29.89																												
Aug	25-Aug-17	6.59	662.1	8.12	828	368	3.4	4.1	29.78																												
Aug	26-Aug-17																																				
Aug	27-Aug-17																																				
Aug	28-Aug-17	7.16	139.8	9.93	180	241	5.8	4.8	29.71																												
Aug	29-Aug-17	6.8	183.2	8.69	408	228	8.8	4.6	29.17																												
Aug	30-Aug-17	6.2	213.8	8.98	582	385	7.8	5	29.4	1	< 1.8	0.8	0.208	< 0.1	6																						
Aug	31-Aug-17	6.3	207.4	8.84	572	385	7.8	5.2	29.07																												
Sep	01-Sep-17	6.84	186.1	8.43	849	219	20.2	4.8	29.78																												
Sep	02-Sep-17																																				
Sep	03-Sep-17																																				
Sep	04-Sep-17	6.98	176.3	11.28	837	262	24.8	3.8	29.37																												
Sep	05-Sep-17	7.03	387.2	10.08	870	268	7.7	6	29.06																												
Sep	06-Sep-17	7.11	413.1	8.73	881	237	1.7	1.8	29.28	1	< 1.8	1.6	0.084	< 0.1	6	0.006	≤0.002	≤0.01	≤0.002	≤0.001	≤0.01	0.01	0.08	1.4	≤0.002	≤0.002	0.014	≤0.002	0.008	0.2	0.03					≤0.002
Sep	07-Sep-17	7.07	388.2	10.08	870	268	7.7	6	29.06																												
Sep	08-Sep-17	7.16	394.6	8.78	881	270	11.7	4.8	29.14																												
Sep	09-Sep-17																																				
Sep	10-Sep-17																																				
Sep	11-Sep-17	6.68	323.1	4.81	531	359	6.2	3.8	30.4																												
Sep	12-Sep-17	6.57	309.8	5.05	532	361	5	3.4	30.19																												
Sep	13-Sep-17																																				
Sep	14-Sep-17	6.56	346.2	5.46	631	400	3.8	3.7	30.44	1.28	< 1.8	1.2	0.07	< 0.1	18																						
Sep	15-Sep-17	6.17	362.8	5.35	535	364	3.1	4.1	30.56																												
Sep	16-Sep-17																																				
Sep	17-Sep-17																																				
Sep	18-Sep-17	6.3	362.3	7.03	535	359	10.8	3.8	30.28																												
Sep	19-Sep-17	6.55	313.3	8.11	818	376	7.5	3.8	29.11																												
Sep	20-Sep-17	6.58	403.5	8.02	902	371	4.8	4.4	29.48	1.67	< 1.8	1.6	0.132	< 0.1	6																						
Sep	21-Sep-17	6.45	364.4	8.3	467	214	4.8	4.8	29.08																												
Sep	22-Sep-17	6.24	302.4	9.46	503	201	1.7	4.8	29.14																												
Sep	23-Sep-17																																				
Sep	24-Sep-17																																				
Sep	25-Sep-17	6.45	374.4	8.8	467	214	5.8	5.1	29.48																												
Sep	26-Sep-17	6.24	33.48	5.8	535	200	1.8	13.5	30.37																												
Sep	27-Sep-17	6.71	362.3	8.15	532	198	1.8	6.1	29.84																												
Sep	28-Sep-17	6.24	467.3	7.02	468	247	3.1	3	29.84																												
Sep	29-Sep-17	6.05	468.8	7.14	406	219	4.1	4.1	29.91																												

Monitoring Parameters Result for STP Phase-II

Month	Date	Daily Parameter								Hourly Parameter						Daily Parameter																					
		pH	ORP	DO	EC	TDS	Turbidity	COD	Temp	pH	T-Cl2	F-R	T-H	Hard	Alk	Cyanide	Chromium	Arsenic	Mercury	Cadmium	Selenium	Lead	Color	Odor	Iron	Fluoride	Residual Chlorine	Nickel	Amm. Nitrogen	Free Ammonia	Total Coliform	Faecal Coliform	Oil & Grease	Phenolic compounds	Sulphide	Zinc	Chlorides	Total Chlorine	Phosphate
Limit		6.5-8.5			Max 2000			Max 250	Max 40°C	Max 8.5	Max 0.5	Max 0.5	Max 500	Max 500	Max 0.5	Max 0.1	Max 0.1	Max 0.1	Max 0.01	Max 0.01	Max 0.1	Max 0.1	Max 300	Max 300	Max 1	Max 1	Max 1	Max 1	Max 1	Max 1	Max 1	Max 1	Max 10	Max 1	Max 1	Max 5	Max 1	Max 1	Max 1
	1-Apr					ppm			°C	ppm	ppm	MPN/100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	Cu/Pt	Co/Pt	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Apr	2-Apr																																					
Apr	3-Apr																																					
Apr	4-Apr-17	8.42	180.6	5.14	329	218	26.1	164	28.3																													
Apr	5-Apr-17		180.8	5.14	330	287	22.1	36	28.78																													
Apr	6-Apr-17		184.2	5.24	327	221	24.7	44	28.8	0.11		2.1	2.147		0	0.014	0.018	≤0.01	≤0.001	≤0.001	≤0.01	0.01	7.11	0	0.102	0.354	0.305	≤0.001	0.045	2.5	0.208							0.265
Apr	7-Apr-17	8.16	180.2	5.1	328	208	23.5		28.31																													
Apr	8-Apr-17	8.47	180.5	5.17	329	222	25.1	58	28.32																													
Apr	9-Apr-17																																					
Apr	10-Apr-17																																					
Apr	11-Apr-17	8.05	177.2	5.05	329	229	30.2	57	28.31																													
Apr	12-Apr-17	8.09	180	5.45	331	232	8.3	40	27.32																													
Apr	13-Apr-1																																					
Apr	14-Apr-1																																					
Apr	15-Apr-1																																					
Apr	16-Apr-1																																					
Apr	17-Apr-1																																					
Apr	18-Apr-1																																					
Apr	19-Apr-1																																					
Apr	20-Apr-1																																					
Apr	21-Apr-1																																					
Apr	22-Apr-1																																					
Apr	23-Apr-1																																					
Apr	24-Apr-17		184.1	5.47	335	222	31	53	30.84																													
Apr	25-Apr-1		177.6	5.34	332	217	31.2	49.4	30.87																													
Apr	26-Apr-1	8.46	180.4	5.15	336	222	8	55	28.7	0	0.12	2.2	2.16	0.16	0.2																							
Apr	27-Apr-1		182.3	5.13	338	224	17.2	56	31.2																													
Apr	28-Apr-1		180.4	5.34	340	213	31.4	45	31.68																													
Apr	29-Apr-1																																					
Apr	30-Apr-1																																					
May	1-May-1																																					
May	2-May-1		183.2	5.46	340	219	30.1	56	30.65																													
May	3-May-1		183.2	5.48	340	214	30.4	51.6	31.44	0.13		2.1	2.61		0.2																							
May	4-May-1		180.6	5.34	335	210	7	55	30.7																													
May	5-May-1		177.7	5.31	332	206	29.3	46	31.45																													
May	6-May-1																																					
May	7-May-1	7.93	182	5.36	333	201	30.1	208	31.45																													
May	8-May-1		188.8	5.56	370	231	28.1	51	31.41	0	0	2.3	2.31	0.31	0	0.011	≤0.005	≤0.01	≤0.001	≤0.001	≤0.01	0.01	11.8	0	0.102	≤0.005	0.038	0.212	0.048	3.5	0.205							0.113
May	9-May-1																																					
May	10-May-1	7.9	187.8	5.8	360	220	23.7	180	30.82																													
May	11-May-1		191.4	5.92	372	228	30	52	31.11																													
May	12-May-1																																					
May	13-May-1																																					
May	14-May-1	7.93	187.1	5.83	364	222	30.6	179	31.56																													
May	15-May-1	7.89	189.1	5.89	1166	698	180	75	30.78																													
May	16-May-1		188.8	5.87	368	230	27.8	51	28.48	0	0	2.2	2.11	0.29	0.8																							
May	17-May-1	7.94	194.2	6.15	378	236	28.4	50	30.66																													
May	18-May-1	8.01	195.1	6.11	379	218	30.1	151	30.6																													
May	19-May-1																																					
May	20-May-1																																					
May	21-May-1	7.95	191.2	6.13	371	218	30.3	64	31.46																													
May	22-May-1	8.06	192	6.19	418	268	30.5	164	31.72																													
May	23-May-1	8.09	198.1	6.33	407	261	28.3	179	31.31	0.11		2.2	2.12	0.31	0.6																							
May	24-May-1	8.02	193.6	6.28	401	259	30.4	68	30.61																													
May	25-May-1	8.15	191.1	6.09	391	255	29.4	64	30.46																													
May	26-May-1																																					
May	27-May-1																																					
May	28-May-1	8.2	193.4	6.34	396	277	28	58	30.2																													
May	29-May-1	8.04	194.8	6.15	376	248	27.1	51	29.58																													
May	30-May-1	7.98	196.8	6.2	384	249	27.5	53	29.13	0.12	0.16	2.3	2.27	0.33	0.8																							
Jun	31-May-1	8.04	193.4	6.21	387	251	28.6	52	30.48																													
Jun	1-Jun-1	8.03	190.7	6.08	388	276	30	59	30.71																													
Jun	2-Jun-1																																					
Jun	3-Jun-1																																					
Jun	4-Jun-17	8.08	189.6	6.04	385	255	30.1	58	30.58																													
Jun	5-Jun-1		188.4	6.01	427	274	30.3	58	30.68																													
Jun	6-Jun-1	8.04	189.7	6.12	428	267	30.7	60	30.48	0.11	0.08	2.3	2.28	0.32	0.6																							
Jun	7-Jun-1	8.08	190.7	6.17	430	268	30.7	59	30.68																													
Jun	8-Jun-1		189.8	6.07	429	269	30.6	58	30.68																													
Jun	9-Jun-1																																					
Jun	10-Jun-1																																					
Jun	11-Jun-1		187.1	6.01	427	267	30.1	58	30.68																													
Jun	12-Jun-1		188.6	6.04	429	268	30.4	59	30.68																													
Jun	13-Jun-1		189.1	6.08	430	269	30.6	58	30.68																													
Jun	14-Jun-1		189.6	6.09	431	270	30.7	59	30.68																													
Jun	15-Jun-1		190.1	6.11	432	271	30.8	59	30.68																													
Jun	16-Jun-1		190.6	6.12	433	272	30.9	59	30.68																													
Jun	17-Jun-1		191.1	6.14	434	273	31	59	30.68																													
Jun	18-Jun-1		191.6	6.15	435	274	31.1	59	30.68																													
Jun	19-Jun-1		192.1	6.17	436	275	31.2	59	30.68																													
Jun	20-Jun-1		192.6	6.18	437	276	31.3	59	30.68																													
Jun	21-Jun-1		193.1	6.2	438	277	31.4	59	30.68																													
Jun	22-Jun-1		193.6	6.21	439	278	31.5	59	30.68																													
Jun	23-Jun-1		194.1	6.23	440	279	31.6	59	30.68																													
Jun	24-Jun-1		194.6	6.24	441	280	31.7	59	30.68																													
Jun	25-Jun-1		195.1	6.26	442	281	31.8	59	30.68																													
Jun	26-Jun-1		195.6	6.27	443	282	31.9	59	30.68																													
Jun	27-Jun-1		196.1	6.29	444	283	32	59	30.68																													
Jun	28-Jun-1		196.6	6.3	445	284	32.1	59	30.68																													
Jun	29-Jun-1		197.1	6.32	446	285	32.2	59	30.68																													
Jun	30-Jun-1		197.6	6.33	447	286	32.3	59	30.68																													

Monitoring Parameters Result for STP(Treated)

Month	Date	pH	MBR	BOD	SVI	TSS	Turbidity	COD	Temp	NH3	Fecal	TDS	DO	Oil	Ammonia	Chromium	Arsenic	Mercury	Cadmium	Selenium	Lead	Color	Odor	Zinc	Oxygen	Barium	Nickel	Sulphide	Free Chlorine	Formate Aldehyde	Silver	SVI	Biosensity	Recombinant Fluorescent Cyano	Fluorine	Total Chlorine	Fluoride
		Daily Parameters								Weekly Parameters						Monthly Parameters																							
Parameters		Limits				Observations			Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations	Observations
Unit		-	-	-	-	ppm	-	-	%	ppm	MPN/100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	Unit	Unit	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Aug	01-Aug-17																																				
Aug	02-Aug-17		811	8.7	466	344	8.8	11	32.50																												
Aug	03-Aug-17		804.8	8.4	503	343	10.8	16	28.88																												
Aug	04-Aug-17		808.8	8.4	511	316	10.1	15	28.88	7.14	0.00	0.0	3.4 Fe		0.0																						
Aug	05-Aug-17		808.8	8.45	503	317	10.2	16	28.72																												
Aug	06-Aug-17		814	8.48	500	317	8.5	16	28.88																												
Aug	07-Aug-17																																				
Aug	08-Aug-17																																				
Aug	09-Aug-17		813.8	8.41	498	340	10.2	131	28.8																												
Aug	10-Aug-17		808.8	10.93	508	350	10.4	16	28.8																												
Aug	11-Aug-17		808.8	8.41	503	351		11	28.88	7.28	0.00	0.0	3.4 Fe		0.0																						
Aug	12-Aug-17	0.08	813.8	8.7	511	354	11.5	17	28.88																												
Aug	13-Aug-17		813.7	8.48	504	351	10	16	28.88																												
Aug	14-Aug-17																																				
Aug	15-Aug-17																																				
Aug	16-Aug-17		813.8	8.45	493	311	10.1	16	28.88																												
Aug	17-Aug-17		808.8	7.95	496	316	9.4	144	28.88																												
Aug	18-Aug-17		807.8	7.98	500	315	10.8	144	28.88	7.14	0.00	0.0	3.4 Fe		0.0																						
Aug	19-Aug-17		808.8	8.14	505	318	11.8	15	28.88																												
Aug	20-Aug-17		807.8	8.05	501	299	10.1	16	28.8																												
Aug	21-Aug-17																																				
Aug	22-Aug-17																																				
Sep	23-Aug-17		809	8.17	501	348	10.11	16	28.8																												
Sep	24-Aug-17		778	8.41	500	340	9.8	15	28.88																												
Sep	25-Aug-17		805.1	8.45	500	347	10.4	16	28.78	6.8	0.00	0.0	3.4 Fe		0.0	0.000	ppt 0.00	0.01	0.017	ppt 0.00	ppt 0.00	0.01	ppt 0.00	0.00	7	0.000	ppt 0.00	0.00	0.00	0.00	0.0	0.000					0.000	
Sep	26-Aug-17		804	8	501	337	10.4	169	28.88																												
Sep	27-Aug-17		808.1	8.31	511	341	11.1	16	28.88																												
Sep	28-Aug-17																																				
Sep	29-Aug-17																																				
Sep	30-Aug-17		807.8	8.17	501	346	10.8	161	28.7																												
Sep	31-Aug-17		808.8	8.48	500	351	10.8	16	28.57																												
Sep	01-Sep-17									6.91	0.00	0.0	3.4 Fe		0.0																						
Sep	02-Sep-17		808.8	8.17	501	348	10.8	16	28.57																												
Sep	03-Sep-17		808.8	8.17	501	348	10.8	16	28.57																												
Sep	04-Sep-17																																				
Sep	05-Sep-17		808.1	8.17	510	347	10.8	16	28.57																												
Sep	06-Sep-17		808.1	8.17	511	344	9.4	16	28.78																												
Sep	07-Sep-17		808.1	8.07	511	347	11.8	169	28.78	6.9	0.00	0.0	3.4 Fe		0.0																						
Sep	08-Sep-17		808.8	8.07	508	350	10.8	16	28.7																												
Sep	09-Sep-17		808.1	8.17	511	351	10.8	16	28.7																												
Sep	10-Sep-17																																				
Sep	11-Sep-17																																				
Sep	12-Sep-17		808.8	8.21	501	350	10.1	168	28.7																												
Sep	13-Sep-17		808.8	8.48	494	341	10.8	16	28.57																												
Sep	14-Sep-17		808.8	8.48	504	350	10.8	16	28.78																												
Sep	15-Sep-17		808.8	8.21	497	345	10.8	178	28.64																												
Sep	16-Sep-17		813.8	8.48	515	360	10.8	178	28.7																												

Monitoring Parameters Result for STP(Phase-2)

Month	Date	pH	ORP	DO	EC	TDS	Turbidity	COD	Temp	BOD	T-Coli	T-N	T-P	O&G	SS	Cyanide	Chromium	Arsenic	Mercury	Cadmium	Selenium	Lead	Color	Odor	Zinc	Copper	Barium	Nickel	Sulphide	Free Chlorine	Total Phenols	Silver	Iron	Ammonia	Hexavalent Chromium (Cr6+)	Fluoride	Total Chloride	Phenols
		Daily Parameters								Weekly Parameters						Monthly Parameters																						
Standard		[illegible]				[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Unit		-	-	-	-	ppm	-	ppm	℃	ppm	MPN/100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	-	-	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm

MJTD

Monitoring Parameters Result for MTP(Inlet-2)

Month	Date	Daily Parameters								Weekly Parameters							Monthly Parameters																							
		pH	SMP	Hrd	EC	TDS	Turbidity	COD	Temp	BOD	T-Coli	FC	T-P	Chlor	Oil	Cyanide	Chromium	Arsenic	Mercury	Cadmium	Selenium	Lead	Color	Odor	Zinc	Copper	Nickel	Phenol	Sulphide	Free Chlorine	Formaldehyde	Silver	Iron	Benzene	Monochloro Benzene (Cuffey)	Fluoride	Total Chlorine	Phenols
Standard		6.0 - 9.0				Max 2,100		Max 50	Max 40	Max 20	Max 400	Max 400	Max 4	Max 1	Max 10	Max 1.0	Max 0.5	Max 0.1	Max 0.05	Max 0.1	Max 0.05	Max 0.1			Max 1	Max 1	Max 1	Max 0.5	Max 1	Max 0.5	Max 1	Max 1	Max 1	Max 0.5	Max 0.5	Max 1	Max 0.5	Max 0.5	Max 1
Unit		-	-	-	-	ppm	-	ppm	°C	ppm	MPN / 100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	-	-	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Aug	16-Aug-17																																						
Aug	17-Aug-17	8.11	803.0	330.7	495	240	5.0	4.2	28.18																														
Aug	18-Aug-17	8.04	815.3	335.2	479	234	7.8	3.1	28.86																														
Aug	19-Aug-17	8.07	808.2	336.1	484	237	4	4.2	29.14	2.0	< 1.8	2.0	0.261	0.11	0.0																								
Aug	20-Aug-17	7.91	809.2	337.5	486	234	3.9	4.4	28.17																														
Aug	21-Aug-17	8.05	807.1	336	485	233	4.0	4.1	29.18																														
Aug	22-Aug-17																																						
Aug	23-Aug-17																																						
Aug	24-Aug-17	8.04	811.3	337.2	487	236	3.7	3.7	28.97																														
Aug	25-Aug-17	8.08	809.0	337.1	486	234	3.9	4.1	28.87																														
Aug	26-Aug-17	8.09	807.1	11.48	517	249	3.8	3	29.7	1.80	< 1.8	1.8	0.26	0.11	< 0																								
Aug	27-Aug-17	8.0	807.3	8.56	502	241	3	4.3	29.82																														
Aug	28-Aug-17	8.08	807.9	11.49	502	242	3.9	3.9	29.91																														
Aug	29-Aug-17																																						
Aug	30-Aug-17																																						
Aug	31-Aug-17																																						
Sep	01-Sep-17	8.10	811.1	11.50	507	244	3.9	4.1	30.3																														
Sep	02-Sep-17	8.08	810.9	8.61	518	251	3.9	4.1	30.98																														
Sep	03-Sep-17	8.03	809.8	8.57	498	239	3.8	4.1	29.77	2.0	< 1.8	2.0	0.267	0.11	< 0																								
Sep	04-Sep-17	8.1	810.3	8.59	512	248	3.9	4.2	30.31																														
Sep	05-Sep-17	8.0	809.5	8.61	501	240	3.8	3.7	29.97																														
Sep	06-Sep-17																																						
Sep	07-Sep-17																																						
Sep	08-Sep-17	8.07	809.7	11.50	508	243	3.9	3.8	30.14																														
Sep	09-Sep-17	8.07	811.0	11.49	509	244	3.8	3.8	30.09	2.0	< 1.8	1.8	0.263	0.11	< 0	0.002	< 0.01	< 0.01	< 0.001	< 0.01	< 0.01	< 0.02	0.28	1	< 0.01	< 0.01	0.113	0.008	0.003	0.1	0.002							0.079
Sep	10-Sep-17	8.10	807	8.59	501	239	3.9	3.9	30.8																														
Sep	11-Sep-17	8.0	810.9	8.61	511	245	3.9	3.7	30.97																														
Sep	12-Sep-17																																						
Sep	13-Sep-17	8.07	808.3	8.58	497	238	3.8	3.9	30.19																														
Sep	14-Sep-17	8.07	810	11.48	495	240	3.8	4.0	30.58																														
Sep	15-Sep-17	8.01	809.7	8.58	511	248	4.0	3.9	30.35	2.0	< 1.8	1.8	0.263	0.11	< 0																								
Sep	16-Sep-17	8.08	808.8	8.59	505	247	3.9	< 3.7	30.46																														
Sep	17-Sep-17	8.11	810.9	8.59	510	248	3.9	< 3.7	30.31																														
Sep	18-Sep-17																																						
Sep	19-Sep-17																																						
Sep	20-Sep-17							3.7																															
Sep	21-Sep-17	8.10	810.3	8.58	511	251	3.9	3.7	30.23																														
Sep	22-Sep-17	8.08	809.5	8.59	509	250	3.9	3.9	29.91	2.0	< 1.8	1.8	0.265	0.11	< 0																								
Sep	23-Sep-17	8.09	808.0	8.58	507	251	3.9	73.5	30.1																														
Sep	24-Sep-17	8.03	811.0	8.59	508	252	3.9	4	30.76																														
Sep	25-Sep-17																																						
Sep	26-Sep-17																																						
Sep	27-Sep-17	8.05	808.3	8.58	510	253	3.9	3.9	30.1																														
Sep	28-Sep-17	8.03	809.8	8.58	508	253	3.8	3.9	30.26																														
Sep	29-Sep-17																																						
Sep	30-Sep-17	8.04	809.2	8.59	510	254	3.9	4.0	30.03																														
Sep	31-Sep-17	8.1	810.7	8.58	509	254	3.9	4.1	30.08																														
Oct	01-Oct-17																																						

Thilawa Special Economic Zone (Zone A) Development Project (Operation Phase)

Appendix

Soil contamination survey in Thilawa SEZ

January, 2017

MJTD MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

SOIL CONTAMINATION SUREVEY IN THILAWA SEZ (ZONE A)

January 2017

Resource & Environment Myanmar Ltd. B-702/401 Delta Plaza Building, Shwegondaing Rd., Bahan, Yangon. MYANMAR

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MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Soil Contamination Survey in Thilawa SEZ (Zone-A)

Survey Item

Parameter for soil contamination survey are determined by referring to the parameter of soil content observation of Japan and other countries as shown in Table 1.

Table 1 Survey parameter for soil quality

No.	Parameter	Unit	Standard		
			Japan	Thailand	Vietnam
1	pH	-	-	-	-
2	Mercury	ppm	15	610	-
3	Arsenic	ppm	150	27	12
4	Lead	ppm	150	750	300
5	Cadmium	ppm	150	810	10
6	Copper	ppm	125	-	100
7	Zinc	ppm	150	-	300
8	Chromium	ppm	250	640	-
9	Fluoride	ppm	4000	-	-
10	Boron	ppm	4000	-	-
11	Selenium	ppm	150	10,000	-

Source: Japan: Ministry of Environment, Government of Japan (2002), "Regulation for Implementing the Law on Soil Contamination Countermeasures"
Thailand: Notification of National Environmental Board No.25, B.E. Thailand (2004), "other purpose" class"
Vietnam: QCVN 03:2008/BTNMT, Applied "industrial land', Vietnam.

Summary of survey points

The survey location is situated in Thilawa Special Economic Zone (Zone-A) areas, Thanlyin Township, Yangon. There are five samples collected for soil quality survey.

Figure 1 Location map of the soil sampling points

The locations of survey points are shown in following table. The detail of each survey point is described below.

Table 2 Summary of survey points

Sampling Point	Coordinates	Description of Sampling Point
S-1	16° 40' 13.49" N 96° 16' 29.89" E	About 40 m northeast of administration building.
S-2	16° 40' 10.74" N 96° 16' 22.01" E	At the embankment area of the drain, near main gate of Thilawa SEZ.
S-3	16° 40' 30.25" N 96° 16' 34.86" E	At the drain from sewage treatment plant.
S-4	16° 40' 24.29" N 96° 15' 49.55" E	At damping area near retention pond.
S-5	16° 40' 32.36" N 96° 15' 49.81" E	At the drain from the retention pond.

S-1

S-1 is situated in the southern part of the Thilawa SEZ Zone (A) area, and distanced about 40 m from administration building. It was collected beside of the Trash Storage Building. Sometimes, wastewater after cleaning that domestic waste is leaked and may sink into the ground. The soil condition is fine to medium grained, reddish brown colored silty clay.

Figure 2 Soil quality sampling at S-1

S-2

S-2 was collected at the slope area of the retention canal, which is situated near the main gate of Thilawa SEZ (Zone-A). It is beside of the Thilawa SEZ car road and intended to plant the trees along the slop. The soil condition is fine to medium grained, reddish brown colored silty caly.

Figure 3 Soil quality sampling at S-2

S-3

S-3 is collected in the retention canal where wastewater from the centralized sewage treatment plant is flowing into the retention canal. It is distanced about 5 m away from the junction of wastewater discharge drainage and main rain water drainage. The soil condition is fine to medium grained, yellowish brown colored silty clay.

Figure 4 Soil quality sampling at S-3

S-4

S-4 is collected from the soil disposing site which is located near Plot No.E-1 of TSEZ Zone-A retention pond, about 40 m in distance. This dumping site is about 16,500 square meters where soil from Thilawa SEZ Zone-A (Phase-2). The soil condition is fine to medium grained, reddish brown colored silty caly.

Figure 5 Soil quality sampling at S-4

S-5

It is collected at the retention canal where wastewater is discharged from the retention pond of Plot No.E-1 of Thilawa SEZ Zone-A. S-5 is distanced about 100 m from this retention pond. The soil condition is fine grained, yellowish brown colored silty clay.

Figure 6 Soil quality monitoring at S-5

Survey Period

Soil sampling was carried out on 17th January 2017.

Survey Method

For soil sampling, the standard agricultural sampler (soil auger) was applied. The sampler is a stainless-steel tube that is sharpened on one end and fitted with a long, T-shaped handle. This tube is approximately three inches inside diameter. In order to refrain from contamination, about 20-30 cm of top soil was removed by the sampler before sampling. Then sample was taken and collected in cleaned plastic bag. Chemical preservation of soil is not generally recommended. Samples were cooled in an ice box which temperature was under 4°C. Samples were protected from sunlight to minimize any potential reaction.

Field equipment used on site are also shown in the table.

Table 3 Field Equipment for Sediment and Soil Quality Survey

No.	Equipment	Originate Country	Model
1	Soil Auger (for soil sampling)	-	-

The analysis method for each parameter is also shown in the following table:

Table 4 Analysis methods of soil quality

No.	Parameter	Analysis Method
1	pH	Atomic Absorption Spectrophotometer, Aqua-regia
2	Mercury (Hg)	Atomic Absorption Spectrophotometer, Aqua-regia
3	Arsenic (As)	Atomic Absorption Spectrophotometer, Aqua-regia
4	Lead (Pb)	Atomic Absorption Spectrophotometer, Aqua-regia
5	Cadmium (Cd)	Atomic Absorption Spectrophotometer, Aqua-regia
6	Copper (Cu)	Atomic Absorption Spectrophotometer, Aqua-regia
7	Zinc (Zn)	Atomic Absorption Spectrophotometer, Aqua-regia
8	Chromium (VI)	Atomic Absorption Spectrophotometer, Aqua-regia
9	Fluoride (F)	Atomic Absorption Spectrophotometer, Aqua-regia
10	Boron (B)	Atomic Absorption Spectrophotometer, Aqua-regia
11	Selenium (Se)	Atomic Absorption Spectrophotometer, Aqua-regia

Survey Result

Chemical properties for soil was analyzed in the laboratory of Applied Geology Department in Myanmar.

The result of soil quality analysis is presented as follow. Most of the results are complied with the proposed standard value of contamination whereas copper concentration of some locations is slightly higher than Vietnam standard, which is likely to be same as the original soil condition since September 2013 EIA Report, in which copper concentration of all sampling point is higher than the standard.

Table 4 Soil quality result

No.	Parameter	Unit	S-1	S-2	S-3	S-4	S-5	Japan	Thailand	Vietnam
1	pH	-	6.8	6.9	6.8	6.7	6.8	-	-	-
2	Mercury	ppm	ND	ND	ND	ND	ND	15	610	-
3	Arsenic	ppm	ND	ND	ND	ND	ND	150	27	12
4	Lead	ppm	135	140	173	128	140	150	750	300
5	Cadmium	ppm	0.007	0.006	0.006	0.007	0.005	150	810	10
6	Copper	ppm	110	95	105	108	110	125	-	100
7	Zinc	ppm	85	80	80	75	75	150	-	300
8	Chromium	ppm	15	12	10	12	10	250	640	-
9	Fluoride	ppm	ND	ND	ND	ND	ND	4000	-	-
10	Boron	ppm	7	8	7	9	7	4000	-	-
11	Selenium	ppm	1.2	1.4	1.4	1.3	1.2	150	10,000	-

Appendix

Lab Result

APPLIED GEOLOGY DEPARTMNENT, GEOCHEMISTRY LABORATORY

Sample Type – Soil
Method – Atomic Absorption Spectrophotometer
Digestion – Aqua-regia

Project – Soil Quality Monitoring in Thilawa SEZ
Resource and Environment Myanmar Co.,Ltd.
Sampling Date – 17-1-2017

Sample No	Mercury (Hg)	Arsenic (As)	Lead (Pb)	Cadmium (Cd)	Copper (Cu)	Zinc (Zn)	Chromium (Cr)	Fluoride (F)	Boron (B)	pH	Selenium (Se)
S-1	ND	ND	135	0.007	110	85	15	ND	7	6.8	1.2
S-2	ND	ND	140	0.006	95	80	12	ND	8	6.9	1.4
S-3	ND	ND	127	0.008	105	80	10	ND	7	6.8	1.4
S-4	ND	ND	128	0.007	108	75	12	ND	9	6.7	1.3
S-5	ND	ND	140	0.005	110	75	10	ND	7	6.8	1.2

Unit - ppm

30.1.17

Dr. Hlaing Sein
Associate Professor
Applied Geology Department

MYANMAR THILAWA DEVELOPMENT LIMITED
MJTD

Thilawa Special Economic Zone (Zone A) Development Project (Operation Phase)

Appendix

Ground Subsidence Monitoring Status

(Location- Admin Complex Compound)

April 2017 to September 2017

Ground Subsidence Monitoring Status (Operation Phase)

Location Admin Complex Compound

Coordinate Points E=209545.508 N=1844669.443

Month	Date	Predefined Level (m)-ASL	Weekly Reading Level (m)-ASL	Subsidence (m)	Remark
Apr	7-Apr-17	+7.137	+7.128	-0.009	
	21-Apr-17	+7.137	+7.126	-0.011	
	28-Apr-17	+7.137	+7.126	-0.011	
May	5-May-17	+7.137	+7.126	-0.011	
	12-May-17	+7.137	+7.129	-0.008	
	19-May-17	+7.137	+7.131	-0.006	
	26-May-17	+7.137	+7.135	-0.002	
Jun	9-Jun-17	+7.137	+7.135	-0.002	
	16-Jun-17	+7.137	+7.134	-0.003	
	23-Jun-17	+7.137	+7.134	-0.003	
	30-Jun-17	+7.137	+7.136	-0.001	
July	7-Jul-17	+7.137	+7.136	-0.001	
	14-Jul-17	+7.137	+7.136	-0.001	
	21-Jul-17	+7.137	+7.138	+0.001	
	28-Jul-17	+7.137	+7.136	-0.001	
Aug	3-Aug-17	+7.137	+7.136	-0.001	
	10-Aug-17	+7.137	+7.137	+0.000	
	17-Aug-17	+7.137	+7.136	-0.001	
	24-Aug-17	+7.137	+7.137	+0.000	
Sept	1-Sep-17	+7.137	+7.136	-0.001	
	8-Sep-17	+7.137	+7.136	-0.001	
	15-Sep-17	+7.137	+7.136	-0.001	
	22-Sep-17	+7.137	+7.136	-0.001	
	29-Sep-17	+7.137	+7.136	-0.001	

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