MJTD

Thilawa Special Economic Zone (Zone A) Development

Environmental Monitoring Report (Operation Phase)

Myanmar Japan Thilawa Development Limited.

April 2017

CONTENTS

Appendix

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED 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 October 2016 to March 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 Phase-1 Operation Phase Report (No.1, April 2016), Report (No.2, October 2016), and Report (No.3) is submitted this day attached with Operation Phase implementation schedule. This EMP Operation Phase Report is for TSEZ Zone-A Phase-1 and Phase-2. 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;

Clear guideline for the reference and target standard of water is necessary to report the clear impact of TSEZ discharging.

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

We would like to inform that Suspended Solids at Thilawa SEZ Retention Pond discharge point (SW-1) and Retention Canal discharge point (SW-5) is higher than the standard. We are discussing with our environmental consultant to change the monitoring points for SW-1 and SW-5 because that location is the mixing point of the water from the Thilawa SEZ treated water and rainwater. Rainwater includes high Suspended Solids as it is the natural surface water conditions around this area, similar to the outside of Thilawa SEZ such as SW-2, SW-3 and SW-4. After we confirmed the changed locations, we will apply to the relevant government authority to obtain approval for such change of monitoring points.

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

There was eleven case of minor accidents and one major accident happened during monitoring period at Thilawa SEZ common area and please refer to the attached Appendix (Accident Records). Each tenants accidents will report directly to Environmental Section, One Stop Service Center, Thilawa SEZ Management Committee.

MYANMA THILAWA DEVELOPMENT LIMITED MJTD

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}	Construction site (1point)	Once/ 3month	Refer to Environmental Monitoring Report (Operation Phase) No.1, air quality monitoring will start after consult with environmental expert
Water Quality	Water temperature, pH, SS, DO, BOD, COD, coliform count, oil and grease, chromium	Discharging points and reference points (6 points) Well in the Monastery (1 point)	Once/2 month	September 2016 (Bi-Monthly), October 2016 (Bi-Annually), December 2016 (Bi-Monthly), February 2017 (Bi-Monthly)
Waste	Amount of solid waste Management of solid waste of construction	Construction site	Once/3month	Monthly Progress Reports (September, October, November, December) 2016
Noise and Vibration	Noise and vibration level of construction	Preservation area such as residence around the proposed construction site (2 points)	Once/3moth (peak period)	Refer to Environmental Monitoring Report (Operation Phase) No.1, noise and vibration monitoring will start after consult with environmental expert
		Preservation site such as residence along the route for on-site vehicles (2points)	Once (peak period)	
Ground Subsidence	Ground elevation Consumption of ground water amount	Representative (1 point)	Every week	Monthly Progress Reports (September, October, November, December) 2016
Hydrology				
Risk for infectious disease such as AIDS/HIV	Status of measures of infectious disease	Construction site	Once/month	Monthly Progress Reports (October, November, December) 2016 and (January, February, March) 2017
Working conditions (including occupational safety)	Prehension of condition of occupational safety and health Prehension of infectious disease	Construction site	Once/ month	
Accident	Existence of accident	Construction site	As occasion arise	

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

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.)
Attached approval letter:				

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 –

Remarks: Air quality monitoring will start after two years of operations assuming at December 2017 according to the consultation with environmental expert which was reported in operation phase first monitoring report.

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)
Construction Area Near Gate 2	NO_2	ppm						Once in three months	HAZSCANNER, EPAS	
	SO_2	ppm							HAZSCANNER, EPAS	
	CO	ppm							HAZSCANNER, EPAS	
	TSP	ppm							HAZSCANNE1R, EPAS	
	PM10	ppm							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 Complains from Residents	Countermeasures

2)(a) Water Quality – September 2016

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*7	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
SW-1	pH	-	6.92	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	mg/l	88	50	Max 30			APHA 2540D Method	
	DO	mg/l	5.46	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	< 0.7	250	Max 70		Once in two month	APHA 5220D Method	
	BOD	mg/l	5.19	50	Max 20			APHA-5210B Method	
	Oil and Grease	mg/l	3.17	10	Max 5			APHA-5520B Method	
	Cr	mg/l	0.066	0.5	Max 0.5			APHA-3120B Method	
	Total coliforms*3	MPN/100ml	90000	400	Max 400	7.5×10^3		APHA-9221B Method	
SW-5	pH	-	8.47	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	mg/l	46	50	Max 30	>=4		APHA 2540D Method	
	DO	mg/l	6.06	-	-		Once in two month	Instrument Analysis Method	
	COD(Cr)	mg/l	3.8	250	Max 70			APHA 5220D Method	
	BOD	mg/l	5.89	50	Max 20			APHA-5210B Method	
	Oil and Grease	mg/l	-	10	Max 5			APHA-5520B Method	

Location	Item	Unit	Measured Value	Country's Standard*7	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
	Cr	mg/l	-	0.5	Max 0.5	7.5×10^3		APHA-3120B Method	
	Total coliforms*4	MPN/100ml	50000	400	Max 400			APHA-9221B Method	
SW-6	pH	-	7.09	6-9	5.0-9.0			Instrument Analysis Method	
	SS	mg/l	8	50	Max 30			APHA 2540D Method	
	DO	mg/l	5.3	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	< 0.7	250	Max 70		Once in two month	APHA 5220D Method	
	BOD	mg/l	5.43	50	Max 20			APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1	10	Max 5			APHA-5520B Method	
	Cr	mg/l	0.04	0.5	Max 0.5			APHA-3120B Method	
	Total coliforms	MPN/100ml	< 2	400	Max 400	7.5×10^3		APHA-9221B Method	
SW-2 (Reference Point)	pH	-	6.46	6-9	5.0-9.0			Instrument Analysis Method	
	SS*3	mg/l	34	50	Max.30			APHA 2540D Method	
	DO	mg/l	4.61	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	7.1	250	Max. 70*5		Once in two month	APHA 5220D Method	
	BOD	mg/l	4.3	50	Max. 20			APHA-5210B Method	
	Oil and Grease	mg/l	-	10	Max. 5			APHA-5520B Method	
	Cr	mg/l	-	0.5	Max. 0.5			APHA-3120B Method	
	Total coliforms*5	MPN/100ml	160000	400	Max 400			APHA-9221B Method	
SW-3 (Reference Point)	pH	-	6.71	6-9	5.0-9.0			Instrument Analysis Method	
	SS*3	mg/l	42	50	Max.30	>=4	Once in two month	APHA 2540D Method	
	DO	mg/l	3.85	-	-			Instrument Analysis Method	

Location	Item	Unit	Measured Value	Country's Standard*7	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
	COD(Cr)	mg/l	6.6	250	Max. 70*5			APHA 5220D Method	
	BOD	mg/l	7.6	50	Max. 20			APHA-5210B Method	
	Oil and Grease	mg/l	-	10	Max. 5			APHA-5520B Method	
	Cr	mg/l	-	0.5	Max. 0.5			APHA-3120B Method	
	Total coliforms*5	MPN/100ml	24000	400	Max 400			APHA-9221B Method	
SW-4 (Reference Point)	pH	-	6.82	6-9	5.0-9.0			Instrument Analysis Method	
	SS*3	mg/l	176	50	Max.30			APHA 2540D Method	
	DO	mg/l	3.72	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	3.3	250	Max. 70*5		Once in two month	APHA 5220D Method	
	BOD	mg/l	5.04	50	Max. 20			APHA-5210B Method	
	Oil and Grease	mg/l	-	10	Max. 5			APHA-5520B Method	
	Cr	mg/l	-	0.5	Max. 0.5			APHA-3120B Method	
	Total coliforms*5	MPN/100ml	90000	400	Max 400			APHA-9221B Method	
GW-1 (Reference Point)	pH	-	7.84	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	mg/l	24			50		APHA 2540D Method	
	DO	mg/l	5.19			>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	< 0.7			60		APHA 5220D Method	
	BOD	mg/l	2.74			15		APHA-5210B Method	
	Oil and Grease	mg/l	-			0.1		APHA-5520B Method	
	Cr	mg/l	-			0.04		APHA-3120B Method	
	Total coliforms*6	MPN/100ml	1400			7.5×10^3		APHA-9221B Method	

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

*[2]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 the retention pond (SW-1) and retention canal (SW-5) 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.

*[3]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.

*[4]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 centralized wastewater treatment plant.

*[5]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.

*[6]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.

*[7]Remarks: There is no current country standard but Ministry of Natural Recourses and Environmental Conservation submitted the National Emission Quality Guidelines (NEQG) for environmental guidelines. The guidelines filled as the country standards in the environmental monitoring form.

2)(b) Water Quality – October 2016

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	Temperature	°C	35	< 3 (increase)	Max 40			Instrument Analysis Method	
	pH	-	7	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	mg/l	982	50	Mas 30			APHA 2540D Method	
	DO	mg/l	4.76	-	-	>=4		Instrument Analysis Method	
	BOD	mg/l	9.35	50	Max 20			APHA-5210B Method	
	COD(Cr)*6	mg/l	2380	250	Max 70*4			APHA 5220D Method	
	Total Coliform*4	MPN/100ml	90000	400	Max 400	7.5×10^3		APHA-9221B Method	
	T-N	mg/l	3.1	-	Max 80		Twice in one	HACH Method 10072	
	T-P	mg/l	0.606	2	-		year	APHA 4500-P E Method	
	Color	Co.Pt	8.75	-	Max 150			APHA-2120C Method	
	Odor	-	200	-	-			APHA-2150B Method	
	HS*12	mg/l	1.188	1	Max 1			HACH 8131 Method	
	Oil and Grease*7	mg/l	320.25	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.49	-	Max 1			HACH 8110 Method	
	Phenols	mg/l	0.032	0.5	Max 1			USEPA Method 420.1 Method	
	Free Chlorine*10	mg/l	8	0.2	Max 1			APHA-4500CL G Method	
	Zinc	mg/l	0.054	2	Max 5			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-1	Chromium	mg/l	≤ 0.002	0.5	Max 0.5			APHA-3120B Method	
	Arsenic	mg/l	0.022	0.1	Max 0.25			APHA-3120B Method	
	Copper	mg/l	0.004	0.5	Max 1			APHA-3120B Method	
	Mercury	mg/l	≤ 0.00054	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	0.048	-	Max 1		year	APHA-3120B Method	
	Selenium	mg/l	≤ 0.001	0.1	Max 0.02			APHA-3120B Method	
	Lead	mg/l	≤ 0.002	0.1	Max 0.2			APHA-3120B Method	
	Nickel	mg/l	0.052	0.5	Max 0.2			APHA-3120B Method	
	Cyanide*9	mg/l	7	1	Max 1			HACH 8017 Method	
SW-5	Temperature	°C	33	< 3 (increase)	Max 40			Instrument Analysis Method	
	pH	-	7.5	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	mg/l	120	50	Mas 30			APHA 2540D Method	
	DO	mg/l	6.71	-	-	>=4		Instrument Analysis Method	
	BOD	mg/l	4.48	50	Max 20			APHA-5210B Method	
	COD(Cr)	mg/l	4.6	250	Max 70*4		Twice in one	APHA 5220D Method	
	Total Coliform*3	MPN/100ml	160000	400	Max 400	7.5×10^3	year	APHA-9221B Method	
	T-N	mg/l	1.2	-	Max 80			HACH Method 10072	
	T-P	mg/l	0.27	2	-			APHA 4500-P E Method	
	Color	Co.Pt	5.62	-	Max 150			APHA-2120C Method	
	Odor	-	1	-	-			APHA-2150B 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	HS	mg/l	0.508	1	Max 1			HACH 8131 Method	
	Oil and Grease	mg/l	< 3.1	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.202	-	Max 1			HACH 8110 Method	
	Phenols	mg/l	0.028	0.5	Max 1			USEPA Method 420.1 Method	
	Free Chlorine	mg/l	2.8	0.2	Max 1			APHA-4500CL G Method	
	Zinc	mg/l	0.042	2	Max 5			APHA-3120B Method	
	Chromium	mg/l	≤ 0.002	0.5	Max 0.5			APHA-3120B Method	
	Arsenic	mg/l	0.012	0.1	Max 0.25		Twice in one	APHA-3120B Method	
	Copper	mg/l	≤ 0.002	0.5	Max 1		year	APHA-3120B Method	
	Mercury	mg/l	≤ 0.00054	0.01	Max 0.005			APHA-3120B Method	
	Cadmium	mg/l	≤ 0.001	0.1	Max 0.03			APHA-3120B Method	
	Barium	mg/l	0.036	-	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	
	Nickel	mg/l	0.028	0.5	Max 0.2			APHA-3120B Method	
	Cyanide	mg/l	0.147	1	Max 1			HACH 8017 Method	
SW-6	Temperature	°C	30	< 3 (increase)	Max 40			Instrument Analysis Method	
	pH	-	7.5	6-9	5.0-9.0			Instrument Analysis Method	
	SS	mg/l	2	50	Mas 30		Twice in one	APHA 2540D Method	
	DO	mg/l	3.32	-	-	>=4	year	Instrument Analysis Method	
	BOD	mg/l	3.32	50	Max 20			APHA-5210B 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	COD(Cr)	mg/l	10.2	250	Max 70*			APHA 5220D Method	
	Total Coliform	MPN/100ml	< 2	400	Max 400	7.5×10^3		APHA-9221B Method	
	T-N	mg/l	7.4	-	Max 80			HACH Method 10072	
	T-P	mg/l	0.09	2	-			APHA 4500-P E Method	
	Color	Co.Pt	7	-	Max 150			APHA-2120C Method	
	Odor	-	1	-	-			APHA-2150B Method	
	HS	mg/l	< 0.005	1	Max 1			HACH 8131 Method	
	Oil and Grease	mg/l	< 3.1	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.004	-	Max 1			HACH 8110 Method	
	Phenols	mg/l	0.004	0.5	Max 1		Twice in one	USEPA Method 420.1 Method	
	Free Chlorine	mg/l	0.1	0.2	Max 1		year	APHA-4500CL G Method	
	Zinc	mg/l	0.006	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	≤ 0.00054	0.01	Max 0.005			APHA-3120B Method	
	Cadmium	mg/l	≤ 0.001	0.1	Max 0.03			APHA-3120B Method	
	Barium	mg/l	0.014	-	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	
	Nickel	mg/l	0.012	0.5	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	Cyanide	mg/l	0.001	1	Max 1			HACH 8017 Method	
SW-2	Temperature	°C	29	< 3 (increase)	Max 40			Instrument Analysis Method	
(Reference	pH	-	6	6-9	5.0-9.0			Instrument Analysis Method	
Point)	SS*3	mg/l	36	50	Mas 30			APHA 2540D Method	
	DO	mg/l	4.62	-	-	>=4		Instrument Analysis Method	
	BOD	mg/l	3.86	50	Max 20			APHA-5210B Method	
	COD(Cr)	mg/l	14.5	250	Max 70*4			APHA 5220D Method	
	Total Coliform*5	MPN/100ml	30000	400	Max 400	7.5×10^3		APHA-9221B Method	
	T-N	mg/l	0.8	-	Max 80			HACH Method 10072	
	T-P	mg/l	0.113	2	-			APHA 4500-P E Method	
	Color	Co.Pt	14.09	-	Max 150		Twice in one	APHA-2120C Method	
	Odor	-	2	-	-		year	APHA-2150B Method	
	HS	mg/l	0.102	1	Max 1			HACH 8131 Method	
	Oil and Grease*8	mg/l	16.56	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.06	-	Max 1			HACH 8110 Method	
	Phenols	mg/l	0.022	0.5	Max 1			USEPA Method 420.1 Method	
	Free Chlorine	mg/l	0.7	0.2	Max 1			APHA-4500CL G Method	
	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	≤ 0.01	0.1	Max 0.25			APHA-3120B Method	
	Copper	mg/l	≤ 0.002	0.5	Max 1			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	Mercury	mg/l	≤ 0.00054	0.01	Max 0.005			APHA-3120B Method	
(Reference	Cadmium	mg/l	≤ 0.001	0.1	Max 0.03			APHA-3120B Method	
Point)	Barium	mg/l	0.012	-	Max 1		Twice in one	APHA-3120B Method	
	Selenium	mg/l	≤ 0.01	0.1	Max 0.02		year	APHA-3120B Method	
	Lead	mg/l	≤ 0.002	0.1	Max 0.2			APHA-3120B Method	
	Nickel	mg/l	0.002	0.5	Max 0.2			APHA-3120B Method	
	Cyanide	mg/l	0.031	1	Max 1			HACH 8017 Method	
SW-3	Temperature	°C	30	< 3 (increase)	Max 40			Instrument Analysis Method	
(Reference	pH	-	6	6-9	5.0-9.0			Instrument Analysis Method	
Point)	SS*3	mg/l	88	50	Mas 30			APHA 2540D Method	
	DO	mg/l	3.71	-	-			Instrument Analysis Method	
	BOD	mg/l	3.67	50	Max 20	>=4		APHA-5210B Method	
	COD(Cr)	mg/l	10.5	250	Max 70*4			APHA 5220D Method	
	Total Coliform*5	MPN/100ml	28000	400	Max 400		Twice in one	APHA-9221B Method	
	T-N	mg/l	7.2	-	Max 80	7.5×10^3	year	HACH Method 10072	
	T-P	mg/l	0.19	2	-			APHA 4500-P E Method	
	Color	Co.Pt	8.76	-	Max 150			APHA-2120C Method	
	Odor	-	2	-	-			APHA-2150B Method	
	HS	mg/l	0.264	1	Max 1			HACH 8131 Method	
	Oil and Grease*8	mg/l	11.38	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.128	-	Max 1	3		HACH 8110 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)
	Phenols	mg/l	0.001	0.5	Max 1			USEPA Method 420.1 Method	
	Free Chlorine*11	mg/l	1.4	0.2	Max 1			APHA-4500CL G Method	
	Zinc	mg/l	0.014	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	
SW-3	Copper	mg/l	≤ 0.002	0.5	Max 1		Twice in one	APHA-3120B Method	
(Reference	Mercury	mg/l	≤ 0.00054	0.01	Max 0.005		year	APHA-3120B Method	
Point)	Cadmium	mg/l	≤ 0.001	0.1	Max 0.03			APHA-3120B Method	
	Barium	mg/l	0.08	-	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	
	Nickel	mg/l	0.01	0.5	Max 0.2			APHA-3120B Method	
	Cyanide	mg/l	0.076	1	Max 1			HACH 8017 Method	
SW-4	Temperature	°C	30	< 3 (increase)	Max 40			Instrument Analysis Method	
(Reference	pH	-	6	6-9	5.0-9.0			Instrument Analysis Method	
Point)	SS*3	mg/l	82	50	Mas 30			APHA 2540D Method	
	DO	mg/l	4.2	-	-	>=4		Instrument Analysis Method	
	BOD	mg/l	3.87	50	Max 20			APHA-5210B Method	
	COD(Cr)	mg/l	11	250	Max 70*4		Twice in one	APHA 5220D Method	
	Total Coliform*5	MPN/100ml	160000	400	Max 400	7.5×10^3	year	APHA-9221B Method	
	T-N	mg/l	7.2	-	Max 80			HACH Method 10072	

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-P	mg/l	0.171	2	-			APHA 4500-P E Method	
	Color	Co.Pt	8.25	-	Max 150			APHA-2120C Method	
	Odor	-	1	-	-			APHA-2150B Method	
	HS	mg/l	0.243	1	Max 1			HACH 8131 Method	
	Oil and Grease	mg/l	< 3.1	10	Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	0.137	-	Max 1			HACH 8110 Method	
SW-4	Phenols	mg/l	0.007	0.5	Max 1			USEPA Method 420.1 Method	
(Reference	Free Chlorine*11	mg/l	1.3	0.2	Max 1			APHA-4500CL G Method	
Point)	Zinc	mg/l	0.022	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		Twice in one	APHA-3120B Method	
	Copper	mg/l	≤ 0.002	0.5	Max 1		year	APHA-3120B Method	
	Mercury	mg/l	≤ 0.00054	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	≤ 0.002	0.1	Max 0.2			APHA-3120B Method	
	Nickel	mg/l	0.01	0.5	Max 0.2			APHA-3120B Method	
	Cyanide	mg/l	0.069	1	Max 1			HACH 8017 Method	
GW-1	Temperature	°C	34	None	Max 40			Instrument Analysis Method	
	pH	-	8	(Available	5.0-9.0			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)
GW-1	SS	mg/l	12	Guideline	Mas 30			APHA 2540D Method	
(Reference	DO	mg/l	5.56	value	-	>=4	Twice in one	Instrument Analysis Method	
Point)	BOD	mg/l	3.34	determined by	Max 20		year	APHA-5210B Method	
	COD(Cr)	mg/l	5	MONREC)	Max 70[4*]			APHA 5220D Method	
	Total Coliform	MPN/100ml	< 2		Max 400	7.5×10^3		APHA-9221B Method	
	T-N	mg/l	0.7		Max 80			HACH Method 10072	
	T-P	mg/l	0.089		-			APHA 4500-P E Method	
	Color	Co.Pt	4.46		Max 150			APHA-2120C Method	
	Odor	-	1		-			APHA-2150B Method	
	HS	mg/l	< 0.005		Max 1			HACH 8131 Method	
	Oil and Grease	mg/l	< 3.1		Max 5			APHA-5520B Method	
	Formaldehyde	mg/l	< 0.003		Max 1			HACH 8110 Method	
	Phenols	mg/l	0.015		Max 1			USEPA Method 420.1 Method	
	Free Chlorine	mg/l	0.1		Max 1		Twice in one	APHA-4500CL G Method	
	Zinc	mg/l	0.01		Max 5		year	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	≤ 0.00054		Max 0.005			APHA-3120B Method	
	Cadmium	mg/l	≤ 0.001		Max 0.03			APHA-3120B Method	
	Barium	mg/l	0.092		Max 1			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)
	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			APHA-3120B Method	
	Cyanide	mg/l	0.002		Max 1			HACH 8017 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 solids 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, COD(Cr) is higher than the standard due to the expected reason- analytical error as positive interference by high concentration of oil and grease. In case of oil and grease are containing sample, the analytical method commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results.

*7Remark: In SW-1, Oil and grease is higher than the standard due to the expected reason- i) accidental spillage of oil and grease to retention pond (SW-1) and ii) influence by water from the downstream of retention pond (SW-1) due to flow back by tidal fluctuation. The accident spillage of oil and grease to retention pond (SW-1) is attached in the appendix of accident case in detail report.

*8Remark: For reference monitoring points (SW-2 and SW-3), the result of oil and grease is higher than the standard due to expected reason- accident spillage of oil and grease to retention pond (SW-1) and these spillages may be flowing up to SW-1 and flowing out to SW-3 during high tide, upstream of Shwe Pyauk creek. The detail information is attached in water quality monitoring report, October 2016.

*9Remark: In SW-1, Cyanide is higher than the standard due to the expected reason: analytical error due to positive interference by high concentration of oil and grease. Since any factories in Thilawa SEZ Zone A have not utilized and produced cyanide in their processes, it is better to consider the reason of exceeded the target value might be an analytical error. The analysis methods commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results.

*10Remark: In SW-1, 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.

*11Remark: For reference monitoring points (SW-3 and 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.

*12Remark: In SW-1, sulphide is higher than the standard due to the expected reason- analytical error as positive interference by high concentration of oil and grease. The analysis methods commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results.

2) (e) Water Quality – December 2016

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*2	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	-	8.8	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	mg/l	166	50	Max 30			APHA 2540D Method	
	DO	mg/l	7.4	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	9.5	250	Max 70		Once in two month	APHA 5220D Method	
	BOD	mg/l	4.2	50	Max 20			APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1	10	Max 5			APHA-5520B Method	
	Cr	mg/l	0.014	0.5	Max 0.5			APHA-3120B Method	
	Total coliforms*4	MPN/100ml	92000	400	Max 400	7.5×10^3		APHA-9221B Method	
SW-5	pH	-	8.6	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	mg/l	34	50	Max 30			APHA 2540D Method	
	DO	mg/l	5.5	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	23.5	250	Max 70		Once in two month	APHA 5220D Method	
	BOD	mg/l	7.9	50	Max 20			APHA-5210B Method	
	Oil and Grease	mg/l	3.5	10	Max 5			APHA-5520B Method	
	Cr	mg/l	≤ 0.002	0.5	Max 0.5			APHA-3120B Method	
	Total coliforms*4	MPN/100ml	92000	400	Max 400	7.5×10^3		APHA-9221B Method	

Location*2	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	pH	-	7.3	6-9	5.0-9.0			Instrument Analysis Method	
	SS	mg/l	8	50	Max 30			APHA 2540D Method	
	DO	mg/l	3.5	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	9.1	250	Max 70		Once in two month	APHA 5220D Method	
	BOD	mg/l	0	50	Max 20			APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1	10	Max 5			APHA-5520B Method	
	Cr	mg/l	≤ 0.002	0.5	Max 0.5			APHA-3120B Method	
	Total coliforms	MPN/100ml	< 1.8	400	Max 400	7.5×10^3		APHA-9221B Method	
SW-2 (Reference Point)	pH	-	7.4	6-9	5.0-9.0			Instrument Analysis Method	
	SS*3	mg/l	462	50	Max.30			APHA 2540D Method	
	DO	mg/l	5.4	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	8.4	250	Max. 70*5		Once in two month	APHA 5220D Method	
	BOD	mg/l	5	50	Max. 20			APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1	10	Max. 5			APHA-5520B Method	
	Cr	mg/l	0.03	0.5	Max. 0.5			APHA-3120B Method	
	Total coliforms*5	MPN/100ml	92000	400	Max 400			APHA-9221B Method	
SW-3 (Reference Point)	pH	-	7.6	6-9	5.0-9.0			Instrument Analysis Method	
	SS*3	mg/l	384	50	Max.30	>=4		APHA 2540D Method	
	DO	mg/l	8.6	-	-		Once in two month	Instrument Analysis Method	
	COD(Cr)	mg/l	11.2	250	Max. 70*5			APHA 5220D Method	
	BOD	mg/l	3.6	50	Max. 20			APHA-5210B Method	

Location*2	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)	Oil and Grease	mg/l	< 3.1	10	Max. 5			APHA-5520B Method	
	Cr	mg/l	0.03	0.5	Max. 0.5			APHA-3120B Method	
	Total coliforms*5	MPN/100ml	54000	400	Max 400			APHA-9221B Method	
SW-4 (Reference Point)	pH	-	7.5	6-9	5.0-9.0	>=4	Once in two month	Instrument Analysis Method	
	SS*3	mg/l	494	50	Max.30			APHA 2540D Method	
	DO	mg/l	6.3	-	-			Instrument Analysis Method	
	COD(Cr)	mg/l	6.9	250	Max. 70*5			APHA 5220D Method	
	BOD	mg/l	6.2	50	Max. 20			APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1	10	Max. 5			APHA-5520B Method	
	Cr	mg/l	0.036	0.5	Max. 0.5			APHA-3120B Method	
	Total coliforms*5	MPN/100ml	92000	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	mg/l	10			50		APHA 2540D Method	
	DO	mg/l	7			>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	2.7			60		APHA 5220D Method	
	BOD	mg/l	6.2			15		APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1			0.1		APHA-5520B Method	
	Cr	mg/l	≤ 0.002			0.04		APHA-3120B Method	
	Total coliforms	MPN/100ml	< 1.8			7.5×10^3		APHA-9221B Method	

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

*[2]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.

*[3]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.

*[4]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.

*[5]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.

2)(d) Water Quality – February 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.

nm

Location*[2]	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	pH	-	8.2	6-9	5.0-9.0		Once in two month	Instrument Analysis Method	
	SS*[2]	mg/l	272	50	Max 30			APHA 2540D Method	

Location*2	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
	DO	mg/l	6.8	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	12.9	250	Max 70			APHA 5220D Method	
	BOD	mg/l	4.07	50	Max 20			APHA-5210B Method	
	Oil and Grease*7	mg/l	5.45	10	Max 5			APHA-5520B Method	
	Cr	mg/l	≤ 0.002	0.5	Max 0.5			APHA-3120B Method	
	Total coliforms*4	MPN/100ml	92,000	400	Max 400	7.5×10^3		APHA-9221B Method	
SW-5	pH	-	8.7	6-9	5.0-9.0			Instrument Analysis Method	
	SS*2	mg/l	30	50	Max 30			APHA 2540D Method	
	DO	mg/l	7.8	-	-	>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	17.4	250	Max 70		Once in two month	APHA 5220D Method	
	BOD	mg/l	4.02	50	Max 20			APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1	10	Max 5			APHA-5520B Method	
	Cr	mg/l	≤ 0.002	0.5	Max 0.5			APHA-3120B Method	
	Total coliforms*4	MPN/100ml	820	400	Max 400	7.5×10^3		APHA-9221B Method	
SW-6	pH	-	7.4	6-9	5.0-9.0			Instrument Analysis Method	
	SS	mg/l	18	50	Max 30	>=4		APHA 2540D Method	
	DO	mg/l	5.7	-	-			Instrument Analysis Method	
	COD(Cr)	mg/l	< 0.7	250	Max 70		Once in two month	APHA 5220D Method	
	BOD	mg/l	2.69	50	Max 20			APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1	10	Max 5			APHA-5520B Method	
	Cr	mg/l	≤ 0.002	0.5	Max 0.5	7.5×10^3		APHA-3120B Method	

Location*2	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
	Total coliforms*4	MPN/100ml	4900	400	Max 400			APHA-9221B Method	
SW-2 (Reference Point)	pH	-	7.4	6-9	5.0-9.0	>=4	Once in two month	Instrument Analysis Method	
	SS*3	mg/l	1400	50	Max.30			APHA 2540D Method	
	DO	mg/l	6	-	-			Instrument Analysis Method	
	COD(Cr)	mg/l	48	250	Max. 70*5			APHA 5220D Method	
	BOD	mg/l	4.42	50	Max. 20			APHA-5210B Method	
	Oil and Grease*8	mg/l	5.64	10	Max. 5			APHA-5520B Method	
	Cr	mg/l	≤ 0.002	0.5	Max. 0.5			APHA-3120B Method	
	Total coliforms*6	MPN/100ml	> 160,000	400	Max 400			APHA-9221B Method	
SW-3 (Reference Point)	pH	-	7.4	6-9	5.0-9.0	>=4	Once in two month	Instrument Analysis Method	
	SS*3	mg/l	2002	50	Max.30			APHA 2540D Method	
	DO	mg/l	6.3	-	-			Instrument Analysis Method	
	COD(Cr)	mg/l	10.8	250	Max. 70*5			APHA 5220D Method	
	BOD	mg/l	5.83	50	Max. 20			APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1	10	Max. 5			APHA-5520B Method	
	Cr	mg/l	0.082	0.5	Max. 0.5			APHA-3120B Method	
	Total coliforms*6	MPN/100ml	> 160,000	400	Max 400			APHA-9221B Method	
SW-4 (Reference Point)	pH	-	7.4	6-9	5.0-9.0	>=4	Once in two month	Instrument Analysis Method	
	SS*3	mg/l	16	50	Max.30			APHA 2540D Method	
	DO	mg/l	5.8	-	-			Instrument Analysis Method	
	COD(Cr)	mg/l	18.4	250	Max. 70*5			APHA 5220D Method	

Location*2	Item	Unit	Measured Value	Country's Standard	Target value to be applied	*1Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
	BOD	mg/l	4.18	50	Max. 20			APHA-5210B Method	
	Oil and Grease	mg/l	4.73	10	Max. 5			APHA-5520B Method	
	Cr	mg/l	0.134	0.5	Max. 0.5			APHA-3120B Method	
	Total coliforms*6	MPN/100ml	> 160,000	400	Max 400			APHA-9221B Method	
GW-1 (Reference Point)	pH	-	7.7	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	mg/l	2			50		APHA 2540D Method	
	DO	mg/l	5.9			>=4		Instrument Analysis Method	
	COD(Cr)	mg/l	6.7			60		APHA 5220D Method	
	BOD	mg/l	2.42			15		APHA-5210B Method	
	Oil and Grease	mg/l	< 3.1			0.1		APHA-5520B Method	
	Cr	mg/l	≤ 0.002			0.04		APHA-3120B Method	
	Total coliforms	MPN/100ml	13			7.5×10^3		APHA-9221B Method	

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

*2Remark: 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 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 STP.

*3Remark: For reference monitoring points (SW-2 and SW-3), 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 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 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.

*5Remark: In SW-6, Total coliform are higher than the standard due to the expected reason- a possible reason for exceeding the targeted value is that retained water did not contact sufficiently with chlorine in the chlorine injection tank before discharging to outlet of the centralized STP at the time of sampling

*6Remark: 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.

*7Remark: In SW-1, oil and grease is higher than the standard sue to the expected reason – influence by water from the downstream of retention pond (SW-1) due to flow back by tidal fluctuation.

*8Remark: In SW-2, oil and grease is higher than the standard sue to the expected reason – oil contaminated water from the local industrial zone outside of Thilawa SEZ and delivered from downstream area by tidal effect.

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

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)
TNV-1	Leq (day)	dB(A)			N/A	N/A	75	Once (peak period)	Sound Level Meter	
	Leq(eve)	dB(A)					70			

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

Noise Level (Living Environment-Near Monastery)

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)
TNV-2	Leq (day)	dB(A)			N/A	75	Singapore	Once in 3 months	Sound Level Meter	
	Leq(eve)	dB(A)				60				
	Leq(night)	dB(A)				55				
TNV-3	Leq(day)	dB(A)			N/A	75	Singapore	Once in 3 months	Sound level Meter	
	Leq(eve)	dB(A)				60				
	Leq(night)	dB(A)				55				

*Remark: Referred to the Singapore Target Noise Standard (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) (a) Solid Waste (Disposal of Domestic Waste from Contractor)

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 Loads	Remarks
1	3-Nov-2016	Waste Disposal	6	YCDC
2	6-Jan-207	Waste Disposal (Sewage)	3	YCDC
3	29-Jan-2017	Waste Disposal	5	YCDC

Remark: Attached waste disposal record (Construction Monthly Progress Report) in appendix.

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.

5) (b) 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	3-Oct-2016	General Waste Disposal	1160	Golden Dowa Eco-system Myanmar Co.,Ltd
2	25- Oct-2016	General Waste Disposal	1620	Golden Dowa Eco-system Myanmar Co.,Ltd
3	30 Nov-2016	General Waste Disposal	1120	Golden Dowa Eco-system Myanmar Co.,Ltd
4	5-Jan-2017	General Waste Disposal	1060	Golden Dowa Eco-system Myanmar Co.,Ltd
5	9-Feb-2017	General Waste Disposal	680	Golden Dowa Eco-system Myanmar Co.,Ltd

6	10-Feb-2017	General Waste Disposal	760	Golden Dowa Eco-system Myanmar Co.,Ltd
7	16-Mar-2017	General Waste Disposal	960	Golden Dowa Eco-system Myanmar Co.,Ltd
8	17-Mar-2017	General Waste Disposal	720	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.

6) (a) Ground Subsidence and Hydrology-October 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
6-Oct-2016	123	m3/week	+ 6.996	m	Once a week	
13-Oct-2016	144	m3/week	+ 6.995	m		
20-Oct-2016	130	m3/week	+ 6.993	m		
27-Oct-2016	136	m3/week	+ 6.994	m		

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

(b) Ground Subsidence and Hydrology-November 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
3-Nov-2016	126	m3/week	+ 6.994	m	Once a week	
10-Nov-2016	132	m3/week	+ 6.995	m		
17-Nov-2016	117	m3/week	+ 6.995	m		
24-Nov-2016	109	m3/week	+ 6.996	m		

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

(c) Ground Subsidence and Hydrology-December 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
1-Dec-2016	110	m3/week	+ 6.996	m	Once a week	
8-Dec-2016	131	m3/week	+ 6.994	m		
15-Dec-2016	127	m3/week	+ 6.994	m		
22-Dec-2016	123	m3/week	+ 6.995	m		
29-Dec-2016	114	m3/week	-*1	m		

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

*1 Remarks: Ground level was not measuring in 29-Dec-2016 because of no working in public holiday (Karen New Year).

(d) Ground Subsidence and Hydrology-January 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
5-Jan-2017	112	m3/week	+ 6.994	m	Once a week	
12-Jan-2017	107	m3/week	+ 6.994	m		
19-Jan-2017	123	m3/week	+ 6.995	m		
26-Jan-2017	115	m3/week	+ 6.996	m		

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

(e) Ground Subsidence and Hydrology-February 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
2-Feb-2017	104	m3/week	-	m	Once a week	
9-Feb-2017	98	m3/week	-	m		

16-Feb-2017	107	m3/week	-	m		
23-Feb-2017	124	m3/week	-	m		

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

(f) Ground Subsidence and Hydrology-July 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
15-Jul-2016	-	m3/week	+ 7.137	m	Once a week	
22-Jul-2016	-	m3/week	+ 7.136	m		
29-Jul-2016	-	m3/week	+ 7.136	m		

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

(g) Ground Subsidence and Hydrology-August 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
5-Aug-2016	-	m3/week	+ 7.136	m	Once a week	
12-Aug-2016	-	m3/week	+ 7.136	m		
19-Aug-2016	-	m3/week	+ 7.136	m		
26-Aug-2016	-	m3/week	+ 7.136	m		

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

(h) Ground Subsidence and Hydrology-September 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
2-Sept-2016	-	m3/week	+ 7.136	m	Once a week	
9-Sept-2016	-	m3/week	+ 7.136	m		
16-Sept-2016	-	m3/week	+ 7.136	m		
23-Sept-2016	-	m3/week	+ 7.136	m		
30-Sept-2016	-	m3/week	+ 7.136	m		

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

(i) Ground Subsidence and Hydrology-October 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
7-Oct-2016	-	m3/week	+ 7.136	m	Once a week	
14-Oct-2016	-	m3/week	+ 7.136	m		
21-Oct-2016	-	m3/week	+ 7.136	m		
28-Oct-2016	-	m3/week	+ 7.136	m		

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

(j) Ground Subsidence and Hydrology-November 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
4-Nov-2016	-	m3/week	+ 7.136	m	Once a week	
11-Nov-2016	-	m3/week	+ 7.136	m		
18-Nov-2016	-	m3/week	+ 7.136	m		
25-Nov-2016	-	m3/week	+ 7.138	m		

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

(k) Ground Subsidence and Hydrology-December 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
2-Dec-2016	-	m3/week	+ 7.136	m	Once a week	
9-Dec-2016	-	m3/week	+ 7.136	m		
16-Dec-2016	-	m3/week	+ 7.135	m		
23-Dec-2016	-	m3/week	+ 7.133	m		
30-Dec-2016	-	m3/week	+ 7.133	m		

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

(l) Ground Subsidence and Hydrology-January 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
6-Jan-2017	-	m3/week	+ 7.134	m	Once a week	
13-Jan-2017	-	m3/week	+ 7.134	m		
20-Jan-2017	-	m3/week	+ 7.134	m		
27-Jan-2017	-	m3/week	+ 7.134	m		

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

(m) Ground Subsidence and Hydrology-February 2016

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
3-Feb-2017	-	m3/week	+ 7.134	m	Once a week	
10-Feb-2017	-	m3/week	+ 7.134	m		
17-Feb-2017	-	m3/week	+ 7.134	m		
24-Feb-2017	-	m3/week	+ 7.134	m		

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

(n) Ground Subsidence and Hydrology-March 2017

Duration (Week)	Water Consumption		Ground Level		Frequency	Note
	Quantity	Unit	Quantity	Unit		
3-Mar-2017	-	m3/week	+ 7.134	m	Once a week	
10-Mar-2017	-	m3/week	+ 7.134	m		
17-Mar-2017	-	m3/week	+ 7.138	m		
24-Mar-2017	-	m3/week	+ 7.138	m		
31-Mar-2017	-	m3/week	+ 7.138	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 28th November 2016 near main gate. The two motor bikes hit near main gate. Nobody got injured and one motor bike front cover was broken.	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 December 2016 near B-3 plot. The tricycle was small firing cause of wiring shock near main gate. Nobody got injured and tricycle was broken.	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 26th December 2016 near main gate. Two vehicles were hit near main gate. Nobody got injured and no big damage.	MJTD take the action as per following: - Remind to reduce speed and explained the traffic rules - Both parties negotiated successfully without police involvement
An Accident was occurred on 29th December 2016 near Plot C-5 and C-6. Motor bike hit the people near Plot C-5 and C-6. The girls who got injured her back waist and both hands and send to the clinic.	MJTD take the action as per following: - Send the injured person to clinic by emergency car - Arranged the required facilities to injured person by bike driver. - Bike driver took full responsibility of victim and bear all the medical cost and one month salary.
An Accident was occurred on 4th January 2017 in front of Plot B21. Motor bike and truck were hit in front of Plot B21. Nobody got injured and motor bike damages.	MJTD take the action as per following: - Remind to reduce speed and explained the traffic rules - Both parties negotiated successfully without police involvement.
An Accident was occurred on 5th January 2017 in front of Plot B21. Truck was hit to the Road lamp post in front of Plot B21. Nobody got injured and only road lamp post damage.	MJTD take the action as per following: - Remind to reduce speed and explained the traffic rules - Repairing the road lamp post

Contents of Incidents	Countermeasures
An Accident was occurred on 14th January 2017 near Plot B-10. The motor bike was hit the platform near Plot B-10. A small injury got injured and no big damage.	MJTD take the action as per following: - Remind to drive carefully in future and explained the traffic rules
An Accident was occurred on 16th January 2017 near main gate. Two motor bikes were hit near main gate. Nobody got injured and got a little damage of motor bike.	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 16th January 2017 at the corner of B20. Two motor bikes were hit at the corner of B20. One person got head injured and another person was broken the chin.	MJTD take the action as per following: - Send the injured person to clinic by emergency car - Remind to reduce speed and explained the traffic rules - Both parties negotiated successfully without police involvement
An Accident was occurred on 26th January 2017 near main gate. Two motor bikes were skidded and overturned near main gate. Nobody got injured and a little damage of motor bike.	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 March 2017 at the Plot-B18-2. Fire case was happened at Plot-B18-2. Nobody got injured and burned some the materials.	MJTD take the action as per following: - Arranged and provided the required facilities to site for firefighting. - Secure and clear the traffic with the victim of fire - Remind and make sure the fire safety plan and emergency plan
An Accident was occurred on 20th March 2017 near Plot-B10. Vehicle and motor bike were hit near Plot-B10. Motor bike driver and his friend got some injured and a little damaged the vehicle and motor bike.	MJTD take the action as per following: - Remind to reduce speed, drive carefully and explained the traffic rules - Negotiation and investigation by the police department.

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

September, 2016

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE A

(PHASE 1 OPERATION STAGE)

(Bi-Monthly Monitoring)

September 2016

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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 Zone A and its surrounding area in timely manner. Among the seven locations, SW-1, SW-5 are main discharging gates 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-5, and SW-6) where can be measured by flow rate instrument. 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 analysis
2	Water Temperature	O	O	O	O	O	O	O	On-site analysis
3	DO	O	O	O	O	O	O	O	On-site analysis
4	BOD	O	O	O	O	O	O	O	Laboratory analysis
5	COD	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	Flow Rate	O	-	-	-	O	O	-	On-site analysis

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' 06.0", E- 96° 16' 43.1"
		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' 54.6", E- 96° 16' 26.4"
		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.
	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 south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone A in the north, industrial compound in the east and paddy field in the south and 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 A in the north, 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 south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone A in the north, industrial compound 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 drain is rain water and wastewater from surrounding. This drain is also connected to the Shwe Pyauk creek. The water quality of this monitoring point has 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 Sewage Treatment Plant (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 1L 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 solid (SS)	APHA 2540 D (Dry at 103-105'C 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 5220 D (Closed 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 2120 C (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 22nd September 2016 and sampling time is shown in Table 2.4-1 to avoid tidal effect.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-1	22/09/2016 12:43
2	SW-2	22/09/2016 11:13
3	SW-3	22/09/2016 10:52
4	SW-4	22/09/2016 10:01
5	SW-5	22/09/2016 12:16
6	SW-6	22/09/2016 16:33
7	GW-1	22/09/2016 12:00

Source: Myanmar Koei International Ltd.

2.5 Monitoring Results

Results of water quality survey are summarized in Table 2.5-1 and Table 2.5-2. 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 were exceeded the target values. As for the result of SS, the result at the outlet of the centralized sewage treatment plant (SW-6) complied with the target value. It implied that effluents from each locator was treated well by the sewage treatment plant. 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 sewage treatment plant (SW-6) also complied with the target value. It may prove that effluent from each locator was treated well by the sewage treatment plant. 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 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.

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 points (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.

[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	31.45	33.04	29.39	
2	pH	-	6.92	8.47	7.09	5~9
3	Suspended solid (SS)	mg/L	88.0	46.00	8.00	30
4	Dissolved oxygen (DO)	mg/L	5.46	6.06	5.30	-
5	BOD (5)	mg/L	5.19	5.89	5.43	20
6	COD (Cr)	mg/L	< 0.7	3.8	<0.7	70
7	Total coliform	MPN/100ml	90,000	50,000	<2	400
8	Total nitrogen (T-N)	mg/L	1.8	0.9	14.3	80
9	Total phosphorous (T-P)	mg/L	0.232	0.134	0.098	-
10	Color	TCU (True Color Unit)	5.91	4.22	0.96	-
11	Odor	TON (Threshold Odor Number)	1	2	4	-
12	Oil and grease*1	mg/L	3.17	-	< 3.1	5
13	Chromium*1	mg/L	0.066	-	0.04	0.5
14	Flow Rate	m^3/s	0.52	0.045	0.025	-

Note *1: In the MJTD's self-monitoring results on 7th September 2016 were not exceeded the target levels of Oil and grease and Chromium. Therefore, the monitoring of Oil and grease and Chromium were not carried out on 22nd September 2016.
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 Total nitrogen were exceeded the target value. As for the result of SS, results at the surface water monitoring points (SW-2, SW-3, SW-4) exceeded the target value due to two expected reasons; 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.

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 downstream area by tidal effect.

As for the result of total coliform in ground water, result at GW-1 (groundwater 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.

As for the result of total nitrogen (T-N), the result at GW-1 (groundwater 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. It has a possibility to high level of nitrite-nitrogen ($N\text{-}NO_2$) to be affected babies causing hemoglobinemia. If a baby who lives in the monastery and drink water from the groundwater, it is recommended to check whether nitrite-nitrogen ($N\text{-}NO_2$) exceeds the guideline value stipulated in World Health Organization (WHO) and to advice the monastery not good for baby to drink water from groundwater.

However, the above observations cannot reach to the conclusion of what is the reason to be exceeded the target values, the continuous monitoring will be necessary.

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	30.55	30.00	29.29	33.63	
2	pH	-	6.46	6.71	6.82	7.84	5~9
3	Suspended solid (SS)	mg/L	34.0	42.00	176.0	24	30
4	Dissolved oxygen (DO)	mg/L	4.61	3.85	3.72	5.19	-
5	BOD (5)	mg/L	4.30	7.60	5.04	2.74	20
6	COD (Cr)	mg/L	7.1	6.6	3.3	<0.7	70
7	Total coliform	MPN/100ml	160,000	24,000	90,000	1,400	400
8	Total nitrogen (T-N)	mg/L	1.7	2.0	3.4	110	80
9	Total phosphorous (T-P)	mg/L	0.293	0.158	0.298	0.237	-
10	Color	TCU (True Color Unit)	12.64	14.51	17.72	1.19	-
11	Odor	TON (Threshold Odor Number)	1	2	1	1	-
12	Flow Rate	m^3/s	-	-	-	-	-

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 sewage treatment plant (SW-6) complied with the target value of both of them. It may prove that effluent from each locator was treated well by the sewage treatment plant. On the other hand, parameters of SS and Total coliform 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 from the industrial area of Zone A to public water body.

As for parameters of SS, Total coliform, and Total nitrogen in surface water and ground water were exceeded the target values at reference monitoring point as baseline of discharged creek and tube well in monastery. 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 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.

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 SEWAGE TREATMENT PLANT

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051/ 09 796935149

Report No. : GEM-LAB-201610022
Revision No. : 1
Report Date : 5 October, 2016
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-1-2216
Sample No. : W-1609070
Waste Profile No. : -

Sampling Date : 22 September, 2016
Sampling By : Customer
Sample Received Date : 22 September, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	88.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.19	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	< 0.7	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.8	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.232	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	5.91	0
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	90000	2

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, 21st edition

Analysed By :
Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051/ 09 796935149

Report No. : GEM-LAB-201610025
Revision No. : 1
Report Date : 5 October, 2016
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-5-2216
Sample No. : W-1609073
Waste Profile No. : -

Sampling Date : 22 September, 2016
Sampling By : Customer
Sample Received Date : 22 September, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	46.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.89	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	3.8	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	0.9	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.134	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	4.22	0
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	-
8	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	50000	2

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, 21st edition

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051/ 09 796935149

Report No. : GEM-LAB-201610026
Revision No. : 1
Report Date : 5 October, 2016
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-6-2216
Sample No. : W-1609074
Waste Profile No. : -

Sampling Date : 22 September, 2016
Sampling By : Customer
Sample Received Date : 22 September, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	8.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.43	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	< 0.7	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	14.3	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.098	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	0.96	0
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	4	-
8	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	< 2	2

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, 21st edition

LAB
GEM

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

Approved By :
Tomoya Suzuki
Director

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

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051/ 09 796935149

Report No. : GEM-LAB-201610023
Revision No. : 1
Report Date : 5 October, 2016
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(a)-2216
Sample No. : W-1609071
Waste Profile No. : -

Sampling Date : 22 September, 2016
Sampling By : Customer
Sample Received Date : 22 September, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	34.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.30	0
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	1.7	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.293	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	12.64	0
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	≥ 160000	2

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, 21st edition

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051/ 09 796935149

Report No. : GEM-LAB-201610029
Revision No. : 1
Report Date : 5 October, 2016
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-3-2216
Sample No. : W-1609077
Waste Profile No. : -

Sampling Date : 22 September, 2016
Sampling By : Customer
Sample Received Date : 22 September, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	42.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	7.60	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	6.6	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.0	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.158	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	14.51	0
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	-
8	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	24000	2

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, 21st edition

LAB
GEM

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

Approved By :
Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051/ 09 796935149

Report No. : GEM-LAB-201610027
Revision No. : 1
Report Date : 5 October, 2016
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-4(a)-2216
Sample No. : W-1609075
Waste Profile No. : -

Sampling Date : 22 September, 2016
Sampling By : Customer
Sample Received Date : 22 September, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	176.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.04	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	3.3	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	3.4	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.298	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	17.72	0
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	90000	2

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, 21st edition

LAB
GEM

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051/ 09 796935149

Report No. : GEM-LAB-201610021
Revision No. : 1
Report Date : 5 October, 2016
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-1-2216
Sample No. : W-1609069
Waste Profile No. : -

Sampling Date : 22 September, 2016
Sampling By : Customer
Sample Received Date : 22 September, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	24.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	2.74	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	< 0.7	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	110	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.237	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	1.19	0
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Total Coliform	APHA 92218 (Standard Total Coliform Fermentation Technique)	MPN/100ml	1400	2

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, 21st edition

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

LAB
GEM

Approved By :
Tomoya Suzuki
Director

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

Appendix

Water and Waste Water Monitoring Report

October, 2016

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE A

(PHASE 1 OPERATION STAGE)

(Bi-Annually Monitoring)

October 2016

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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-5, and SW-6) where can be measured by flow rate instrument. 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	O	O	O	O	O	O	O	Laboratory analysis
5	COD	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	Sulphide	O	O	O	O	O	O	O	Laboratory analysis
11	Free chlorine	O	O	O	O	O	O	O	Laboratory analysis
12	Color	O	O	O	O	O	O	O	Laboratory analysis
13	Cyanide	O	O	O	O	O	O	O	Laboratory analysis
14	Oil and grease	O	O	O	O	O	O	O	Laboratory analysis
15	Formaldehyde	O	O	O	O	O	O	O	Laboratory analysis
16	Phenol	O	O	O	O	O	O	O	Laboratory analysis
17	Mercury	O	O	O	O	O	O	O	Laboratory analysis
18	Zinc	O	O	O	O	O	O	O	Laboratory analysis
19	Arsenic	O	O	O	O	O	O	O	Laboratory analysis
20	Chromium	O	O	O	O	O	O	O	Laboratory analysis
21	Cadmium	O	O	O	O	O	O	O	Laboratory analysis
22	Selenium	O	O	O	O	O	O	O	Laboratory analysis
23	Lead	O	O	O	O	O	O	O	Laboratory analysis
24	Copper	O	O	O	O	O	O	O	Laboratory analysis
25	Barium	O	O	O	O	O	O	O	Laboratory analysis
26	Nickel	O	O	O	O	O	O	O	Laboratory analysis
27	Odor	O	O	O	O	O	O	O	Laboratory analysis
28	Flow Rate	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' 06.0", E- 96° 16' 43.1"
		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' 54.6", E- 96° 16' 26.4"
		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 south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone A in the north, local industrial zone in the east and paddy field in the south and 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 A in the north, 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 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 south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone A in the north, 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 drain is rain water and waste water from surrounding. This drain is also connected to the Shwe Pyauk creek. The water quality of this monitoring point has 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 Sewage Treatment Plant (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'C 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	Sulphide	HACH 8131 (USEPA Methylene Blue Method)
11	Free chlorine	APHA 4500 CL G (DPD Colorimetric Method)
12	Color	APHA 2120C (Spectrophotometric Method)
13	Cyanide	HACH 8027 (Pyridine – Pyrazalone Method)
14	Oil and grease	APHA 5520B (Partition-Gravimetric Method)
15	Formaldehyde	HACH 8110 (MBTH Method)
16	Phenol	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP With Distillation))
17	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)

No.	Parameter	Method
18	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
19	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
20	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
21	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
22	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
23	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
24	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
25	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
26	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
27	Odor	APHA 2150 B (Threshold Odor Test)
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 survey were conducted on 18th October 2016 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon river, Myanmar on 18th October 2016 is shown in Figure 2.4-1.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-1	18/10/2016 13:28
2	SW-2	18/10/2016 10:54
3	SW-3	18/10/2016 11:26
4	SW-4	18/10/2016 12:00
5	SW-5	18/10/2016 12:31
6	SW-6	18/10/2016 12:53
7	GW-1	18/10/2016 13:59

Source: Myanmar Koei International Ltd.

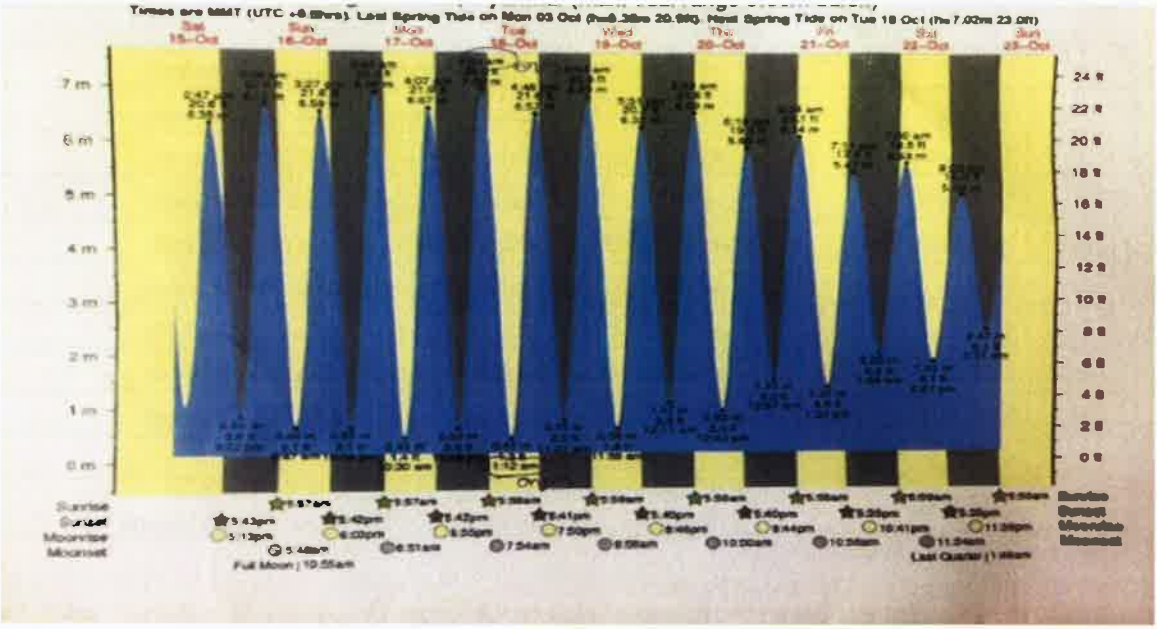


Figure 2.4-1 Tide Record for Yangon River, Myanmar

2.5 Monitoring Results

Results of water quality survey are summarized in Table 2.5-1 and Table 2.5-2. 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 and Industrial Zone, Internal Regulations of Thilawa SEZ Zone A.

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

(1) Results of Bi Annually Monitoring

As the comparison with the target value, the results of suspended solid (SS), COD (Cr), total coliform, oil and grease, cyanide, free chlorine, sulphide were exceeded than the target value.

As for the result of SS, the result at the outlet of the centralized wastewater treatment plant (SW-6) complied with the target value. It implied that effluents from each locator were treated well by the wastewater treatment plant. 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 COD (Cr) of surface water, the result at the outlet of the centralized wastewater treatment plant (SW-6) and at the outlet of retention canal (SW-5) also complied with the target value. It implied that effluents from each locator were treated well by the wastewater treatment plant. On the other hand, result at the other surface water monitoring point (SW-1) exceeded the target value due to the expected reason; analytical error as positive interference by high concentration of oil and grease. In case of oil and grease are containing sample, the analysis method commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results.

As for the result of total coliform of surface water, the result at the outlet of the centralized wastewater treatment plant (SW-6) also complied with the target value. It implied that effluents from each locator were treated well by the wastewater treatment plant. 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 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.

As for the result of oil and grease of surface water, the result at the outlet of the centralized wastewater treatment plant (SW-6) also complied with the target value. It implied that effluents from each locator were treated well by the wastewater treatment plant. On the other hand, results at the monitoring points of retention pond (SW-1) exceeded the target value due to the expected reasons; i) accidental spillage of oil and grease to retention pond (SW-1) 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 cyanide of surface water, the result at the outlet of the centralized wastewater treatment plant (SW-6) and at the outlet of retention canal (SW-5) also complied with the target value. It implied that effluents from each locator were treated well by the wastewater treatment plant. On the other hand, results at the other surface water monitoring point (SW-1) exceeded the target value due to the expected reasons; analytical error due to positive interference by high concentration of oil and grease. Since any factories in Thilawa SEZ Zone A have not utilized and produced cyanide in their processes, it is better to consider the reason of exceeded the target value might be an analytical error. The analysis methods commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results.

As for the result of free chlorine of surface water, the result at the outlet of the centralized wastewater treatment plant (SW-6) also complied with the target value. It implied that effluents from each locator were treated well by the wastewater treatment plant. On the other hand, results at the other surface water monitoring points (SW-1 and 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, 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.

As for the result of sulphide of surface water, the result at the outlet of the centralized wastewater treatment plant (SW-6) and at the outlet of retention canal (SW-5) also complied with the target value. It implied that effluents from each locator were treated well by the wastewater treatment plant. On the other hand, results at the other surface water monitoring point (SW-1) exceeded the target value due to the expected reason; analytical error as positive interference by high concentration of oil and grease. The analysis methods commonly used in Myanmar where there is limitation of laboratory instruments are unable to get correct results.

(2) Additional Information by MJTD

MJTD has carried out regular water quality monitoring in accordance with EIA report. In addition to EIA report, MJTD has conducted water quality monitoring by weekly and monthly basis. During Bi-annually monitoring was carried out on (18-Oct-2016), water sample has contained high concentration of oil and grease at SW-1. Therefore, results (18-Oct-2016) is compared with results (2-Nov-2016). It can be clearly seen that the result of COD (Cr), cyanide, free chlorine, sulphide are lower than results on (2-Nov-2016). In conclusion, all exceeded parameters as COD (Cr), cyanide, free chlorine, sulphide at SW-1 are due to the possibility of positive interference by high concentration of oil and grease in sample. One of the possibility to avoid positive interference is to analyze with the upgraded method.
As for the result of oil and grease on 18-Oct-2016, this exceeding issue is incidental case because the total oil and grease monitoring results in the previous monitoring month and additional monitoring result on 2-Nov-2016 complied with the target value. Thus, the impact on oil and grease to the surrounding area is not expected.
As described above, the result of SS at 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. In addition, the result of total coliform 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 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.
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 points (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.

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

Sampling Date			18-Oct-16	2-Nov-16	18-Oct-16	18-Oct-16	Target Value
No.	Parameters	Unit	Regular Monitoring*1	Additional Monitoring *1	Regular Monitoring		
			SW-1	SW-1	SW-5	SW-6	
1.	Temperature	°C	35	-	33	30	Max. 40
2.	pH	-	7	-	7.5	7.5	5.0~9.0
3.	Suspended solid (SS)	mg/L	982	402	120	2	Max. 30
4.	Dissolved oxygen (DO)	mg/L	4.76	-	6.71	3.32	-
5.	BOD (5)	mg/L	9.35	0.6	4.48	3.32	Max. 20
6.	COD (Cr)	mg/L	2380.0	< 0.7	4.6	10.2	Max. 70
7.	Total coliform	MPN/ 100ml	90,000	160,000	160,000	< 2	Max. 400
8.	Total nitrogen (T-N)	mg/L	3.1	5.3	1.2	7.4	80
9.	Total phosphorous (T-P)	mg/L	0.606	0.522	0.27	0.09	-
10.	Sulphide	mg/L	1.188	0.763	0.508	< 0.005	Max. 1
11.	Free chlorine	mg/L	8.0	4.1	2.8	0.1	Max. 1
12.	Color	TCU (True Color Unit)	8.75	7.53	5.62	7.00	-
13.	Cyanide	mg/L	7.00	0.196	0.147	0.001	Max. 0.2
14.	Oil and grease	mg/L	320.25	4.73	< 3.1	< 3.1	Max. 5
15.	Formaldehyde	mg/L	0.490	0.377	0.202	0.004	Max. 1
16.	Phenols	mg/L	0.032	≤0.002	0.028	0.004	Max. 1
17.	Mercury	mg/L	≤0.00054	≤0.00054	≤0.00054	≤0.00054	Max. 0.005
18.	Zinc	mg/L	0.054	0.056	0.042	0.006	Max. 5
19.	Arsenic	mg/L	0.022	0.012	0.012	≤0.01	Max. 0.25
20.	Chromium	mg/L	≤0.002	0.046	≤0.002	≤0.002	Max. 0.5
21.	Cadmium	mg/L	≤0.001	≤0.001	≤0.001	≤0.001	Max. 0.03
22.	Selenium	mg/L	≤0.01	≤0.01	≤0.01	≤0.01	Max. 0.02
23.	Lead	mg/L	≤0.002	≤0.002	≤0.002	≤0.002	Max. 0.2
24.	Copper	mg/L	0.004	≤0.002	≤0.002	≤0.002	Max. 1

[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.

Sampling Date			18-Oct-16	2-Nov-16	18-Oct-16	18-Oct-16	Target Value
No.	Parameters	Unit	Regular Monitoring*1	Additional Monitoring *1	Regular Monitoring		
			SW-1	SW-1	SW-5	SW-6	
25.	Barium	mg/L	0.048	0.068	0.036	0.014	Max. 1
26.	Nickel	mg/L	0.052	0.03	0.028	0.012	Max. 0.2
27.	Odor	TON (Threshold Odor Number)	200	8	1	1	-
28.	Flow Rate	m^3/s	0.44	-	0.093	0.012	-

Note *1: Regular water quality monitoring was carried out in accordance with EIA report. In addition to EIA report, additional self-water quality monitoring was also carried out by weekly and monthly basis. As of the water quality monitoring results on 18 Oct 2016, water sample has contained high level of oil and grease at SW-1. Therefore, results (18-Oct-2016) is compared with results (2-Nov-2016). It can be clearly seen that the result of COD (Cr), oil and grease, cyanide, free chlorine, sulphide are lower in (2-Nov-2016) results.
Source: Myanmar Koei International Ltd.

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

As the comparison with the target value, the results of SS, total coliform, oil and grease, 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, SW-4) exceeded the target value due to two expected reasons; 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.

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 downstream area by tidal effect.

As for the result of oil and grease of surface water, results at the other surface water monitoring points (SW-2, SW-3) exceeded the target value due to expected reason; accidental spillage of oil and grease to retention pond (SW-1) and these spillages may be flowing up to SW-2 and flowing out to SW-3 during high tide, upstream of Shwe Pyauk creek. After this issue was found, retention pond discharge gate was closing from 18th October 2016 to 26th October 2016. In during those days, heavy rain and the collected rain water diluted with oil contaminated water. Then, oil and grease level has been lower than the National Environmental Quality (Emission) Guideline (NEQG) value. For the confirmation of current status for oil and grease at retention pond, additional water quality monitoring was conducted. After confirmed that oil and grease level were below the target value, retention pond discharge gate was opened. Therefore, oil contaminated water which is exceeded the target value were not discharged to the natural creek.

As for the result of free chlorine, results at the other surface water monitoring points (SW-3, 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 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.

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

Sampling Date			18-Oct-16	18-Oct-16	18-Oct-16	18-Oct-16	Target Value
No.	Parameters	Unit	SW-2	SW-3	SW-4	GW-1	
1.	Temperature	°C	29	30	30	34	Max. 40
2.	pH	-	6	6	6	8	5.0~9.0
3.	Suspended solid (SS)	mg/L	36	88	82	12	Max. 30
4.	Dissolved oxygen (DO)	mg/L	4.62	3.71	4.2	5.56	-
5.	BOD(5)	mg/L	3.86	3.67	3.87	3.34	Max. 20
6.	COD (Cr)	mg/L	14.5	10.5	11.0	5.0	Max. 70
7.	Total coliform	MPN/ 100ml	30,000	28,000	160,000	< 2	Max. 400
8.	Total nitrogen (T-N)	mg/L	0.8	7.2	7.2	0.7	80
9.	Total phosphorous (T-P)	mg/L	0.113	0.19	0.171	0.089	-
10.	Sulphide	mg/L	0.102	0.264	0.243	< 0.005	Max. 1
11.	Free chlorine	mg/L	0.7	1.4	1.3	0.1	Max. 1
12.	Color	TCU (True Color Unit)	14.09	8.76	8.25	4.46	-
13.	Cyanide	mg/L	0.031	0.076	0.069	0.002	Max. 0.2
14.	Oil and grease	mg/L	16.56	11.38	< 3.1	< 3.1	Max. 5
15.	Formaldehyde	mg/L	0.060	0.128	0.137	< 0.003	Max. 1
16.	Phenols	mg/L	0.022	0.001	0.007	0.015	Max. 1
17.	Mercury	mg/L	≤0.00054	≤0.00054	≤0.00054	≤0.00054	Max. 0.005
18.	Zinc	mg/L	0.012	0.014	0.022	0.01	Max. 5
19.	Arsenic	mg/L	≤0.01	≤0.01	≤0.01	≤0.01	Max. 0.25
20.	Chromium	mg/L	≤0.002	≤0.002	≤0.002	≤0.002	Max. 0.5
21.	Cadmium	mg/L	≤0.001	≤0.001	≤0.001	≤0.001	Max. 0.03
22.	Selenium	mg/L	≤0.01	≤0.01	≤0.01	≤0.01	Max. 0.02
23.	Lead	mg/L	≤0.002	≤0.002	≤0.002	≤0.002	Max. 0.2
24.	Copper	mg/L	≤0.002	≤0.002	≤0.002	≤0.002	Max. 1
25.	Barium	mg/L	0.012	0.08	0.018	0.092	Max. 1
26.	Nickel	mg/L	0.002	0.01	0.01	≤0.002	Max. 0.2
27.	Odor	TON (Threshold Odor Number)	2	2	1	1	-
28.	Flow Rate	m^3/s	-	-	-	-	-

Source: Myanmar Koei International Ltd.

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As for the result of oil and grease, the results at the outlet of the centralized sewage treatment plant (SW-6) complied with the both target values. It may prove that effluent from each locator was treated well by the sewage treatment plant. The result of oil and grease at SW-1 exceeding the target values but the value this event was incidental case and its impact is not expected because the results in the previous monitoring months and result of additional monitoring at retention pond (SW-1) complied with the target value. Besides, it can be concluded that the result which were exceeded the target value as COD (Cr), cyanide, free chlorine, sulphide at SW-1 are due to the possibility of positive interference by high concentration of oil and grease in sample.

On the other hand, parameters of SS and total coliform 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 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 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 bacterial; 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

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 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 SEWAGE TREATMENT PLANT

DOWA
GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. F1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051, 09 796935149

Report No. : GEM-LAB-201611016
Revision No. : 1
Report Date : 7 November, 2016
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-1-1018 — Sampling Date : 18 October, 2016
Sample No. : W-1610077 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 18 October, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	982.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	9 35	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	2380.0	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	3.1	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.606	0.05
6	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	320.25	3.1
7	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	90000	2
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	8.75	0
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	200	0
10	Cyanide	HACH 8027 (Pyridine -Pyrazalone Method	mg/l	7 000	0.002
11	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	8.0	0.1
12	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	L.188	0 005
13	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0 490	0 003
14	Phenol	USEPA Method 420.1 : Phenolics (Spectrophotometric, Manual) 4AAP with Distillation	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. 21st edition

LAB
GEM

MJTD

No.	Parameter	Method	Unit	Result	LOQ
15	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.00054	0.00054
16	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.054	0.002
17	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.022	0.01
18	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
19	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.001	0.001
20	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.01	0.01
21	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
22	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.004	0.002
23	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.048	0.001
24	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.052	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, 21st edition

Analyzed By:

Ni Ni Aye Lwin
Assistant supervisor

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

LAB
GEM

Approved By :

Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051/09 796935149

Report No. : GEM-LAB-201611020
Revision No. : 1
Report Date : 7 November, 2016
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 S-1018 Sampling Date : 18 October, 2016
Sample No. : W-1610081 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 18 October, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	120.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.48	0
3	COD (Cr)	APHA 5220D (Close Reflux Colonmetric Method)	mg/l	4.6	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.2	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.27	0.05
6	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
7	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	160000	2
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	5.62	0
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	0
10	Cyanide	HACH 8027 (Pyridine -Pyrazalone Method	mg/l	0.147	0.002
11	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	2.8	0.1
12	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.508	0.005
13	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.202	0.003
14	Phenol	[illegible]	mg/l	0.028	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, [illegible] edition

LAB
GEM

SOUTH THILAWA DEVELOPMENT LIMITED MIID

1 of 2

No.	Parameter	Method	Unit	Result	LOQ
15	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.00054	0.00054
16	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.042	0.002
17	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.012	0.01
18	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
19	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.001	0.001
20	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
21	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
22	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
23	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.036	0.001
24	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.028	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, 21st edition

Analyzed By:

Ni Ni Aye Lwin
Assistant supervisor

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

LAB
GEM

Approved By :

Tomoya Suzuki
Director

2 of 2

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051, 09 799935149

Report No. : GEM-LAB-201611021
Revision No. : 1
Report Date : 7 November, 2016
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-6-1018 Sampling Date : 18 October, 2016
Sample No. : W-1610082 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 18 October, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	2.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.32	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	10.2	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	7.4	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.09	0.05
6	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
7	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	< 2	2
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	7.00	0
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	0
10	Cyanide	HACH 8027 (Pyridine -Pyrazalone Method	mg/l	0.001	0.002
11	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	0.1	0.1
12	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	< 0.005	0.005
13	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.004	0.003
14	Phenol	USEPA Method 420.1 "Phenolics (Spectrophotometric, Manual 4AAP With Dist Ration)"	mg/l	0.004	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, 21st edition

LAB
GEM

MJTD

1 of 2

No.	Parameter	Method	Unit	Result	LOQ
15	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.00054	0.00054
16	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.006	0.002
17	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.01	0.01
18	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
19	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.001	0.001
20	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
21	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
22	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
23	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.014	0.001
24	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.012	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, 21st edition

Analyzed By :

Ni Ni Aye Lwin
Assistant supervisor

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

LAB
GEM

Approved By :

Tomoya Suzuki
Director

2 of 2

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

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 (09 796935149)

Report No. : GEM-LAB-201611017
Revision No. : 1
Report Date : 7 November, 2016
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-2-1018 — Sampling Date : 18 October, 2016
Sample No. : W-1610078 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 18 October, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	36.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.86	0
3	COD (Cr)	APHA 5220D (Close Reflux Colonmetnc Method)	mg/l	14.5	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	0.8	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.113	0.05
6	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	16.56	3.1
7	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	30000	2
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	14.09	0
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	0
10	Cyanide	HACH 8027 (Pyridine -Pyrazalone Method	mg/l	0.031	0.002
11	Free Chlorine	APHA 4500 Cl G (DPD Colorimetric Method)	mg/l	0.7	0.1
12	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.102	0.005
13	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.060	0.003
14	Phenol	USEPA Method 420.1 (Preceded by Chemical Manual 4AAP Manual Distillation)	mg/l	0.022	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, 21st edition

LAB GEM

MJTD

1 of 2

No.	Parameter	Method	Unit	Result	LOQ
15	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.00054	0.00054
16	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.012	0.002
17	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
18	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
19	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.001	0.001
20	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
21	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
22	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
23	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.012	0.001
24	Nickel	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, 21st edition

Analyzed By:

Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :

Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

2 of 2

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051/ 09 796935149

Report No. : GEM-LAB-201611018
Revision No. : 1
Report Date : 7 November, 2016
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-3-1018 Sampling Date : 18 October, 2016
Sample No. : W-1610079 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 18 October, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	88.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.67	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetnc Method)	mg/l	10.5	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	7.2	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.19	0.05
6	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	11.38	3.1
7	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	28000	2
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	8.76	0
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	0
10	Cyanide	HACH 8027 (Pyridine -Pyrazalone Method	mg/l	0.076	0.002
11	Free Chlorine	APHA 4500 CL G (DPD Colorimetnc Method)	mg/l	1.4	0.1
12	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.264	0.005
13	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.128	0.003
14	Phenol	USEPA Method 420.1 (Phenolics: Spectrophotometric, Manual 4AAP with Distillation)	mg/l	0.001	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, 21st edition

LAB
GEM

MTD

No.	Parameter	Method	Unit	Result	LOQ
15	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.00054	0.00054
16	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.014	0.002
17	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
18	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
19	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.001	0.001
20	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
21	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
22	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
23	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.08	0.001
24	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.01	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, 21st edition

Analyzed By:

Ni Ni Aye Lwin
Assistant supervisor

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

LAB
GEM

Approved By :

Tomoya Suzuki
Director

2 of 2

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 09 796935149

Report No. : GEM-LAB-201611019
Revision No. : 1
Report Date : 7 November, 2016
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-4-1018 — Sampling Date : 18 October, 2016
Sample No. : W-1610080 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 18 October, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	82.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.87	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	11.0	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	7.2	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.171	0.05
6	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
7	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	160000	2
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	8.25	0
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	0
10	Cyanide	HACH 8027 (Pyridine -Pyrazalone Method	mg/l	0.069	0.002
11	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	1.3	0.1
12	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.243	0.005
13	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.137	0.003
14	Phenol	USEPA Method 420.1 : Phenolics Spectrophotometric Manual 4AAP With Distillation	mg/l	0.007	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, 21st edition

LAB GEM

鈴木

MJTD

No.	Parameter	Method	Unit	Result	LOQ
15	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.00054	0.00054
16	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0 022	0 002
17	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0 01	0.01
18	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
19	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.001	0.001
20	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
21	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
22	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0 002
23	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.018	0.001
24	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.01	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, 21st edition

Analyzed By:

Ni Ni Aye Lwin

Assistant supervisor

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

LAB GEM

Approved By :

Tomoya Suzuki

Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051, 09 796935149

Report No. : GEM-LAB-201611015

Revision No. : 1

Report Date : 7 November, 2016

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-1-1018 Sampling Date : 18 October, 2016

Sample No. : W-1610076 Sampling By : Customer

Waste Profile No. : - Sample Received Date : 18 October, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	12.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.34	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	5.0	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	0.7	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0 089	0 05
6	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3 1
7	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	<2	2
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	4.46	0
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	0
10	Cyanide	HACH 8027 (Pyridine -Pyrazalone Method	mg/l	0 002	0.002
11	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	0.1	0 1
12	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	< 0.005	0 005
13	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	< 0 003	0 003
14	Phenol	[illegible]	mg/l	0.015	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, 21st Edition

LAB GEM

MJTD

1 of 1

No.	Parameter	Method	Unit	Result	LOQ
15	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.00054	0.00054
16	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.01	0.002
17	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
18	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
19	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.001	0.001
20	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
21	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
22	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
23	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.092	0.001
24	Nickel	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, 21st edition

Analyzed By:

Ni Ni Aye Lwin

Assistant supervisor

LAB GEM

Approved By :

Tomoya Suzuki

Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

Appendix

Water and Waste Water Monitoring Report

December, 2016

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE A

(PHASE 1 & 2 OPERATION STAGE)

(Bi-Monthly Monitoring)

December 2016

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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-2 have been monitored in Thilawa SEZ and its surrounding area in timely manner. Among the seven locations, SW-1, SW-5 are main discharging gates 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-2 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 survey are determined so as to cover the environmental monitoring plan of the EIA report.

Water quality sampling was carried out at 7 locations. Among the 7 locations, water flow measurement was carried out at 2 locations (SW-1, SW-6) where can be measured by flow rate instrument. 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-2	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	O	O	O	O	O	O	O	Laboratory analysis
5	COD	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	Oil and grease	O	O	O	O	O	O	O	Laboratory analysis
12	Chromium	O	O	O	O	O	O	O	Laboratory analysis
13	Odor	O	O	O	O	O	O	O	Laboratory analysis
14	Flow Rate	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' 06.0", E- 96° 16' 43.1"
		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' 54.6", E- 96° 16' 26.4"
		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-2	**Coordinate**- N-16° 40' 16.6", E- 96° 16' 34.0"
		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 south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone A in the north, local industrial zone in the east and paddy field in the south and 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 A in the north, 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 south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone A in the north, industrial compound 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 drain is rain water and waste water from surrounding. This drain is also connected to the Shwe Pyauk creek. The water quality of this monitoring point has 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 Sewage Treatment Plant (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-2 (Reference of Existing Tube Well)

It is located in the compound of Moegyoe swan monastery. The depth of the tube well is about 62 meter below ground level and same depth with GW-1. The surrounding area are Thilawa SEZ Zone A in the west, retention pond in the east and Dagon-Thilawa road in the south respectively. GW-1, the water sample could not have collected because well water pump was broken and under repairing. Therefore, GW-2, water sample was collected from the nearest tube well as ground water sample.

2.3 Monitoring Method

All water samples were collected with cleaned 1L 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'C 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	Oil and grease	APHA 5520B (Partition-Gravimetric Method)
12	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
13	Odor	APHA 2150 B (Threshold Odor Test)
14	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 15th December 2016 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon river, Myanmar on 15th December 2016 is shown in Figure 2.4-1.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-1	15/12/2016 11:50
2	SW-2	15/12/2016 10:46
3	SW-3	15/12/2016 10:30
4	SW-4	15/12/2016 09:56
5	SW-5	15/12/2016 12:13
6	SW-6	15/12/2016 11:17
7	GW-2	15/12/2016 13:15

Source: Myanmar Koei International Ltd.

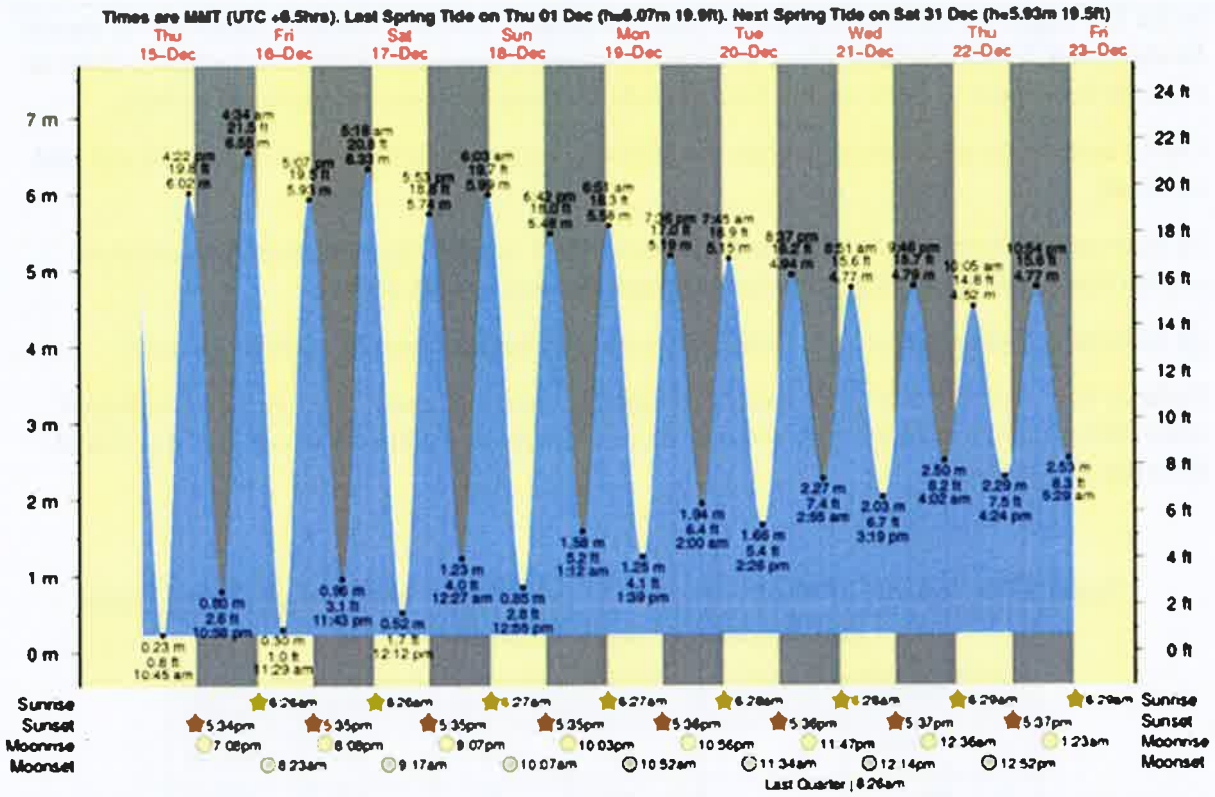


Figure 2.4-1 Tide Record for Yangon River, Myanmar

2.5 Monitoring Results

Results of water quality survey 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 sewage treatment plant (SW-6) complied with the target value. It implied that effluent from each locator was treated well by the sewage treatment plant. 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 sewage treatment plant (SW-6) also complied with the target value. It may prove that effluent from each locator was treated well by the sewage treatment plant. 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 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.

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 points (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.

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	30	31	29	Max. 40
2	pH	-	8.8	8.6	7.3	5.0~9.0
3	Suspended solid (SS)	mg/L	166	34	8	Max. 30
4	Dissolved oxygen (DO)	mg/L	7.4	5.5	3.5	-
5	BOD (5)	mg/L	4.2	7.9	0.0	Max. 20.0
6	COD (Cr)	mg/L	9.5	23.5	9.1	Max. 70
7	Total coliform	MPN/ 100ml	92,000	92,000	< 1.8	Max. 400
8	Total nitrogen (T-N)	mg/L	5.6	1.0	14.4	80.0
9	Total phosphorous (T-P)	mg/L	0.216	0.264	0.057	-
10	Color	TCU (True Color Unit)	12.96	28.05	6.92	-
11	Oil and grease	mg/L	< 3.1	3.5	< 3.1	Max. 5.0
12	Chromium	mg/L	0.014	≤0.002	≤0.002	Max. 0.500
13	Odor	TON (Threshold Odor Number)	1	2	1	-
14	Flow Rate	m^3/s	0.338	-	0.011	-

Source: Myanmar Koei International Ltd.

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

[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.

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, SW-4) exceeded the target value due to two expected reasons; i) delivered from up downstream 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.

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 downstream 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-2	Target Value
1	Temperature	°C	27	27	25	30	Max. 40
2	pH	-	7.4	7.6	7.5	8.1	5.0~9.0
3	Suspended solid (SS)	mg/L	462	384	494	10	Max. 30
4	Dissolved oxygen (DO)	mg/L	5.4	8.6	6.3	7.0	-
5	BOD (5)	mg/L	5	3.6	6.2	3.2	Max. 20.0
6	COD (Cr)	mg/L	8.4	11.2	6.9	2.7	Max. 70
7	Total coliform	MPN/ 100ml	92,000	54,000	92,000	< 1.8	Max. 400
8	Total nitrogen (T-N)	mg/L	2.4	2.9	3.2	1.3	80.0
9	Total phosphorous (T-P)	mg/L	0.471	0.354	0.547	0.154	-
10	Color	TCU (True Color Unit)	16.53	15.42	15.28	5.79	-
11	Oil and grease	mg/L	< 3.1	< 3.1	< 3.1	< 3.1	Max. 5.0
12	Chromium	mg/L	0.030	0.030	0.036	≤0.002	Max. 0.500
13	Odor	TON (Threshold Odor Number)	1	1	2	1	-
14	Flow Rate	m^3/s	-	-	-	-	-

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 sewage treatment plant (SW-6) complied with the target value of both of them. It may prove that effluent from each locator was treated well by the sewage treatment plant. On the other hand, parameters of SS and total coliform 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 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 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 bacteria1; and
- To examine the possibility of the overflow water from construction sites.

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

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

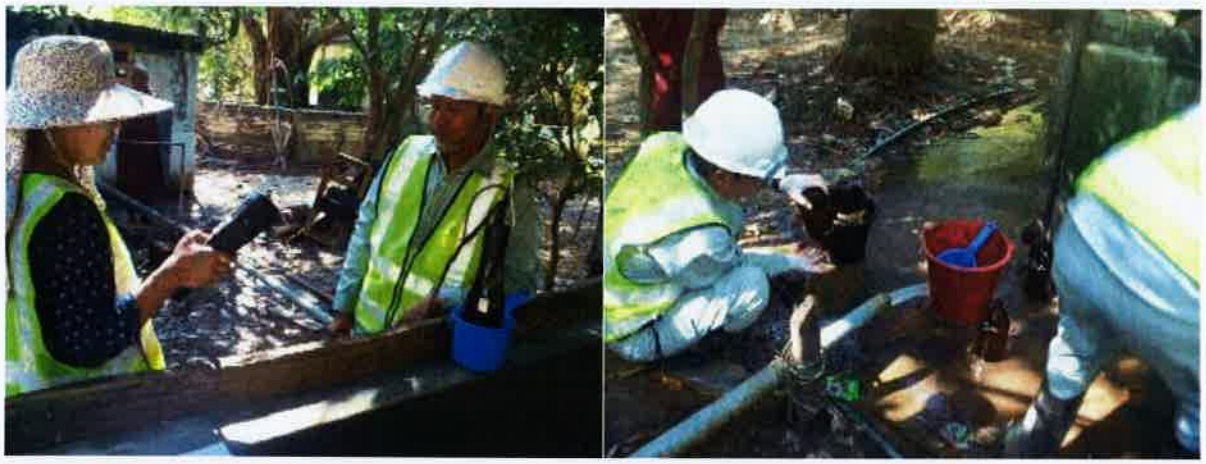
Surface water sampling and onsite measurement at SW-6

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-2

There is no water at GW-1

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

APPENDIX-2 LABORATORY RESULTS

FOR DISCHARGING POINTS AND AFTER SEWAGE TREATMENT PLANT

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 09 796935149

Report No. : GEM-LAB-201701002
Revision No. : 2
Report Date : 5 January, 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-1-1214 — Sampling Date : 15 December, 2016
Sample No. : W-1612066 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 15 December, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	166.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.21	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	9.5	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	5.6	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.216	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	12.96	0
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	92000	1.8
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.014	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, 21st edition

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Analysed By :
Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel.01-2309051 09 796935149

Report No. : GEM-LAB-201701005
Revision No. : 2
Report Date : 5 January, 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-5-1214 Sampling Date : 15 December, 2016
Sample No. : W-1612069 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 15 December, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	34.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	7.85	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	23.5	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.0	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.264	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	28.05	0
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	-
8	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	3.50	3.1
9	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	92000	1.8
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, 21st edition

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 09 796935149

Report No. : GEM-LAB-201701006
Revision No. : 2
Report Date : 5 January, 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-6-1214 Sampling Date : 15 December, 2016
Sample No. : W-1612070 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 15 December, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	8.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	0.00	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	9.1	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	14.4	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.057	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	6.92	0
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	< 1.8	1.8
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, 21st edition

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LTD. MJTD

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

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. C1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051/ 09 796935149

Report No. : GEM-LAB-201701003
Revision No. : 2
Report Date : 5 January, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koel International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-2-1214 — Sampling Date : 15 December, 2016
Sample No. : W-1612067 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 15 December, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	462.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.97	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	8.4	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.4	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.471	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	16.53	0
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	92000	1.8
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.030	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, 21st edition

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 09 796935149

Report No. : GEM-LAB-201701004
Revision No. : 2
Report Date : 5 January, 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-3-1214 Sampling Date : 15 December, 2016
Sample No. : W-1612068 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 15 December, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	384.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.63	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	11.2	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.9	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.354	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	15.42	0
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	0.030	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, 21st edition

Analysed By :
Aye Lwin
Assistant supervisor

MJTD
MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

LAB
GEM

Approved By :
Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 09 796935149

Report No. : GEM-LAB-201701007
Revision No. : 2
Report Date : 5 January, 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-4-1214 Sampling Date : 15 December, 2016
Sample No. : W-1612071 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 15 December, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	494.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	6.18	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	6.9	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	3.2	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.547	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	15.28	0
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	-
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	92000	1.8
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.036	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, 21st edition

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051/ 09 796935149

Report No. : GEM-LAB-201701001
Revision No. : 2
Report Date : 5 January, 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-2-1214
Sample No. : W-1612065
Waste Profile No. : -

Sampling Date : 15 December, 2016
Sampling By : Customer
Sample Received Date : 15 December, 2016

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	10.00	0
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.19	0
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	2.7	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.3	0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.154	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	5.79	0
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	< 1.8	1.8
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, 21st edition

Analysed By :
Ni Ni Win Lwin
Assistant Supervisor

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

LAB
GEM

Approved By :
Tomoya Suzuki
Director

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

Appendix

Water and Waste Water Monitoring Report

February, 2017

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE A

(PHASE 1 & 2 OPERATION STAGE)

(Bi-Monthly Monitoring)

February 2017

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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 survey 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 two locations (SW-1, 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	Oil and grease	O	O	O	O	O	O	O	Laboratory analysis
12	Chromium	O	O	O	O	O	O	O	Laboratory analysis
13	Odor	O	O	O	O	O	O	O	Laboratory analysis
14	Flow Rate	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' 06.0", E- 96° 16' 43.1"
		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' 54.6", E- 96° 16' 26.4"
		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 south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone A in the north, local industrial zone in the east and paddy field in the south and 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 A in the north, 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 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 south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone A in the north, 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 drain is rain water and waste water from surrounding. This drain is also connected to the Shwe Pyauk creek. The water quality of this monitoring point has 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 Sewage Treatment Plant (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'C 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	Oil and grease	APHA 5520B (Partition-Gravimetric Method)
12	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
13	Odor	APHA 2150 B (Threshold Odor Test)
14	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 13th February 2017 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon river, Myanmar on 13th February 2017 is shown in Figure 2.4-1.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-1	13/02/2017 11:30
2	SW-2	13/02/2017 10:42
3	SW-3	13/02/2017 10:30
4	SW-4	13/02/2017 09:47
5	SW-5	13/02/2017 11:54
6	SW-6	13/02/2017 11:07
7	GW-1	13/02/2017 12:27

Source: Myanmar Koei International Ltd.

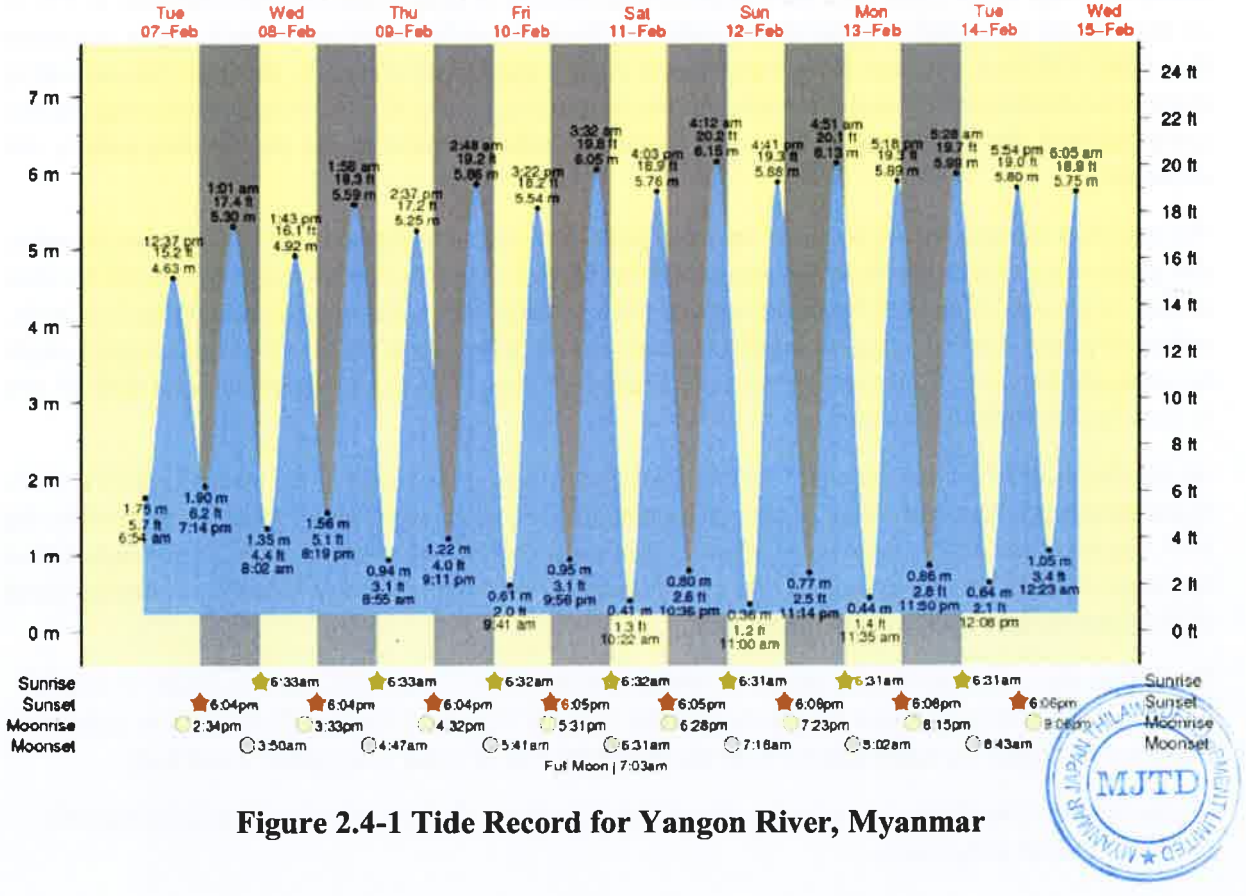


Figure 2.4-1 Tide Record for Yangon River, Myanmar

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 and oil and grease 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) 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) exceeded the target value. A possible reason for exceeding the target value is that retained water did not contact sufficiently with chlorine in the chlorine injection tank before discharging to outlet of the centralized STP at the time of sampling. However, the monitoring result of total coliform (4,900 MPN//mL) was much lower than the results outside of Zone A (more than 160,000 MPN/mL at SW-2, -3, and -4) and complied with the environment quality standard for water pollution in Japan (not more than 5,000 MPN/mL as Class B for water supply class 3 and fishery class 2[1]). Besides, this exceeding event is incidental case because the total coliform monitoring results in the previous monitoring months complied with the target value. Thus, the impact on total coliform to the surrounding area is not expected.

The results at the monitoring points of retention pond (SW-1) and retention canal (SW-5) also exceeded the target value due to the expected reasons. i) the biggest expected reason might be 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.

As for the result of oil and grease of surface water, the result at the outlet of the centralized STP (SW-6) 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 other surface water monitoring point (SW-1) slightly higher than the target value due to the expected reasons; 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) 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, and oil and grease;

[1] There are six classes (AA, A, B, C, D, E; Class AA is most strict) for river water quality standards in environmental quality standards for conservation the living environment. In the Class B of the river water quality standard, "water supply class 3" targets to purify water using pre-treatment and other advanced method and "fishery class 2" targets for alpha-oligosaprobic marine products as Salmonidae (salmon/trout) species, sweetfish, and marine products for fishery class 3. In detail, see the following link http://www.env.go.jp/en/water/wq/wp.pdf (accessed in July 2017).

1) 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;

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.

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	31	31	28	Max. 40
2	pH	-	8.2	8.7	7.4	5.0~9.0
3	Suspended solid (SS)	mg/L	272	30	18	Max. 30
4	Dissolved oxygen (DO)	mg/L	6.8	7.8	5.7	-
5	BOD (5)	mg/L	4.07	4.02	2.69	Max. 20.0
6	COD (Cr)	mg/L	12.9	17.4	< 0.7	Max. 70
7	Total coliform	MPN/100ml	92,000	820	4900	Max. 400
8	Total nitrogen (T-N)	mg/L	10.5	1.5	18.0	80.0
9	Total phosphorous (T-P)	mg/L	0.097	0.065	0.157	-
10	Color	TCU (True Color Unit)	14.03	25.18	7.50	-
11	Oil and grease	mg/L	5.45	< 3.1	< 3.1	Max. 5.0
12	Chromium	mg/L	≤0.002	≤0.002	≤0.002	Max. 0.500
13	Odor	TON (Threshold Odor Number)	2	1	1.4	-
14	Flow Rate	m^3/s	0.024	-	0.007	-

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 and oil and grease were exceeded than the target value. As for the result of SS, results at the surface water monitoring points (SW-2 and SW-3) exceeded the target value due to two expected reasons; 1) delivered from upstream area such as natural origin and wastewater from the local industrial zone outside of Thilawa SEZ, and 2) delivered from downstream 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; 1) runoff of animal waste from the undeveloped area and delivered from local industrial zone and illegal dumping site

[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.

from outside of Thilawa SEZ in the upstream area, and 2) delivered from downstream area by tidal effect.

As for the result of oil and grease of surface water, results at the other surface water monitoring point (SW-2) slightly higher than the target value due to expected reason;1) oil contaminated water from the local industrial zone outside of Thilawa SEZ and 2) delivered from downstream 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	°C	27	27	26	35	Max. 40
2	pH	-	7.4	7.4	7.4	7.7	5.0~9.0
3	Suspended solid (SS)	mg/L	1400	2002	16	2	Max. 30
4	Dissolved oxygen (DO)	mg/L	6.0	6.3	5.8	5.9	-
5	BOD (5)	mg/L	4.42	5.83	4.18	2.42	Max. 20.0
6	COD (Cr)	mg/L	48.0	10.8	18.4	6.7	Max. 70
7	Total coliform	MPN/ 100ml	> 160,000	> 160,000	> 160,000	13	Max. 400
8	Total nitrogen (T-N)	mg/L	2.6	3.6	3.6	2.4	80.0
9	Total phosphorous (T-P)	mg/L	< 0.05	< 0.05	0.089	0.067	-
10	Color	TCU (True Color Unit)	13.34	13.20	14.26	3.93	-
11	Oil and grease	mg/L	5.64	< 3.1	4.73	< 3.1	Max. 5.0
12	Chromium	mg/L	≤0.002	0.082	0.134	≤0.002	Max. 0.500
13	Odor	TON (Threshold Odor Number)	2	2	1	1	-
14	Flow Rate	m^3/s	-	-	-	-	-

Source: Myanmar Koei International Ltd.

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As for the result of SS and oil and grease, the results at the outlet of the centralized sewage treatment plant (SW-6) complied with the both target values. It may prove that effluent from each locator was treated well by the sewage treatment plant. The result of total coliform at SW-6 exceeding the target values but the value this event was incidental case and its impact is not expected because i) the result was much lower than the results outside of Zone A and complied with the environment quality standard for water pollution in Japan and ii) the results in the previous monitoring months complied with the target value.

On the other hand, parameters of SS, total coliform and oil and grease 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 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 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 bacteria1; and
- To examine the possibility of the overflow water from construction sites.
- To examine the effectiveness of chlorine injection through regular monitoring.

End of the Document

APPENDIX-1 FIELD SURVEY PHOTOS

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

FOR DISCHARGING POINTS AND AFTER CENTRALIZED STP

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 09 796935149

Report No. : GEM-LAB-201702125
Revision No. : 1
Report Date : 27 February, 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-1-0213
Sample No. : W-1702078
Waste Profile No. : -

Sampling Date : 13 February, 2017
Sampling By : Customer
Sample Received Date : 13 February, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	272.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.07	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	12.9	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	10.5	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.097	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	14.03	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	-
8	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	5.45	3.1
9	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	92000	1.8
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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051/ 09 796935149

Report No. : GEM-LAB-201702128
Revision No. : 1
Report Date : 27 February, 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-5-0213 Sampling Date : 13 February, 2017
Sample No. : W-1702081 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 13 February, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	30.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.02	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	17.4	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.5	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.065	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	25.18	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	820	1.8
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

Analysed By :

MJTD MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

[illegible] Lwin
Assistant supervisor

Approved By :

Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051, 09 796935149

Report No. : GEM-LAB-201702129
Revision No. : 1
Report Date : 27 February, 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-6-0213 Sampling Date : 13 February, 2017
Sample No. : W-1702082 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 13 February, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	18.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	2.69	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	< 0.7	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	18.0	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.157	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	7.50	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1.4	-
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	4900	1.8
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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

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

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051, 09 796935149

Report No. : GEM-LAB-201702126
Revision No. : 1
Report Date : 27 February, 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-2-0213 — Sampling Date : 13 February, 2017
Sample No. : W-1702079 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 13 February, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	1400.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.42	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	48.0	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	< 0.05	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	13.34	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	-
8	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	5.64	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	≤ 0.002	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

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 / 09 796935149

Report No. : GEM-LAB-201702127
Revision No. : 1
Report Date : 27 February, 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-3-0213
Sample No. : W-1702080
Waste Profile No. : -

Sampling Date : 13 February, 2017
Sampling By : Customer
Sample Received Date : 13 February, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	2002.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.83	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	10.8	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	3.6	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	13.20	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	-
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	> 160000	1.8
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.082	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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051, 09 796935149

Report No. : GEM-LAB-201702130
Revision No. : 1
Report Date : 27 February, 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-4-0213
Sample No. : W-1702083
Waste Profile No. : -

Sampling Date : 13 February, 2017
Sampling By : Customer
Sample Received Date : 13 February, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	16.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.18	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	18.4	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	3.6	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.089	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	14.26	0.00
7	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
8	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	4.73	3.1
9	Total Colliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.134	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

Analysed By :
Ni Ni Aye Lwin
Assistant Supervisor

Approved By :
Tomoya Suzuki
Director

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO. LTD
Lot No. E1 ,ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 09 796935149

Report No. : GEM-LAB-201702124
Revision No. : 1
Report Date : 27 February, 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-1-0213
Sample No. : W-1702077
Waste Profile No. : -

Sampling Date : 13 February, 2017
Sampling By : Customer
Sample Received Date : 13 February, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	2.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	2.42	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	6.7	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.4	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.067	0.05
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	3.93	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	13	1.8
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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

MYANMA YOMIURI THILAWA DEVELOPMENT LIMITED MJTD

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

Appendix

Ground Subsidence and Ground Water Usage Monitoring Status

(Construction Monthly Progress Report- October to December 2016)

Attachment 2.5. Ground Subsidence Monitoring Status

MONTHLY PROGRESS REPORT
ATTACHMENT 2.5- GROUND SUBSIDENCE MONITORING STATUS
PHASE-1

Jan-17

S.N	Date of performance	Predefined level of landfill(m)	Ground level over a weekly period (m)	Subsidence (m)	Sample density
1	27-Mar-14	7	6.999	-0.001	
2	3-Apr-14	7	6.998	-0.002	
3	9-Apr-14	7	6.998	-0.002	
4	24-Apr-14	7	7	0	
5	1-May-14	7	7	0	
6	8-May-14	7	7	0	
7	15-May-14	7	7	0	
8	22-May-14	7	7	0	
9	30-May-14	7	7	0	
10	5-Jun-14	7	7	0	
11	12-Jun-14	7	7	0	
12	19-Jun-14	7	7	0	
13	26-Jun-14	7	7	0	
14	3-Jul-14	7	6.999	-0.001	
15	10-Jul-14	7	6.999	-0.001	
16	17-Jul-14	7	7	0	
17	24-Jul-14	7	7	0	
18	31-Jul-14	7	Under repairing works and no reading		
19	7-Aug-14	7	Under repairing works and no reading		
20	14-Aug-14	7	7	0	
21	21-Aug-14	7	7	0	
22	28-Aug-14	7	7	0	
23	4-Sep-14	7	7	0	
24	11-Sep-14	7	7	0	
25	18-Sep-14	7	7	0	
26	25-Sep-14	7	7	0	
27	2-Oct-14	7	7.012	0.012	
28	9-Oct-14	7	7.014	0.014	
29	16-Oct-14	7	7.013	0.013	
30	23-Oct-14	7	7.012	0.012	
31	30-Oct-14	7	7.014	0.014	
	6-Nov-14	7	7.014	0.014	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

MONTHLY PROGRESS REPORT
ATTACHMENT 2.5- GROUND SUBSIDENCE MONITORING STATUS Jan-17
PHASE-1

S.N	Date of performance	Predefined level of landfill(m)	Ground level over a weekly period (m)	Subsidence (m)	Sample density
33	13-Nov-14	7	7.015	0.015	
34	20-Nov-14	7	7.015	0.015	
35	27-Nov-14	7	7.015	0.015	
36	4-Dec-14	7	7.017	0.017	
37	11-Dec-14	7	7.015	0.015	
38	18-Dec-14	7	7.015	0.015	
39	25-Dec-14	7	7.015	0.015	
40	1-Jan-15	7	7.015	0.015	
41	8-Jan-15	7	7.017	0.017	
42	15-Jan-15	7	7.015	0.015	
43	22-Jan-15	7	7.015	0.015	
44	29-Jan-15	7	7.015	0.015	
45	5-Feb-15	7	7.004	0.004	
46	12-Feb-15	7	7.004	0.004	
47	19-Feb-15	7	7.004	0.004	
48	26-Feb-15	7	7.005	0.005	
49	5-Mar-15	7	7.005	0.005	
50	12-Mar-15	7	6.995	-0.005	
51	19-Mar-15	7	6.993	-0.007	
52	26-Mar-15	7	6.997	-0.003	
53	2-Apr-15	7	6.997	-0.003	
54	9-Apr-15	7	6.993	-0.007	
55	23-Apr-15	7	6.996	-0.004	
56	30-Apr-15	7	6.995	-0.005	
57	7-May-15	7	6.997	-0.003	
58	14-May-15	7	6.996	-0.004	
59	21-May-15	7	6.996	-0.004	
60	28-May-15	7	6.995	-0.005	
61	5-Jun-15	7	6.992	-0.008	
62	11-Jun-15	7	6.991	-0.009	
63	18-Jun-15	7	6.989	-0.011	
64	26-Jun-15	7	6.990	-0.010	
65	2-Jul-15	7	6.990	-0.010	
66	9-Jul-15	7	6.989	-0.011	
67	16-Jul-15	7	6.989	-0.011	
68	23-Jul-15	7	6.988	-0.012	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

MONTHLY PROGRESS REPORT
ATTACHMENT 2.5- GROUND SUBSIDENCE MONITORING STATUS Jan-17
PHASE-1

S.N	Date of performance	Predefined level of landfill(m)	Ground level over a weekly period (m)	Subsidence (m)	Sample density
69	30-Jul-15	7	6.986	-0.014	
70	6-Aug-15	7	6.985	-0.015	
71	13-Aug-15	7	6.984	-0.016	
72	20-Aug-15	7	6.988	-0.012	
73	27-Aug-15	7	6.987	-0.013	
74	3-Sep-15	7	6.986	-0.014	
75	10-Sep-15	7	6.987	-0.013	
76	17-Sep-15	7	6.986	-0.014	
77	24-Sep-15	7	6.991	-0.009	
78	1-Oct-15	7	6.995	-0.005	
79	8-Oct-15	7	6.989	-0.011	
80	15-Oct-15	7	6.992	-0.008	
81	22-Oct-15	7	6.989	-0.011	
82	29-Oct-15	7	6.990	-0.01	
83	5-Nov-15	7	-	-	
84	12-Nov-15	7	6.988	-0.012	
85	19-Nov-15	7	6.986	-0.014	
86	26-Nov-15	7	-	-	
87	3-Dec-15	7	6.990	-0.010	
88	10-Dec-15	7	6.991	-0.009	
89	17-Dec-15	7	6.992	-0.008	
90	24-Dec-15	7	6.994	-0.006	
91	31-Dec-15	7	6.994	-0.006	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

MONTHLY PROGRESS REPORT
ATTACHMENT 2.5- GROUND SUBSIDENCE MONITORING STATUS Jan-17
PHASE-2

S.N	Date of performance	Predefined level of landfill(m)	Ground level over a weekly period (m)	Subsidence (m)	Sample density
1	7-Jan-16	7	6.989	-0.011	
2	14-Jan-16	7	6.990	-0.010	
3	21-Jan-16	7	6.993	-0.007	
4	28-Jan-16	7	6.996	-0.004	
5	4-Feb-16	7	6.995	-0.005	
6	11-Feb-16	7	6.989	-0.011	
7	18-Feb-16	7	6.989	-0.011	
8	25-Feb-16	7	6.992	-0.008	
9	3-Mar-16	7	6.997	-0.003	
10	10-Mar-16	7	6.995	-0.005	
11	17-Mar-16	7	6.995	-0.005	
12	24-Mar-16	7	6.990	-0.010	
13	31-Mar-16	7	6.987	-0.013	
14	7-Apr-16	7	6.990	-0.010	
15	21-Apr-16	7	6.992	-0.008	
16	28-Apr-16	7	6.995	-0.005	
17	5-May-16	7	6.989	-0.011	
18	12-May-16	7	6.987	-0.013	
19	19-May-16	7	6.991	-0.009	
20	26-May-16	7	6.994	-0.006	
21	2-Jun-16	7	6.997	-0.003	
22	9-Jun-16	7	6.998	-0.002	
23	16-Jun-16	7	6.999	-0.001	
24	23-Jun-16	7	6.992	-0.008	
25	30-Jun-16	7	6.990	-0.010	
26	7-Jul-16	7	6.994	-0.006	
27	14-Jul-16	7	6.996	-0.004	
28	21-Jul-16	7	6.991	-0.009	
29	28-Jul-16	7	6.993	-0.007	
30	4-Aug-16	7	6.994	-0.006	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

S.N	Date of performance	Predefined level of landfill(m)	Ground level over a weekly period (m)	Subsidence (m)	Sample density
31	11-Aug-16	7	6.996	-0.004	
32	18-Aug-16	7	6.995	-0.005	
33	25-Aug-16	7	6.993	-0.007	
34	1-Sep-16	7	6.992	-0.008	
35	8-Sep-16	7	6.993	-0.007	
36	15-Sep-16	7	6.994	-0.006	
37	22-Sep-16	7	6.994	-0.006	
38	29-Sep-16	7	6.995	-0.005	
39	6-Oct-16	7	6.996	-0.004	
40	13-Oct-16	7	6.995	-0.005	
41	20-Oct-16	7	6.993	-0.007	
42	27-Oct-16	7	6.994	-0.006	
43	3-Nov-16	7	6.994	-0.006	
44	10-Nov-16	7	6.995	-0.005	
45	17-Nov-16	7	6.995	-0.005	
46	24-Nov-16	7	6.996	-0.004	
47	1-Dec-16	7	6.996	-0.004	
48	8-Dec-16	7	6.994	-0.006	
49	15-Dec-16	7	6.994	-0.006	
50	22-Dec-16	7	6.995	-0.005	
51	5-Jan-17	7	6.994	-0.006	
52	12-Jan-17	7	6.994	-0.006	
53	19-Jan-17	7	6.995	-0.005	
54	26-Jan-17	7	6.996	-0.004	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

Attachment 2.6 - Ground Water Usage Monitoring Status

MONTHLY PROGRESS REPORT
ATTACHMENT 2.6 - GROUND WATER USAGE MONITORING STATUS

Feb-17

S.N	Date of Performance	Accumulative usage (volume) of ground water in site region, (m^3)	Weekly water consumption (m^3)	Remarks
1	27-Mar-14	25	25	
2	3-Apr-14	49	24	
3	9-Apr-14	65	16	
4	24-Apr-14	91	26	
5	1-May-14	134	43	
6	8-May-14	160	26	
7	15-May-14	197	37	
8	22-May-14	228	31	
9	29-May-14	259	31	
10	5-Jun-14	294	35	
11	12-Jun-14	354	60	
12	19-Jun-14	407	53	
13	26-Jun-14	458	51	
14	3-Jul-14	525	67	
15	10-Jul-14	571	46	
16	17-Jul-14	654	83	
17	24-Jul-14	747	93	
18	31-Jul-14	868	121	
19	7-Aug-14	988	120	
20	14-Aug-14	1141	153	
21	21-Aug-14	1316	175	
22	28-Aug-14	1498	182	
23	4-Sep-14	1686	188	
24	11-Sep-14	1884	198	
25	18-Sep-14	2107	223	
26	25-Sep-14	2300	193	
27	2-Oct-14	2401	101	
28	9-Oct-14	2544	143	
29	16-Oct-14	2616	132	
30	23-Oct-14	2852	176	
31	30-Oct-14	2983	131	
32	6-Nov-14	3048	65	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

S.N	Date of Performance	Accumulative usage (volume) of ground water in site region. (m^3)	Weekly water consumption (m^3)	Remarks
33	13-Nov-14	3210	162	
34	20-Nov-14	3370	160	
35	27-Nov-14	3520	150	
36	4-Dec-14	3643	123	
37	11-Dec-14	3792	149	
38	18-Dec-14	3924	132	
39	25-Dec-14	4053	129	
40	1-Jan-15	4170	117	
41	8-Jan-15	4310	140	
42	15-Jan-15	4478	168	
43	22-Jan-15	4650	172	
44	29-Jan-15	4831	181	
45	5-Feb-15	5000	169	
46	12-Feb-15	5230	230	
47	19-Feb-15	5423	193	
48	26-Feb-15	5645	222	
49	5-Mar-15	5835	190	
50	12-Mar-15	6064	229	
51	19-Mar-15	6300	236	
52	26-Mar-15	6559	259	
53	2-Apr-15	6795	236	
54	9-Apr-15	7025	230	
55	16-Apr-15	7166	141	
56	23-Apr-15	7404	238	
57	30-Apr-15	7649	245	
58	7-May-15	7900	251	
59	14-May-15	8161	261	
60	21-May-15	8384	223	
61	28-May-15	8582	198	
62	4-Jun-15	8787	205	
63	11-Jun-15	8990	203	
64	18-Jun-15	9138	148	
65	25-Jun-15	9260	122	
66	2-Jul-15	9430	170	
67	9-Jul-15	9560	130	
68	16-Jul-15	9710	150	

S.N	Date of Performance	Accumulative usage (volume) of ground water in site region. (m^3)	Weekly water consumption (m^3)	Remarks
69	23-Jul-15	9880	170	
70	30-Jul-15	9990	110	
71	6-Aug-15	10240	250	
72	13-Aug-15	10440	200	
73	20-Aug-15	10668	228	
74	27-Aug-15	10948	280	
75	3-Sep-15	11150	202	
76	10-Sep-15	11400	250	
77	17-Sep-15	11597	197	
78	24-Sep-15	11800	203	
79	1-Oct-15	12000	200	
80	8-Oct-15	12240	240	
81	15-Oct-15	12370	130	
82	22-Oct-15	12620	250	
83	29-Oct-15	12740	120	
84	5-Nov-15	12915	175	
85	12-Nov-15	13155	240	
86	19-Nov-15	13323	168	
87	26-Nov-15	13578	255	
88	3-Dec-15	13790	212	
89	10-Dec-15	14102	312	
90	17-Dec-15	14378	276	
91	24-Dec-15	14589	211	
92	31-Dec-15	14780	191	
93	7-Jan-16	14991	211	
94	14-Jan-16	15212	221	
95	21-Jan-16	15353	141	
96	28-Jan-16	15560	207	
97	4-Feb-16	15700	140	
98	11-Feb-16	15876	176	
99	18-Feb-16	16128	252	
100	25-Feb-16	16343	215	
101	3-Mar-16	16450	107	
102	10-Mar-16	16670	220	
103	17-Mar-16	16778	108	
104	24-Mar-16	16889	111	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

S.N	Date of Performance	Accumulative usage (volume) of ground water in site region, (m^3)	Weekly water consumption (m^3)	Remarks
105	31-Mar-16	17132	243	
106	7-Apr-16	17250	118	
107	14-Apr-16	17380	130	
108	21-Apr-16	17470	90	
109	28-Apr-16	17580	110	
110	5-May-16	17700	120	
111	12-May-16	17880	180	
112	19-May-16	17987	107	
113	26-May-16	18156	169	
114	2-Jun-16	18280	124	
115	9-Jun-16	18430	150	
116	16-Jun-16	18575	145	
117	23-Jun-16	18757	182	
118	30-Jun-16	18882	125	
119	7-Jul-16	19000	118	
120	14-Jul-16	19165	165	
121	21-Jul-16	19274	109	
122	28-Jul-16	19387	113	
123	4-Aug-16	19510	123	
124	11-Aug-16	19617	107	
125	18-Aug-16	19738	121	
126	25-Aug-16	19889	151	
127	1-Sep-16	20020	131	
128	8-Sep-16	20174	154	
129	15-Sep-16	20316	142	
130	22-Sep-16	20455	139	
131	29-Sep-16	20611	156	
132	6-Oct-16	20734	123	
133	13-Oct-16	20878	144	
134	20-Oct-16	21008	130	
135	27-Oct-16	21144	136	
136	3-Nov-16	21270	126	
137	10-Nov-16	21402	132	
138	17-Nov-16	21519	117	
139	24-Nov-16	21628	109	
140	1-Dec-16	21738	110	

S.N	Date of Performance	Accumulative usage (volume) of ground water in site region. (m^3)	Weekly water consumption (m^3)	Remarks
141	8-Dec-16	21869	131	
142	15-Dec-16	21996	127	
143	22-Dec-16	22119	123	
144	29-Dec-16	22233	114	
145	5-Jan-17	22345	112	
146	12-Jan-17	22452	107	
147	19-Jan-17	22575	123	
148	26-Jan-17	22690	115	
149	2-Feb-17	22794	104	
150	9-Feb-17	22892	98	
151	16-Feb-17	22999	107	
152	23-Feb-17	23123	124	
	Total Usage		23123	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

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

Appendix

Waste Disposal Record

(Construction Monthly Progress Report- October to December 2016)

Attachment 2.8 - Waste Disposal Record

MONTHLY PROGRESS REPORT
ATTACHMENT 2.8 - WASTE DISPOSAL MONITORING

January 2017

Item	Date	Description	No. of Loads	Remarks
1	30-Jun-14	Waste Disposal	1	YCDC
2	10-Jul-14	Waste Disposal	1	YCDC
3	11-Aug-14	Waste Disposal	1	YCDC
4	12.Aug-14	Waste Disposal	1	YCDC
5	17-Sep-14	Waste Disposal	1	YCDC
6	26-Sep-14	Waste Disposal	1	YCDC
7	29-Sep-14	Waste Disposal	1	YCDC
8	25-Oct-14	Waste Disposal	1	YCDC
9	7-Nov-14	Waste Disposal	1	YCDC
10	21-Nov-14	Waste Disposal	1	YCDC
11	1-Dec-14	Waste Disposal	2	YCDC
12	6-Dec-14	Waste Disposal (Sewage)	1	YCDC
13	24-Jan-15	Waste Disposal	2	YCDC
14	27-Jan-15	Waste Disposal	1	YCDC
15	24-Feb-15	Waste Disposal (Sewage)	1	YCDC
16	14-Mar-15	Waste Disposal	1	YCDC
17	20-Mar-15	Waste Disposal	1	YCDC
18	5-May-15	Waste Disposal	1	YCDC
19	9-May-15	Waste Disposal (Sewage)	2	YCDC
20	13-May-15	Waste Disposal	1	YCDC
21	18-May-15	Waste Disposal (Sewage)	2	YCDC
22	19-Jun-15	Waste Disposal	5	YCDC
23	1-Aug-15	Waste Disposal	6	YCDC
24	22-Sep-15	Waste Disposal	5	YCDC
25	21-Nov-15	Waste Disposal	5	YCDC
26	4-Dec-15	Waste Disposal (Sewage)	3	YCDC
27	22-Feb-16	Waste Disposal	6	YCDC
28	11-Mar-16	Waste Disposal (Sewage Damage Pipe)	10	YCDC
29	6-Apr-16	Waste Disposal	5	YCDC
30	29-Jul-16	Waste Disposal	6	YCDC
31	3-Nov-16	Waste Disposal	6	YCDC
32	6-Jan-17	Waste Disposal (Sewage)	3	YCDC
	29-Jan-17	Waste Disposal	5	YCDC
	Total		90	

MJTD MYANMA-JAPAN THILAWA DEVELOPMENT LIMITED

RECEIVED
JAN 06 2017

ငွေလက်ခံ/ထုတ်ပေးပြေစာ

ထုတ်ပေးသည့်အကြောင်းအရာ ။ အမှိုက်သိမ်းစရိတ်ပေးချေခြင်း ။
Waste Disposal Charges (3 times × 35,000)

ပေါင်း။ (၁၀၅၀၀၀ ကျပ်)

ထုတ်ပေးသည့်ရက်စွဲ။

ထုတ်ပေးသူ 06/01/17

အမည် ။ Htwe Aung Nyunt

အမှတ် ။

နေရပ်/ဌာန ။ Penta Ocean Construction Co., Ltd.

။ TSEZ Project

လက်ခံသူ (ကိုယ်စား)

အမည် ။ ဦးစိုးမြင့် (သန်)

အမှတ် ။ မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့

နေရပ်/ဌာန။ သန်လျင်မြို့

။ 09-421088719

Ko Kyaw Soe Moe (Thanlyin, YCDC)

မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့

ကျောက်တန်းမြို့ 29.1.2017

ငွေလွှဲပြောင်း/လက်ခံပြေစာ

၁။ လွှဲပြောင်းပေးသည့်ငွေ(စာဖြင့်) ကျပ်တစ်သိန်း ခြောက်သောင်း တိတိ —

၂။ လွှဲပြောင်းပေးသည့်ငွေ(ဂဏန်းဖြင့်) ၁၆၀၀၀၀/-

၃။ လွှဲပြောင်းပေးသည့်အကြောင်းအရာ ဈေးရုံ အသုံးစရိတ် သိမ်း ပါသည်။

၄။ လွှဲပြောင်းပေးသည့်ရက်စွဲ ၂၉.၁.၂၀၁၇

၅။ အထက်ဖော်ပြပါငွေကျပ်(၁၆၀၀၀၀/-) အား လက်ခံရရှိပါကြောင်းအောက်တွင်လက်မှတ်ရေးထိုးပါသည်-

လွှဲပြောင်းပေးသူ

အမည်၊ လှိုင်မင်းဖြိုး

ရာထူး၊ ဆည်း ဂေါ်ဒ တိုက်

လွှဲပြောင်းလက်ခံသူ

အမည်၊ အောင်နန္ဒာ

လိပ်စာ၊ ၁၁၈၁၀၇ —

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

Appendix

General Waste Disposal Record

(Admin Complex Compound- October 2016 to March 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	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

Manifest — E-Slip

*Waste service companyto Waste Generator

Date of issuance	(Day Month, Year) 3. 10. 2016	Issuer	(Name&Sign) Myo Min Thein 13.10.16
Number of issuance	9999 1610 0002		

Contractors	Waste generator	Transportation company	Waste service company
Company Name	MJTD	GEM	GEM
Tel			

Waste	Kind	Name	Style of packing
	☑Non-Hazardous	General Waste.	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	1160 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Min Min Oo 9H-3422	(Day Month, Year) 3 / 10 / 2016 10.10.2016
Waste service company	(Name&Sign) Wai Yan Htaung	(Day Month, Year) 8.10.2016

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

Manifest — C-Slip

*Transpiration company to Waste Generator

Date of issuance	(Day Month, Year) 25. 10. 2016	Issuer	(Name&Sign) Myo Min Thein
Number of issuance	9999 1610 0023		

Contractors	Waste generator	Transportation company	Waste service company
Company Name	Myanmar Japan Thilawa Development Co.,ltd.	GEM	GEM
Tel			

Waste	Kind	Name	Style of packing
	☑Non-Hazardous	General waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	1620 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign)	(Day Month, Year) 25. 10. 2016
Waste service company	(Name&Sign) Wai Yan Htaung	(Day Month, Year) 25.10.2016

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

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

Manifest	C-Slip	*Transpiration company to Waste Generator

Date of issuance	(Day Month, Year) ~~29.11.2016~~ 30.11.2016.	Issuer	(Name&Sign) Myo Min Thein
Number of issuance	9999 1611 ~~0033~~ 0036		

Contractors	Waste generator	Transportation company	Waste service company
Company Name	Myanmar Japan Thilawa Development Co Ltd.	Golden Dowa Eco. System Myanmar.	Golden Dowa Eco. System Myanmar
Tel			

	Kind	Name	Style of packing
Waste	☑Non-Hazardous	General Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	1120kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) 30/11/2016 Aung Ko Ko Aung	(Day Month, Year) 30.11.2016.
Waste service company	(Name&Sign) Win Htaing	(Day Month, Year) 30.11.16

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

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Manifest	C-Slip	*Transpiration company to Waste Generator

Date of issuance	(Day Month, Year) 5 . Jan . 2017	Issuer	(Name&Sign) Myo Min Thein 13.1.17
Number of issuance	9999 1701 0005		

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

Waste	Kind	Name	Style of packing
	☑Non-Hazardous	General Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	1060 kg	

Customer code	0009	Waste Profile code	A009

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Min Min Oo 314.8896	(Day Month, Year) 5 1 1 17
Waste service company	(Name&Sign) Win Oab Hlaing	(Day Month, Year) 5.1.17

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

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

Manifest	C-Slip	*Transpiration company to Waste Generator

Date of issuance	(Day Month, Year) 9 Feb 2017	Issuer	(Name&Sign)
Number of issuance	9999 1702 0012		

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

Waste	Kind	Name	Style of packing
	☐Non-Hazardous	General Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	680 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Kyaw Tun Mya 3K9145	(Day Month, Year) 9. 2. 2017
Waste service company	(Name&Sign) Win BB Hlaing	(Day Month, Year) 9. 2. 17

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

Manifest	C-Slip	*Transpiration company to Waste Generator

Date of issuance	(Day Month, Year) 10 Feb 2017	Issuer	(Name&Sign) for Min
Number of issuance	9999 1702 0014		

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

Waste	Kind	Name	Style of packing
	☐Non-Hazardous	General Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	760 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Kyaw Tun Mya 3K8896 10-2	(Day Month, Year) 10. 2. 2017
Waste service company	(Name&Sign) Win BB Hlaing	(Day Month, Year) 10. 2. 17

MJTD MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

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

Manifest C-Slip

*Transpiration company to Waste Generator

Date of issuance	(Day Month, Year) 16 Mar 2017	Issuer	(Name&Sign) Myo Min Thein 16.3.17
Number of issuance	1119 1703 0030		

Contractors	Waste generator	Transportation company	Waste service company
Company Name	Myanmar Japan Thilawa Development (H	GEM	GEM
Tel			

Waste	Kind	Name	Style of packing
	☐Non-Hazardous	General Waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	960 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Kyaw Tun Myint CK/ [illegible] 96 16.3.17	(Day Month, Year) 16. 3. 2017
Waste service company	(Name&Sign) Win Oo Hlaing	(Day Month, Year) 16.3.17

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

Manifest C-Slip

*Transpiration company to Waste Generator

Date of issuance	(Day Month, Year) 17 · March - 2017	Issuer	(Name&Sign) Myo Min Thein 17.3.17
Number of issuance	9999 1703 0033		

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

Waste	Kind	Name	Style of packing
	☑Non-Hazardous	General waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	720 kg	

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) Kyaw Tun Myint [illegible] 17.3.17	(Day Month, Year) 17. 3. 17
Waste service company	(Name&Sign) Win Oo Hlaing	(Day Month, Year) 17.3.17

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

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

Appendix

Sewage Treatment Plant Monitoring Record

(October 2016 to March 2017)

Monitoring Parameters Result for STP(Phase-2)

Month	Date	Inlet																												
		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	Formal-dehyde	Phenols
		Daily Parameters								Weekly Parameters						Monthly Parameters																
Standard		6.5-8.5	-	-	-	Max 2,000	-	Max 300	Max 35 °C	Max 200	Max 400	Max 80	-	Max 5	Max 200	Max 0.2	Max 0.5	Max 0.25	Max 0.005	Max 0.03	Max 0.02	Max 0.2	150	150	Max 5	Max 1	Max 1	Max 0.2	Max 1	Max 1	Max 1	Max 1
Unit		-				ppm			°C	ppm	MPN/100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	Co-Pt	Co-Pt	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Oct	1-Oct-16																															
Oct	2-Oct-16																															
Oct	3-Oct-16	7.99	321.5	0.42	656	328	19.40	18.60	29.60																							
Oct	4-Oct-16	8.10	327.2	0.46	706	354	188.00	3.70	30.03																							
Oct	5-Oct-16	7.22	189.3	0.55	733	367	15.40	12.90	29.59	0.5	≥160000	6.8	0.699	3.27	114	0.042	0.056	≤ 0.05	≤ 0.00054	≤ 0.00086	≤ 0.075	≤ 0.04	9.42 (TCU)	4 (TON)	0.102	≤ 0.00355	0.06	0.052	0.101	0.7	0.011	0.008
Oct	6-Oct-16	7.46	354.3	0.61	742	371	62.30	5.60	29.52																							
Oct	7-Oct-16	7.42	384.5	0.55	637	318	17.90	<0.7	29.57																							
Oct	8-Oct-16																															
Oct	9-Oct-16																															
Oct	10-Oct-16	8.20	350	0.40	973	487	31.60	147.00	29.69																							
Oct	11-Oct-16	7.74	418.1	0.45	844	423	192.00	30.10	29.32																							
Oct	12-Oct-16	7.67	398.4	0.37	620	310	139.00	26.30	29.53	10.6	≥160000	6.6	0.273	<3.1	16																	
Oct	13-Oct-16	7.46	370.9	0.25	381	190	36.50	14.30	29.30																							
Oct	14-Oct-16	8.00	357.6	0.38	1025.00	512	77.80	16.10	29.48																							
Oct	15-Oct-16																															
Oct	16-Oct-16																															
Oct	17-Oct-16	7.68	271.5	0.45	606	302	23.60	22.30	29.52																							
Oct	18-Oct-16	7.75	338.6	0.68	649	325	13.30	26.90	29.59																							
Oct	19-Oct-16	8.20	275.2	0.42	738	268	322.00	6.80	29.43	2.6	≥160000	9.2	0.904	< 3.1	304																	
Oct	20-Oct-16	8.96	231.6	0.17	625	312	20.80	85.00	29.53																							
Oct	21-Oct-16	7.45	189.4	0.29	755	378	111.00	28.00	29.54																							
Oct	22-Oct-16																															
Oct	23-Oct-16																															
Oct	24-Oct-16	7.72	136.1	0.33	612	305	30.90	13.10	29.34																							
Oct	25-Oct-16	7.58	144.5	0.31	587	292	18.10	10.30	29.37																							
Oct	26-Oct-16	7.70	252.1	0.32	823	411	38.50	74.00	29.44	20.2	≥160000	8.5	0.368	13.9	24																	
Oct	27-Oct-16	7.55	160.7	0.36	674	335	19.70	21.80	29.43																							
Oct	28-Oct-16	7.60	380.4	0.38	587	293	33.50	18.90	29.19																							
Oct	29-Oct-16																															
Oct	30-Oct-16																															
Oct	31-Oct-16	7.63	293.7	0.41	563	281	16.70	3.30	29.33																							
Nov	1-Nov-16	7.44	208.4	0.24	683	342	48.80	23.80	29.39																							
Nov	2-Nov-16	8.48	313.5	0.41	694	347	18.90	91.00	29.42	26.1	≥160000	9.6	0.301	4.36	22	0.017	≤ 0.002	≤0.01	≤0.00054	≤0.001	≤0.01	≤0.002	27.24	17	0.06	≤0.002	0.04	0.066	0.013	0.3	0.088	0.002
Nov	3-Nov-16	7.52	206.7	0.33	698	347	20.80	76.00	29.40																							
Nov	4-Nov-16	7.75	193.6	0.33	774	387	11.70	35.40	29.51																							
Nov	5-Nov-16																															
Nov	6-Nov-16																															
Nov	7-Nov-16	7.87	390	0.35	690	345	14.20	4.50	29.49																							
Nov	8-Nov-16	7.53	138.4	0.44	701	350	14.40	19.40	29.53																							
Nov	9-Nov-16	7.23	189.1	0.48	723	361	23.10	251.00	29.56	44.3	90000	17.4	0.624	92.5	20																	
Nov	10-Nov-16	6.82	425.4	0.13	632	316	23.20	114.00	29.47																							
Nov	11-Nov-16	7.49	186.5	0.33	571	286	22.40	9.20	29.44																							
Nov	12-Nov-16																															
Nov	13-Nov-16																															
Nov	14-Nov-16																															
Nov	15-Nov-16	7.60	313.0	0.46	590	295	23.60	7.20	29.42																							
Nov	16-Nov-16	8.99	227.2	0.42	893	447	31.20	95.00	29.40	33.5	≥160000	11.3	0.865	11.64	44																	
Nov	17-Nov-16	8.14	158.5	0.48	794	398	70.10	49.00	29.52																							
Nov	18-Nov-16	8.02	145.2	0.82	777	386	26.10	39.10	29.42																							
Nov	19-Nov-16																															
Nov	20-Nov-16																															
Nov	21-Nov-16	7.61	439.4	0.48	564	282	26.60	2.30	29.23																							
Nov	22-Nov-16	7.85	294.5	0.48	746	374	17.50	35.10	29.48																							
Nov	23-Nov-16	8.12	225.4	0.62	634	323	45.40	22.30	29.40	42.5	≥160000	16.7	1.41	5.45	26																	
Nov	24-Nov-16																															
Nov	25-Nov-16	8.07	225.7	0.33	553.0	276	44.70	2.00	29.29																							
Nov	26-Nov-16																															
Nov	27-Nov-16																															
Nov	28-Nov-16	8.18	312.9	0.53	731	366	16.50	51.00	29.31																							
Nov	29-Nov-16	7.30	385.9	0.48	564	282	21.40	59.00	29.65																							
Nov	30-Nov-16	7.33	337.8	0.68	712	354	23.20	88.00	29.64	27.1	300	14.1	0.323	11.83	12																	
Dec	1-Dec-16	8.37	245.5	0.75	1321	659	95.60	183.00	29.79																							
Dec	2-Dec-16	8.30	257.9	1.21	948	302	24.60	30.90	29.52																							
Dec	3-Dec-16																															
Dec	4-Dec-16																															
Dec	5-Dec-16	7.40	271.1	0.68	757	379	52.20	122.00	29.61																							
Dec	6-Dec-16	7.37	248.5	0.73	677	338	7.40	102.00	29.56																							
Dec	7-Dec-16	7.38	310.7	0.92	862	431	54.50	88.00	29.47	45.5	≥160000	20.4	1.144	17.2	46	0.046	≤0.002	≤0.01	≤0.00054	≤0.001	≤0.01	≤0.002	23.15	17	0.06	≤0.002	0.034	0.052	0.034	0.3	0.123	0.005
Dec	8-Dec-16	8.76	215	0.84	1020	510	170.0	198.00	29.19																							
Dec	9-Dec-16	7.99	231.1	0.72	770	384	46.0	98.00	29.48																							
Dec	10-Dec-16																															
Dec	11-Dec-16																															
Dec	12-Dec-16	8.39	240.8	0.67	669	335	89.90	330.00	29.38																							
Dec	13-Dec-16	8.32	221.3	0.63	682	381	26.90	71.00	29.21	24.91	≥160000	24.9	1.89	3.64	26																	
Dec	14-Dec-16	8.34	182.8	0.57	1218	604	42.40	132.00	29.54																							
Dec	15-Dec-16	9.53	219	0.59	1343	672	39.90	80.40	29.77																							
Dec	16-Dec-16	9.13	168.5	0.65	848	424	209.00	675.00	29.60																							
Dec	17-Dec-16																															
Dec	18-Dec-16																															
Dec	19-Dec-16	8.29	187.8	0.48	597	298	25.30	48	29.47																							
Dec	20-Dec-16	8.15	206.5	0.43	769	385	28.90	63.00	29.38																							
Dec	21-Dec-16	8.15	281.5	0.80	874	437	23.70	68.00	29.26	28.3	≥160000	20.3	1.86	4	10																	
Dec	22-Dec-16	7.94	255.2	0.79	1243	622	35.70	84.00	29.39																							
Dec	23-Dec-16	8.01	211.6	0.65	787	393	28.60	30.00	29.27																							
Dec	24-Dec-16																															
Dec	25-Dec-16																															
Dec	26-Dec-16	9.78	313.2	0.88	1661	830	82.50	77.00	29.80																							
Dec	27-Dec-16	8.44	261.2	0.53	728	364	37.10	63.00	29.29																							
Dec	28-Dec-16	8.29	236.7	0.41	932	466	56.80	149.00	29.52	78.6	≥160000	12	0.267	12	46																	
Dec	29-Dec-16																															
Dec	30-Dec-16	6.55	277.4	0.25	562	281	28.20	18.00	29.20																							
Dec	31-Dec-16																															
Jan	1-Jan-17																															
Jan	2-Jan-17	6.17	313.6	0	791	395	20.1	35	29.14																							
Jan	3-Jan-17	7.87	245.6	0.29	580	290	46.8	16.2	29.22	6.6	≥160000	14.4	1	8.45	34	0.02	≤0.002	0.012	≤0.00054	≤0.001	≤0.01	≤0.002	15.91	4	0.08	≤0.002	0.036	0.07	0.03	0.6	0.085	0.011
Jan	4-Jan-17																															
Jan	5-Jan-17	6.1	319.6	0	859	432	17.6	26.6	29.38																							
Jan	6-Jan-17	7.32	394.8	0.33	697	349	29.6	25.1	28.44																							
Jan	7-Jan-17																															
Jan	8-Jan-17																															
Jan	9-Jan-17	8.16	220.8	0.14	879	448	61.1	109	27.43																							
Jan	10-Jan-17	7.4	260.1	0	1019	509	48.3	42	28.02																							
Jan	11-Jan-17	6.92	234.3	1.33	1761	882	42.6	30	28.77	14.5	≥160000	8	0.256	<3.1	38																	
Jan	12-Jan-17	7.23	253.2	0.47	1454	730	21.8	85	29.1																							
Jan	13-Jan-17	7.38	217.6	0.03	910	455	16.4	38	29.04																							
Jan	14-Jan-17																															
Jan	15-Jan-17																															
Jan	16-Jan-17	7.84	239.1	2.22	828	414	36.3	40	29.01																							

Monitoring Parameters Result for STP(Phase-2)

Month	Date	Inlet																														
		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	Formal-dehyde	Phenols
		Daily Parameters								Weekly Parameters						Monthly Parameters																
Standard		6.5-8.5	-	-	-	Max 2,000	-	Max 300	Max 35°C	Max 200	Max 400	Max 80	-	Max 5	Max 200	Max 0.2	Max 0.5	Max 0.25	Max 0.005	Max 0.03	Max 0.02	Max 0.2	150	150	Max 5	Max 1	Max 1	Max 0.2	Max 1	Max 1	Max 1	Max 1
Unit		-				ppm			°C	ppm	MPN/100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	Co-Pt	Co-Pt	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Jan	17-Jan-17	8.45	208.8	2.25	1422	712	42.6	96	28.95																							
Jan	18-Jan-17	6.74	312.1	3.57	542	272	22.1	14	29.04	1.8	>160000	7.1	0.506	7	20																	
Jan	19-Jan-17	6.4	262.1	3.31	986	493	39.8	51	29.07																							
Jan	20-Jan-17	7.75	237.3	3.39	896	448	27.7	36	29.01																							
Jan	21-Jan-17																															
Jan	22-Jan-17																															
Jan	23-Jan-17	8.04	196.4	3.26	910	448	15.5	32.4	29.12																							
Jan	24-Jan-17	8.57	202.6	3.24	1678	839	34.1	92	29.4																							
Jan	25-Jan-17	8.37	207.2	2.77	692	347	25.4	16.9	29.05	2.1	>160000	11.2	0.911	4.2	48																	
Jan	26-Jan-17	8.35	236.5	2.44	1767	887	16.9	47	29.12																							
Jan	27-Jan-17	8.18	229.1	2.35	675	338	27	21.5	29.03																							
Jan	28-Jan-17																															
Jan	29-Jan-17																															
Jan	30-Jan-17	8.39	167.8	3.72	592	296	20	15.9	29.1																							
Jan	31-Jan-17	8.29	219.6	3.99	561	280	28.8	18.6	29.13																							
Feb	1-Feb-17	7.79	301.6	3.39	864	432	0.42	21.3	28.77	5.1	>160000	10.9	0.605	5.44	30	0.02	≤0.002	0.012	≤0.0009	≤0.001	≤0.01	≤0.002	12.5	1.4	0.08	≤0.002	0.038	0.018	0.01	0.2	0.099	<0.002
Feb	2-Feb-17	9.11	178.2	2.66	1017	510	160	203	29.02																							
Feb	3-Feb-17	9.94	122.4	2.66	1089	549	53.1	121	29.05																							
Feb	4-Feb-17																															
Feb	5-Feb-17																															
Feb	6-Feb-17	11.28	66.7	3.54	1157	578	121	406	29.14																							
Feb	7-Feb-17	9.54	130.5	2.86	1824	390	40.2	91	28.92																							
Feb	8-Feb-17	9.03	146.5	2.75	997	499	57.9	236	29.02	46.6	>160000	24.5	1.79	21.42	48																	
Feb	9-Feb-17	7.74	286.2	4.08	818	409	5.5	114	28.86																							
Feb	10-Feb-17	8.79	289.6	3.6	1044	521	51.1	114	28.94																							
Feb	11-Feb-17																															
Feb	12-Feb-17																															
Feb	13-Feb-17	8.45	150.5	5.3	711	355	28	33	29.01																							
Feb	14-Feb-17	8.23	77.3	3.83	680	340	32.2	33	29.09																							
Feb	15-Feb-17	10.64	236.4	3.93	1048	540	41	54	29.21	11.5	>160000	15.4	0.927	13.09	42																	
Feb	16-Feb-17	8.5	266.6	5.04	796	398	35.1	43	28.9																							
Feb	17-Feb-17	8.37	145	3.17	828	144	14.4	52	29.04																							
Feb	18-Feb-17																															
Feb	19-Feb-17																															
Feb	20-Feb-17	8.67	291	3.94	838	419	46.4	98	29.08																							
Feb	21-Feb-17	8.3	76.4	4.06	755	378	34.6	36	29.09																							
Feb	22-Feb-17	8.43	228.5	4.82	928	464	8.3	34	29.09	8.7	>160000	13.7	0.359	3.34	12																	
Feb	23-Feb-17	8.34	283.4	4.11	782	391	25.3	34	29.05																							
Feb	24-Feb-17	8.58	174	4.11	876	438	40.3	53	29.23																							
Feb	25-Feb-17																															
Feb	26-Feb-17																															
Feb	27-Feb-17	8.25	271.3	4.51	783	382	16.2	57	29.18																							
Feb	28-Feb-17	8.41	67	4.66	665	332	48.5	33	29.09																							
Mar	1-Mar-17	9.71	202.5	3.81	947	474	25.7	53	29.09	13.5	>160000	20.6	1.43	4.73	8	0.016	≤ 0.002	0.014	≤ 0.002	≤ 0.001	≤ 0.01	≤ 0.002	20.77	2	0.036	≤ 0.002	0.008	0.01	0.037	0.2	0.1	0.019
Mar	2-Mar-17																															
Mar	3-Mar-17	8.63	185.6	4.89	1041	521	36.4	75	29.25																							
Mar	4-Mar-17																															
Mar	5-Mar-17																															
Mar	6-Mar-17	8.79	184.8	4.08	1169	582	38.6	125	29.25																							
Mar	7-Mar-17	8.39	182.5	4.46	640	320	12	31	29.18																							
Mar	8-Mar-17	9.31	300	4.26	1203	602	31.1	86	29.5	34.3	>160000	21.2	1.49	5.64	42																	
Mar	9-Mar-17	8.58	314.4	4.4	847	424	44.4	33	29.39																							
Mar	10-Mar-17	8.79	295.4	2.85	965	485	155	34	29.29																							
Mar	11-Mar-17																															
Mar	12-Mar-17																															
Mar	13-Mar-17	7.81	211.2	6.47	820	410	15.5	222	30.01																							
Mar	14-Mar-17	8.35	133.7	5.7	523	262	59.6	31	29.69																							
Mar	15-Mar-17	9.35	255.7	4.04	905	453	30.5	131	30.14	41.5	>160000	12	0.662	8.18	44																	
Mar	16-Mar-17	8.38	342.6	3.44	469	235	15.22	18	29.92																							
Mar	17-Mar-17	9.94	182.6	4.01	971	484	20.3	108	30.15																							
Mar	18-Mar-17																															
Mar	19-Mar-17																															
Mar	20-Mar-17	10.14	203	4.39	1004	499	759	2000	29.95																							
Mar	21-Mar-17	8.14	270.2	4.24	761	381	30.9	96	30.05																							
Mar	22-Mar-17	8.73	250.3	3.51	1171	587	33.9	198	30.13	42.3	>160000	15	0.659	39.64	58																	
Mar	23-Mar-17	8.45	314.5	3.72	1008	491	56.1	31	30																							
Mar	24-Mar-17	8.82	250.4	4.07	959	482	57.1	23	29.79																							
Mar	25-Mar-17																															
Mar	26-Mar-17																															
Mar	27-Mar-17	8.85	250	4.21	864	482	35.6	51	29.75																							
Mar	28-Mar-17	8.63	265.3	4.35	1121	456	33.7	93	30.17	21.8	>160000	31	1.96	10	24																	
Mar	29-Mar-17	8.45	3004	3.75	964	472	30.5	126	29.81																							
Mar	30-Mar-17	8.73	275.3	4.08	1120	520	58.3	17	29.95																							
Mar	31-Mar-17																															

MJTD

Monitoring Parameters Result for STP(Phase-2)

Month	Date	Outlet																														
		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	Formal-dehyde	Phenols
		Daily Parameters								Weekly Parameters						Monthly Parameters																
Standard		5.0 - 9.0	-	+	-	Max 2,000	-	Max 60	Max 40	Max 200	Max 400	Max 80	Max 2	Max 5	Max 30	Max 0.2	Max 0.5	Max 0.25	Max 0.005	Max 0.03	Max 0.02	Max 0.2	-	-	Max 5	Max 1	Max 1	Max 1	Max 0.2	Max 1	Max 1	Max 1	Max 1
Unit		-	-	-	-	ppm	-	ppm	°C	ppm	MNP/100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	-	-	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Oct	1-Oct-16																															
Oct	2-Oct-16																															
Oct	3-Oct-16	7.95	320.2	0.48	743	372	3.2	1.10	30.37																							
Oct	4-Oct-16	8.07	344.8	0.41	740	370	2.5	2.40	29.66																							
Oct	5-Oct-16	8.09	297.4	0.65	702	352	3.9	<0.7	29.62	0.5	<2	6.9	0.153	<3.1	4	0.002	0.044	≤ 0.05	≤ 0.00054	≤ 0.00086	≤ 0.075	≤ 0.04	2.01 (TCU)	1 (TON)	0.06	≤ 0.00355	0.052	0.022	≤ 0.005	0.1	0.146	≤ 0.002
Oct	6-Oct-16	7.53	374.2	0.56	684	342	5.1	1.1	29.51																							
Oct	7-Oct-16	7.69	393.9	0.60	676	339	3.2	6.1	29.4																							
Oct	8-Oct-16																															
Oct	9-Oct-16																															
Oct	10-Oct-16	7.83	406.8	0.47	843	421	0.4	<0.7	2.37																							
Oct	11-Oct-16	7.86	444.5	0.46	843	422	1.9	4.5	29.46																							
Oct	12-Oct-16	7.65	419.5	0.45	815	402	0.9	3.5	29.44	0	13	8.9	0.143	<3.1	12																	
Oct	13-Oct-16	7.76	423	0.4	776	388	2.1	<0.7	29.49																							
Oct	14-Oct-16	7.98	397.5	0.43	741	372	0.9	<0.7	29.86																							
Oct	15-Oct-16																															
Oct	16-Oct-16																															
Oct	17-Oct-16	8.28	217.3	0.46	757	379	0	2.7	29.22																							
Oct	18-Oct-16	8.65	293.5	0.78	675	338	0.7	2.7	29.52																							
Oct	19-Oct-16	8.12	245.5	0.41	643	322	0	2.6	29.58	0	<2	7.7	0.071	<3.1	4																	
Oct	20-Oct-16	5.83	516.2	0.08	655	328	0	20.8	29.9																							
Oct	21-Oct-16	7.06	248.4	0.42	642	321	0	<0.7	29.84																							
Oct	22-Oct-16																															
Oct	23-Oct-16																															
Oct	24-Oct-16	7.61	333	0.32	562	281	5.6	9.3	28.79																							
Oct	25-Oct-16	7.88	525.1	0.45	558	279	0	<0.7	28.99																							
Oct	26-Oct-16	8.28	463.1	0.40	552	276	0	<0.7	28.98	0	<2	7.8	0.087	<3.1	4																	
Oct	27-Oct-16	8.03	445.1	0.44	653	326	0	<0.7	29.10																							
Oct	28-Oct-16	8.00	524.5	0.73	662	328	0.4	<0.7	29.02																							
Oct	29-Oct-16																															
Oct	30-Oct-16																															
Oct	31-Oct-16	7.92	368.4	0.33	539	269	0	1.1	29.26																							
Nov	1-Nov-16	8.11	511.8	0.44	552	276	0.5	1.6	29.39																							
Nov	2-Nov-16	8.11	521.5	0.46	563	281	0	<0.7	29.48	0	< 2	6	0.086	< 3.1	2	0.002	≤0.002	≤0.01	≤0.00054	≤0.001	≤0.01	≤0.002	1.5	17	0.02	≤0.002	0.022	≤0.002	0.006	0.2	0.012	0.002
Nov	3-Nov-16	8.08	502.7	0.40	572	289	0.2	<0.7	29.37																							
Nov	4-Nov-16	8.05	254.6	0.36	617	308	0.9	2.7	29.86																							
Nov	5-Nov-16																															
Nov	6-Nov-16																															
Nov	7-Nov-16	8.11	551.2	0.41	795	398	0	2.8	29.82																							
Nov	8-Nov-16	8.12	235.9	0.70	859	429	0	2.9	29.62																							
Nov	9-Nov-16	7.42	260.8	0.42	697	329	0.8	8.0	29.54	0	<2	7.5	0.081	<3.1	16																	
Nov	10-Nov-16	7.56	348.4	0.16	750	375	0	9.3	29.12																							
Nov	11-Nov-16	7.90	229.4	0.57	709	354	0.4	< 0.7	28.96																							
Nov	12-Nov-16																															
Nov	13-Nov-16																															
Nov	14-Nov-16																															
Nov	15-Nov-16	7.66	356.2	0.47	660	330	0	2.4	29.85																							
Nov	16-Nov-16	8.19	240.5	0.39	667	334	0	1.5	29.74	0	<2	6.3	< 0.05	< 3.1	6																	
Nov	17-Nov-16	8.48	228.4	0.73	692	448	0.5	5.5	29.72																							
Nov	18-Nov-16	8.45	309.6	0.89	991	494	0	4.7	29.58																							
Nov	19-Nov-16																															
Nov	20-Nov-16																															
Nov	21-Nov-16	8.19	467.0	0.55	787	394	0	< 0.7	28.9																							
Nov	22-Nov-16	8.45	255.6	0.64	717	359	0	5.3	28.82																							
Nov	23-Nov-16	8.32	206.1	0.44	696	348	0	7.0	28.3	0	<2	9.6	< 0.05	< 3.1	2																	
Nov	24-Nov-16																															
Nov	25-Nov-16	8.33	169.2	0.33	900	350	0	2.9	28.12																							
Nov	26-Nov-16																															
Nov	27-Nov-16																															
Nov	28-Nov-16	8.74	308.2	0.45	866	434	0	< 0.7	28.87																							
Nov	29-Nov-16	8.49	309.1	0.69	768	384	1.1	< 0.7	28.96																							
Nov	30-Nov-16	8.05	319.00	0.69	701	351	0	1.9	29.07	0	< 2	8.9	< 0.05	< 3.1	2																	
Dec	1-Dec-16	8.05	256.7	0.65	677	339	10.1	3.9	29.11																							
Dec	2-Dec-16	8.30	271.2	1.21	732	376	0.4	3.7	29.07																							
Dec	3-Dec-16																															
Dec	4-Dec-16																															
Dec	5-Dec-16	8.49	219.4	0.74	752	376	0	< 0.7	29.09																							
Dec	6-Dec-16	7.56	303.4	0.88	734	367	0	< 0.7	28.92																							
Dec	7-Dec-16	7.79	342.7	0.87	743	732	0	< 0.7	28.7	0	< 2	15	< 0.05	< 3.1	2	0.09	≤0.002	≤0.01	≤0.00054	≤0.001	≤0.01	≤0.002	5.7	1	0.04	≤0.002	0.074	0.096	<0.005	0.7	0.072	0.005
Dec	8-Dec-16	7.69	293.7	0.78	753	377	0	7.7	28.15																							
Dec	9-Dec-16	8.66	228.3	0.80	823	411	0	13.4	28.52																							
Dec	10-Dec-16																															
Dec	11-Dec-16																															
Dec	12-Dec-16	8.70	190.5	0.62	811	406	0	1.2	28.71																							
Dec	13-Dec-16	8.40	229.3	0.52	948	398	0	3.1	28.82	0	< 2	13.4	< 0.05	< 3.1	8																	
Dec	14-Dec-16	8.39	172.6	0.46	806	403	0.3	11	28.99																							
Dec	15-Dec-16	8.23	237.8	0.58	843	421	0.2	6.8	28.67																							
Dec	16-Dec-16	8.51	196.2	1.00	909	454	0	5.1	28.57																							
Dec	17-Dec-16																															
Dec	18-Dec-16																															
Dec	19-Dec-16	8.60	154.3	0.41	900	450	0	3.7	28.74																							
Dec	20-Dec-16	8.63	185.8	0.68	844	422	0	7.4	28.76																							
Dec	21-Dec-16	8.53	281.5	0.80	874	437	0	8.5	28.15	0	<1.8	12.5	< 0.05	< 3.1	2																	
Dec	22-Dec-16	8.32	212.9	0.72	819	409	7.8	17.4	28.17																							
Dec	23-Dec-16	8.43	175.9	0.65	827	414	0	6.3	28.31																							
Dec	24-Dec-16																															
Dec	25-Dec-16																															
Dec	26-Dec-16	8.63	444.5	0.38	934	467	0	2.7	28.93																							
Dec	27-Dec-16	8.81	254.9	0.48	1017	509	3.1	5	29.08																							
Dec	28-Dec-16	8.54	228.7	0.29	986	493	0	3.4	20.09	0	<1.8	15.1	<0.05	<3.1	4																	
Dec	29-Dec-16																															
Dec	30-Dec-16	8.58	181.7	0.15	871	436	0	5.1	28.4																							
Dec	31-Dec-16																															
Jan	1-Jan-17																															
Jan	2-Jan-17	7.72	243.9	0.00	842	421	0	4.7	28.5																							
Jan	3-Jan-17	7.47	310.6	0.25	866	433	0	5.3	28.78	1.3	<1.8	17.5	0.093	<3.1	4	0.004	≤0.002	≤0.01	≤0.00054	≤0.001	≤0.01	≤0.002	5.28	1	0.042	≤0.002	0.016	0.01	0.007	0.2	0.031	<0.002
Jan	4-Jan-17																															
Jan	5-Jan-17	6.65	232.7	0.00	802	401	15.1	13.2	28.02																							
Jan	6-Jan-17	7.44	317.4	0.39	812	406	0	<0.7	27.86																							
Jan	7-Jan-17																															
Jan	8-Jan-17																															
Jan	9-Jan-17	8.11	209.9	0.34	820	410	0.1	3.3	26.82																							
Jan	10-Jan-17	8.93	244.9	0.00	821	410	61.1	1.6	26.73																							
Jan	11-Jan-17	5.82	294.4	1.56	824	412	0	3.3	26.94	11.1	13	13.3	0.062	<3.1	26																	
Jan	12-Jan-17	7.59	231.8	0.60	838	420	0	8.5	27.21																							
Jan	13-Jan-17	7.85	189.4	0.26	835	417	0	4.6	27.02																							
Jan	14-Jan-17																															
Jan	15-Jan-17																															

MJTD

Monitoring Parameters Result for STP(Phase-2)

Month	Date	Outlet																												
		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	Formal-dehyde	Phenols
		Daily Parameters								Weekly Parameters						Monthly Parameters																
Standard		5.0 - 9.0	-	-	-	Max 2,000	-	Max 60	Max 40	Max 200	Max 400	Max 80	Max 2	Max 5	Max 30	Max 0.2	Max 0.5	Max 0.25	Max 0.005	Max 0.03	Max 0.02	Max 0.2	-	-	Max 5	Max 1	Max 1	Max 0.2	Max 1	Max 1	Max 1	Max 1
Unit		-	-	-	-	ppm	-	ppm	°C	ppm	MNP/100ml	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	-	-	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Jan	16-Jan-17	7.72	255.6	4.68	862	431	0	4.8	26.68																							
Jan	17-Jan-17	7.91	240.4	4.87	873	437	0.4	3.7	27.12																							
Jan	18-Jan-17	7.42	242.4	4.92	916	458	0	2.7	27.18	0	2	16	0.054	<3.1	2																	
Jan	19-Jan-17	7.76	191	4.75	927	464	0	5.2	27.09																							
Jan	20-Jan-17	7.9	194.9	4.81	936	468	8.8	10.6	27.08																							
Jan	21-Jan-17																															
Jan	22-Jan-17																															
Jan	23-Jan-17	8.53	135.8	4.63	924	462	0	4.4	27.3																							
Jan	24-Jan-17	8.65	177.9	4.87	933	466	0	4.2	27.73																							
Jan	25-Jan-17	8.84	172.5	5.02	973	486	0	6.1	27.77	0	<1.8	15.8	0.094	<3.1	10																	
Jan	26-Jan-17	8.56	183.3	6.23	983	494	0	6.2	27.94																							
Jan	27-Jan-17	8.79	208.6	4.33	997	499	0	7.7	27.91																							
Jan	28-Jan-17																															
Jan	29-Jan-17																															
Jan	30-Jan-17	8.77	137.7	5.11	1071	536	0	7.4	27.81																							
Jan	31-Jan-17	8.76	201.7	5.16	1094	547	0.2	12	27.4																							
Feb	1-Feb-17	8.15	314.2	5.12	1037	518	0	2.1	27.79	0	<1.8	16.5	0.075	<3.1	4	0.004	≤0.002	≤0.01	≤0.0009	≤0.001	≤0.01	≤0.002	1.72	1	0.574	0.036	0.014	0.07	<0.005	0.3	0.009	<0.002
Feb	2-Feb-17	7.77	204.9	5.38	973	486	25.4	11.3	27.91																							
Feb	3-Feb-17	8.48	161.7	4.75	991	496	0.2	6.4	27.89																							
Feb	4-Feb-17																															
Feb	5-Feb-17																															
Feb	6-Feb-17	8.3	139.1	5.26	1049	524	1.1	5.8	28.04																							
Feb	7-Feb-17	8.61	106.5	5.30	1024	512	0	5.7	27.2																							
Feb	8-Feb-17	8.62	161.7	5.14	994	496	1.3	4.1	27.84	0	<1.8	16.7	0.095	<3.1	6																	
Feb	9-Feb-17	8.92	390.8	8.06	932	466	0	1.1	27.8																							
Feb	10-Feb-17	8.19	496.9	7.82	882	441	0	1.6	27.74																							
Feb	11-Feb-17																															
Feb	12-Feb-17																															
Feb	13-Feb-17	8.66	175.8	8.12	782	391	6.5	6.2	28.28																							
Feb	14-Feb-17	8.77	198.1	6.41	776	388	0.4	6	28.08																							
Feb	15-Feb-17	8.79	370.3	6.31	783	392	0	6.5	28	0	<1.8	16.5	0.115	<3.1	2																	
Feb	16-Feb-17	9.07	301.3	6.95	785	392	0.9	5.4	27.97																							
Feb	17-Feb-17	8.91	284	5.73	809	405	10.9	11.4	28.12																							
Feb	18-Feb-17																															
Feb	19-Feb-17																															
Feb	20-Feb-17	8.91	345.9	6.57	774	387	0	4.9	28.19																							
Feb	21-Feb-17	8.85	256.2	6.12	794	397	0.2	5.8	28.16																							
Feb	22-Feb-17	8.75	209	5.76	806	403	0.6	6.3	28.34	0	<1.8	17	0.079	<3.1	2																	
Feb	23-Feb-17	8.82	290.6	5.81	827	413	0	2.7	28.09																							
Feb	24-Feb-17	8.89	188.7	6.19	842	421	0	4	29.04																							
Feb	25-Feb-17																															
Feb	26-Feb-17																															
Feb	27-Feb-17	8.79	334.1	7.01	855	427	0	6	27.89																							
Feb	28-Feb-17	8.72	178.5	6.32	867	433	0.6	2.2	28.18																							
Mar	1-Mar-17	8.77	241.5	6.16	861	430	1.1	5.7	28.99	0	<1.8	19.2	0.071	<3.1	6	0.008	≤0.002	≤0.01	≤0.002	≤0.001	≤0.01	≤0.002	0.95	1.4	0.024	≤0.002	≤0.001	0.004	0.011	0.2	0.011	0.004
Mar	2-Mar-17																															
Mar	3-Mar-17	8.82	177.2	6.70	824	412	0	5	28.5																							
Mar	4-Mar-17																															
Mar	5-Mar-17																															
Mar	6-Mar-17	8.97	160.1	7.15	807	404	0.1	5.6	28.47																							
Mar	7-Mar-17	8.83	169.3	5.92	846	423	0	6.8	28.37																							
Mar	8-Mar-17	8.73	435.8	5.72	846	423	0.2	9.2	28.82	0.7	<1.8	15.5	0.09	<3.1	10																	
Mar	9-Mar-17	8.54	347	6.02	858	429	0	9.1	29.11																							
Mar	10-Mar-17	8.7	419.8	4.43	887	444	0	4.6	29.2																							
Mar	11-Mar-17																															
Mar	12-Mar-17																															
Mar	13-Mar-17	8.02	448.1	8.53	890	444	0	3.1	29.38																							
Mar	14-Mar-17	8.92	191.1	6.30	847	423	1.2	11.7	29.73																							
Mar	15-Mar-17	8.28	568.3	6.09	748	374	2.4	12.6	29.35	0	<1.8	13.3	0.086	<3.1	4																	
Mar	16-Mar-17	8.77	468.4	5.04	740	370	0	6	29.29																							
Mar	17-Mar-17	8.73	440.2	5.95	727	363	0.1	7.2	29.4																							
Mar	18-Mar-17																															
Mar	19-Mar-17																															
Mar	20-Mar-17	8.95	483.5	6.53	681	341	0.3	7	29.32																							
Mar	21-Mar-17	8.9	475	5.63	742	371	2.6	11.2	29.43																							
Mar	22-Mar-17	8.79	430.1	5.53	744	372	3.7	6.7	29.56	0	<1.8	8.9	0.153	<3.1	6																	
Mar	23-Mar-17	8.74	447.9	5.65	743	372	0	4.1	29.37																							
Mar	24-Mar-17	8.75	300.9	5.22	748	375	10.9	8.9	29.4																							
Mar	25-Mar-17																															
Mar	26-Mar-17																															
Mar	27-Mar-17																															
Mar	28-Mar-17	8.75	330	6.51	761	342	0	4.5	28.47																							
Mar	29-Mar-17	8.97	445	5.71	755	375	0.4	4.2	28.5	0	<1.8	13.9	0.11	<3.1	6																	
Mar	30-Mar-17	8.9	370.2	5.53	745	371	2.6	8.2	29.56																							
Mar	31-Mar-17	8.51	350.2	5.65	744	375	1.7	3.9	29.4																							

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

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

Appendix

Ground Subsidence Monitoring Status

(Location- Admin Complex Compound)

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
Jul	15-Jul-16	+7.137	+7.137	0.000	
	22-Jul-16	+7.137	+7.136	-0.001	
	29-Jul-16	+7.137	+7.136	-0.001	
Aug	5-Aug-16	+7.137	+7.136	-0.001	
	12-Aug-16	+7.137	+7.136	-0.001	
	19-Aug-16	+7.137	+7.136	-0.001	
	26-Aug-16	+7.137	+7.136	-0.001	
Sept	2-Sep-16	+7.137	+7.136	-0.001	
	9-Sep-16	+7.137	+7.136	-0.001	
	16-Sep-16	+7.137	+7.136	-0.001	
	23-Sep-16	+7.137	+7.136	-0.001	
	30-Sep-16	+7.137	+7.136	-0.001	
Oct	7-Oct-16	+7.137	+7.136	-0.001	
	14-Oct-16	+7.137	+7.136	-0.001	
	21-Oct-16	+7.137	+7.136	-0.001	
	28-Oct-16	+7.137	+7.136	-0.001	
Nov	4-Nov-16	+7.137	+7.136	-0.001	
	11-Nov-16	+7.137	+7.136	-0.001	
	18-Nov-16	+7.137	+7.136	-0.001	
	25-Nov-16	+7.137	+7.138	+0.001	
Dec	2-Dec-16	+7.137	+7.136	-0.001	
	9-Dec-16	+7.137	+7.136	-0.001	
	16-Dec-16	+7.137	+7.135	-0.002	
	23-Dec-16	+7.137	+7.133	-0.004	
	30-Dec-16	+7.137	+7.133	-0.004	
Jan	6-Jan-17	+7.137	+7.134	-0.003	
	13-Jan-17	+7.137	+7.134	-0.003	
	20-Jan-17	+7.137	+7.134	-0.003	
	27-Jan-17	+7.137	+7.134	-0.003	
Feb	3-Feb-17	+7.137	+7.134	-0.003	
	10-Feb-17	+7.137	+7.134	-0.003	
	17-Feb-17	+7.137	+7.134	-0.003	
	24-Feb-17	+7.137	+7.134	-0.003	
Mar	3-Mar-17	+7.137	+7.134	-0.003	
	10-Mar-17	+7.137	+7.134	-0.003	
	17-Mar-17	+7.137	+7.128	-0.009	After earthquake
	24-Mar-17	+7.137	+7.128	-0.009	
	31-Mar-17	+7.137	+7.128	-0.009	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

Appendix

Accident or Incident Case Record

September 2016 – March 2017

Date : 3 November 2016

Description : Oil and Grease found in the Retention Pond

Issue

MJTD found the oil and grease in retention pond when water quality monitoring at 18 October 2016 and reported to OSSC at once.

Figure 1 Found the oil and grease in SW-1 (retention pond discharge)

Figure 2 Found oil and grease around the box culvert (But cannot see in photo because of the thin layer of oil is dispersed on water)

Figure 3 Construction Site near around the box culvert

Action

1. Takes the action by closing the discharge gate of retention pond immediately because oil contaminated water may gradually release or discharge the retention pond and may effect to the villager who is living near the creek. The next day (19th October 2016) as MJTD planned schedule of weekly monitoring for SW-1 (retention pond discharge) and collected the sample and sent to the laboratory. Weekly result from SW-1 for that result, MJTD plan to check whether it was comply with the standard. Please see the below table 2.1
2. In 19th October 2016, cooperation with Environmental Section from OSSC and checking around the retention pond again and remind to construction near that area for not to dispose or discharge into the drain directly.
3. TSMC instructs MJTD to implement the following action:
   - Oil removal and discharging water from retention pond as long as MJTD can control flood.
   - Additional water quality monitoring - take the sample from SW-1(discharging point of retention pond) and analysis parameter of oil and grease and other bi-monthly monitoring parameters after removal of oil (before discharging water to the outside cannel).
   - To install simple oil fence, oil removal mat or oil catcher to take action such incident in future to prevent such kind of incident.

Table 2.1 Water Quality Monitoring Result (Before and After Discharging)

No	Parameters	Standards	Units	Storage in Retention Pond	Discharging	
					Before	After
Date				19-Oct-16	26-Oct-16	2-Nov-16
1	COD(Cr)	60	ppm	2020	3.5	< 0.7
2	BOD(5)	200	ppm	322.6	1.8	0.6
3	Total Coliform	400	MPN/100ml	160000	160000	160000
4	Total-Nitrogen	80	ppm	3	2.9	5.3
5	Total-Phosphorus	2	ppm	0.663	0.507	0.522
6	Oil and Grease	5	ppm	421.4	8.8	4.73
7	Suspended Solids	30	ppm	350	346	402

In the water quality monitoring at SW-1 (Retention Pond Discharge Point), parameters (COD, BOD, Total Coliform, Oil and Grease and Suspended Solids) are excess than the standards when the oil and grease found in the retention pond at 18 October 2016. According to the sample of result before discharging and after discharging, COD and BOD is rapidly lower than the standard and oil and grease is slightly decreased than the standard. In the MJTD water quality monitoring result, total coliform and suspended solids are higher than the standards since the start of weekly monitoring from September 2016. In conclusion, total coliform and suspended solids are higher than the standards is not concerned to the spillage of oil and grease issue.

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

FREE TRADE INTEGRATED LOGISTICS LIMITED

Lot No. B-18-2, Zone A, Thilawa Special Economics Zone, Thanlyin Township, Yangon, Myanmar.
Phone No: 01-2306666, 01-2305770, Fax: 01-503832

FIRE INCIDENT REPORT

Date: 30-3-2017

To : Officer and General Manager

Operations Department

Myanmar Japan Thilawa Development Limited

From: Free Trade Integrated Logistics Limited. B 18-2, Zone A, TSEZ

Gas cutter cutting the packing frame causes SWP Panel fire

At (9-3-2017)11:30 am Thursday, gas cutter (U Ye Lin Naung) cutting the packing frame causes SWP Panel fire as fire spark touch to panel at B 18-2, Zone A, TSEZ. Immediately, we inform to MJTD office and call firefighters from MJTD and fire department. Soon after arrival, flames were coming through the pile of SWP panel. Firefighters acted quickly and were able to extinguish the fire in about 30 minutes.

When cutting packing frame with GAS Cutter (propane), some fire spark touch to SWP Panel and caused this fire. The occupants of this work immediately tried to extinguish the fire with an extinguisher (ABC), watering from fire water tank to this fire before coming Fire department and water boxer. When firefighter (MJTD, SUNTAX and Fire Department) coming they extinguish the fire and fire stopped at 12:10am.

We prepare safety plan before this job such as fire extinguisher. No other injuries for the cases.

We are sorry for the cases in MJTD complex to all other locators and MJTD.

We lists out lost materials as follow:

Sr. No	Item	No.	Quantity	Units	Remark
1	Flashings	244		No.	
2	Insulated Puff Panels Super wall 100mm		1965.535	Sqm	
3	Insulated Puff Panels Super wall 50mm		578.64	Sqm	
4	Insulated Puff Panels Glamet 50mm		1822.14	Sqm	
5	Column Assembly	9	5691.6	Kgs	
6	Mezz: Beam Assembly	2	1663.4	Kgs	
7	Mezz: Column Assembly	3	2140.8	Kgs	
8	Roll up Door Cover	10		No	
9	Rope Sealant Tape (5x22)	780		No	

FREE TRADE INTEGRATED LOGISTICS LIMITED

Lot No. B-18-2, Zone A, Thilawa Special Economics Zone, Thanlyin Township, Yangon, Myanmar.
Phone No: 01-2306666, 01-2305770, Fax: 01-503832

10	Single Skin Curved Sheet	42		No	
11	Sturt Beam Assembly	16	1607.8	Kgs	
12	40FT Container	2		No	

We prepared counter measure for the fire case. We hereby submit the following document of counter measure plan for a fire safety in B 18-2, Zone A, TSEZ.

Free Trade Integrated Logistics Ltd.

Attachments:

a) Layout plan for Fire Extinguisher.

b) Layout plan for firefighting water tank.

c) Assembly Point Plan

d) Hot Work Yard

e) Incident operation procedure (fire safety plan)

f) Contact Person and number

Applicant

Signature

Name U Myint Lwin (Director)

Address No.82/84, Banyadala Street, Mingalar Taung Nyunt Tsp, Yangon, Myanmar.

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Fire Safety Plan

The fire safety plan include

1) The designation and organization of site personnel to carry out fire safety duties, including fire watch service if applicable,
2) The emergency procedures to be used in the case of fire,
3) Sounding the fire alarm,
4) Notifying the fire department,
5) Notifying the MJTD office,
6) Instruction site personnel on procedures to be followed when the alarm sounds, and
7) Fire fighting procedure,
8) The control of the fire hazards in and around the site,
9) Maintenance of the fire fighting facilities,
10) Follow emergency evacuation

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Contact Person and Number (YANGON CREATION GROUP CO., LTD.)

Sr. No	Name	Position	Ph No.	Email	Remarks
1	U Myint Lwin	Director	095146300	myintlwin35@gmail.com	
2	U Kyaw Nyein	Senior Project Manager	095144887	kyawnyain@gmail.com	
3	U Tin Aung Win	Project Manager	09254452415	tinaungwin36@gmail.com	
4	U Zaw Win	Project Engineer	09254897673		
5					
6					

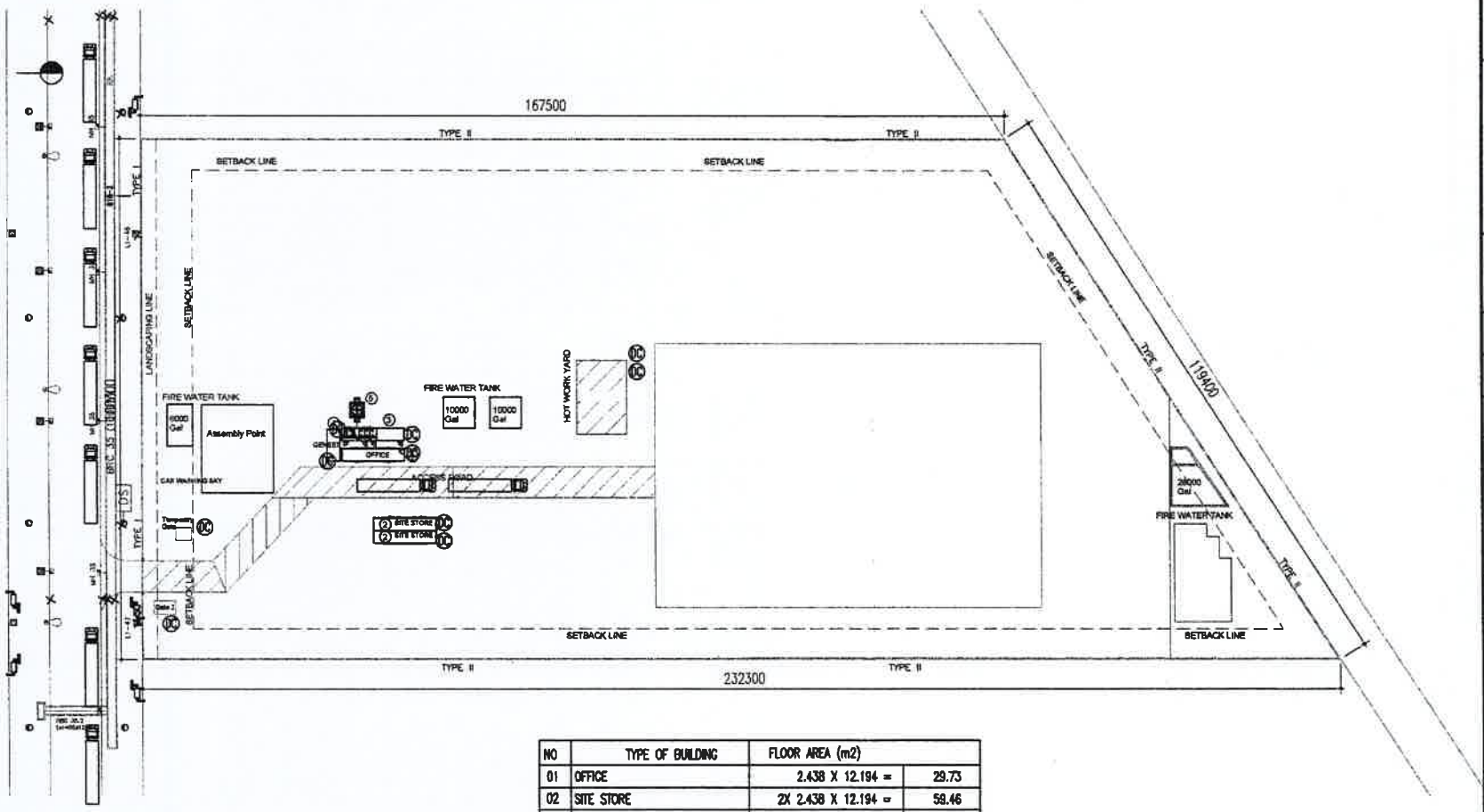
Contact Person and Number (MJTD)

Sr. No	Name	Position	Ph No.	Email	Remarks
1	U Zay Yar Tway	Senior Mechanical Engineer	09421072136	zayar@mjtd.com.mm	
2	Daw Thant Nandar Yin	Civil engineer	09252386641	thantnandaryin@mjtd.com.mm	
3	Daw Thwe2 Myint Aung	Assisant Manager	09798484863	Thwethwe.mjtd@gmail.com	
4	U Thura Win		09799522165	thurawin@mjtd.com.mm	
5					

Contact Person and Number (Fire Department)

Sr. No	Name	Position	Ph No.	Email	Remarks
1	Fire Services Dept:		01-664080, 01-656644, 01-584060, 01-254000		
2					
3					

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD



NO	TYPE OF BUILDING	FLOOR AREA (m2)	
01	OFFICE	2.438 X 12.194 =	29.73
02	SITE STORE	2X 2.438 X 12.194 =	59.46
03	TOILET & CANTEEN	2.438 X 12.194 =	29.73
04	GENSETS (GENERATOR ROOM)	2.438 X 6.00 =	14.63
05	SEPTIC TANK	2.756 X 3.056 =	8.42
	TOTAL FLOOR AREA		
	FLOOR AREA RATIO		

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

(DC) = 5/3/2 KG ABC DRY POWDER

Owner / Application

FREE TRADE INTEGRATED LOGISTICS LIMITED

Lot No. B-18-2, Zone A, Thilawa Special Economic Zone, Thanlyin Township, Yangon, Myanmar.
Ph: 01 2306666, 01 2305770, Fax: 01:503832

Project	LOGISTICS PROJECT	
	Block No.	Zone A
	Lot No.	B-18-2
Thilawa Special Economic Zone		
Subject	Temporary Layout plan	
Scale		Sheet No.
Date		

End of Document

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD