MJTD

Thilawa Special Economic Zone (Zone B) Development

Environmental Monitoring Report Phase-1 and 2 (Operation Phase)

Myanmar Japan Thilawa Development Limited.

September 2020

CONTENTS

Appendix

1. Executive Summary

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

The monitoring record from February 2020 to August 2020 according to the Environment Monitoring Plan is submitted in conformity with the provision of Chapter 10, 10.1 Table 10.1-3 and 10.2, Table 10.2-3 Content of the EIA Report of Thilawa SEZ Development Project (Zone B).

2. Summary of Monitoring Activities

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

We submitted EMP for TSEZ Zone-B as following table.

Report No.	Description	Phase	Submission
1	Environmental Monitoring Report	Phase-1 Operation Phase	September, 2019
2	Environmental Monitoring Report	Phase-1 & 2 Operation Phase	March, 2020
3	Environmental Monitoring Report	Phase-1 & 2 Operation Phase	September, 2020

Report (No.3 is submitted this day attached with Operation Phase implementation schedule. Subsequent Operation Phase reports will be submitted on Bi-annually.

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

None

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

- Depend on the exceeding parameters and situation

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

Please refer to the attached Environmental Monitoring Form.

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 construction phase implemented according to the following table, reference on Table 10.2-3, Chapter 10, EIA for Industrial Area of Zone-B.

Monitoring Plan (Operation Phase)

Category	Item	Location	Frequency	Remark
Air Quality	NO_x, SO_x, CO, $PM_{2.5}$, PM_{10}	Representative point inside the project area	1 week each in the dry and rainy seasons	June 2019, Air Quality Monitoring Report
Water Quality	Water temperature, pH, SS, DO, BOD5, COD, color and odor, Total Nitrogen, Total Phosphorus, Sulphide, HCN, Oil, Grease, Formaldehyde, Phenols, Free chlorine, Zinc, Chromium, Arsenic, Copper, Mercury, Cadmium, Barium, Selenium, Lead, and Nickel	Outflow of retention pond to the creek (at least 3 sampling points/mixing point: discharge water, upstream water, and downstream water)	Every 2 month: Water temperature, pH, SS, DO, BOD5, COD, color and odor, Every 6 month :all parameters	February, April 2020 Water and Wastewater Quality Monitoring Report (Bi-monthly report) June 2020 Water and Wastewater Quality Monitoring Report (Bi-annually report)
Waste	-Amount of Non-hazardous waste management -Amount of hazardous waste management	Each Tenant	Twice/year (submission of the environmental report by the tenants)	General waste disposal record (Waste generated from common area of TSEZ and Admin complex)
Soil Contamination	-Status of control of solid and liquid waste which causes soil contamination	Each Tenant	Twice/year (Submission of the environmental report by the tenants)	
Noise and Vibration	- Noise and vibration level - Traffic Count	Tenants including Project Proponent	One time each in the dry and rainy seasons	Noise and Vibration Monitoring Report, June 2020 Traffic Count Monitoring Report June 2020
Bottom Sediment	-Water quality monitoring (as indicator of the pollution of the bottom sediment)	Same as the water quality monitoring	-Additional analysis on the bottom sediment of creek, in case of finding continuous high concentration	Refer in Environmental Monitoring report
Hydrological Situation	-Checking the function of retention pond at heavy rain	Retention Pond	When the heavy rain	
Living and Livelihood/ Vulnerable Group/ Misdistribution of Benefit and Damage/ Children's Right	-The implementation status for CSR activities such as community support program	Around Project Site	Once/year	Refer in Environmental Monitoring report
Risks for Infections Disease such as AIDS/HIV	-Status of measure against infectious diseases	Each tenant	Twice/year (Submission of the environmental report by the tenants	Refer in Environmental Monitoring report
Occupational Health and Safety	-Record of accident and infectious diseases	Work site and office	Twice/year (Submission of the environmental report by the tenants)	Refer in Environmental Monitoring form
Community Health and Safety	Record of accidents and infectious diseases refared to the community	Around the project site	Twice/year	Refer in Environmental Monitoring form
	The implementation status for CSR activities such as community support program	Around project site	Once/year	Refer in Environmental Monitoring form

Category	Item	Location	Frequency	Remark
Usage of Chemicals	Record of the type and quantity of chemicals and implementation status of control measures through self-inspection	Each tenant (that uses chemicals)	Biannually	Refer in Environmental Monitoring form

*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 B– Phase 1 & 2 (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 (Industrial Area of Zone B). 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

Name of permits	Expected issuance date	Actual issuance date	Concerned authority	Remarks (Conditions, etc.)
Approved letter for Environmental Impact Assessment (EIA) Report of Industrial Area, Thilawa Special Economic Zone (Zone-B)		29th December 2016	Thilawa SEZ Management Committee	
Notification of the comments of Ministry of Natural Resources and Environmental Conservation regarding with the Standard Change of Wastewater Quality of Industrial Zone, Internal Regulations of Thilawa SEZ Zone-A and Zone-B	5th January 2018	10th January 2018	Thilawa SEZ Management Committee	

3) Response/Actions to Comments and Guidance from Government Authorities and the Public

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

(2) Monitoring Results

1) Ambient Air Quality (June 2020)

NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max)	Country's Standard	Target value to be applied*1	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
AQ-1	NO_2	mg/m³	0.029	0.095	0.2 mg/m³ (1 Hour)	0.1 mg/m³ (24 Hour)	-	One time / 6 months	Haz-Scanner EPAS	Refer to air quality report
	SO_2*2	mg/m³	0.043	0.514	0.02 mg/m³ (24 Hours)	0.02 mg/m³ (24 Hours)	-			
	CO	mg/m³	0.03	0.063	-	10.26 mg/m³ (24 Hours)	-			
	PM2.5	mg/m³	0.01	0.01	0.025 mg/m³ (24 Hours)	0.025 mg/m³ (24 Hours)	-			
	PM10	mg/m³	0.016	0.074	0.05 mg/m³ (24 Hours)	0.05 mg/m³ (24 Hours)	-			

*1**Remarks:** Referred to the tentative target value of ambient air quality (EIA Report for industrial area, Table 2.4-1), Reference to the air quality monitoring report (June 2020)

*2**Remarks:** The result of SO2 in AQ1 is excess than target value due to four expected reasons i) combustion of fuel from nearby roads ii) operation activities of Thilawa Port iii)

operation activities of local industrial zone iv) construction activities of Zone-B. Countermeasure for construction activities of Zone-B follow up as per recommendation in monitoring report.

Complaints from Residents

- Are there any complaints from residents regarding air quality in this monitoring period? ☐ Yes ☑ No
If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Complaints from Residents	Countermeasures

2) (a) Water Quality – February 2020

Measurement Point: Effluent of Wastewater (SW-2 and SW-4 are attached as reference point only and they are natural creek water which are combine all the wastewater from the Local industrial water and domestic water from existing living environment. SW-7 is the main discharging point. GW-2 is also as reference point for monitoring of existing tube well located in the Monastery Compound near Zone-B area)

- 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 (Max)	Country's Standard*2	Target value to be applied*1	Frequency	Method	Note (Reason of excess of the standard)
SW-2 (reference point)	Temperature	°C	25	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.9	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L	44	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	2.03	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.01	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	48	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100 ml	24,000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease		<3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Color	TCU	22.19	-	150		APHA 2120C Method	
	Odor	TON	2	-	-		APHA 2150 B Method	
	Total Dissolved solids (TDS) *6	mg/L	946	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180 C)	
	Iron*6	mg/L	1.610	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*6	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
SW-4 (reference point)	Temperature	°C	28	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	
	pH*5	-	9.6	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	64	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	8.79	-	-		Instrument Analysis Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	BOD_5	mg/L	6.27	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	35.3	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	Refer to
	Total Coliform	MPN/100 ml	140	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	water quality
	Oil and Grease	mg/L	<3.1	10	10		APHA 5520 B (partition Gravimetric Method)	report
	Color	TCU	7.85	-	150		APHA 2120C Method	
	Odor	TON	2	-	-		APHA 2150 B Method	
	Total Dissolved solids (TDS)*4, *5	mg/L	3762	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron *6	mg/L	1.148	3.5	3.5		APHA 3120 B (Indiactively Coupled Plasma (ICP) Method)	
	Mercury*6	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Temperature	°C	33	< 3 (increase)	≤ 35		Instrument Analysis Method	
	pH*3	-	9.3	6-9	6.0 - 9.0		Instrument Analysis Method	
	SS*3	mg/L	56	50	50		APHA 2540D (Dry at 103-105°C Method)	Refer to
SW-7	DO	mg/L	7.91	-	-	Once per	Instrument Analysis Method	water
(Discharge	BOD_5	mg/L	6.10	50	30	2 months	APHA 5210 B (5days BOD Test)	quality
d Point)	COD_{Cr}	mg/L	32.5	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	report
	Total Coliform*4	MPN/100 ml	1400	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Color	TCU	5.13		150		APHA 2120C Method	
	Odor	TON	2		-		APHA 2150 B Method	
	Total Dissolved solids (TDS) *6,*3	mg/L	3798	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron*6	mg/L	1.516	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*4	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
GW-2 (reference point)	Temperature	℃	31	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.3	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L	2	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	3.87	-	-		Instrument Analysis Method	
	BOD_5	mg/L	0.81	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	< 0.7	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100 ml	33	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Color	TCU	3	-	150		APHA 2120C Method	
	Odor	TON	1	-	-		APHA 2150 B Method	
	Total Dissolved	mg/L	128	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	solids (TDS) *5							
	Iron*7,*9	mg/L	7.050	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*9	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	

*1Remark: Reference to the Water and Wastewater Quality Monitoring Report (February 2020)

*2Remark: Referred to the National Emission Quality Guideline (NEQG) 29th December 2015

*5Remark: For the monitoring point of SW-4 and SW-7, the result of SS exceeded and SW-7 the result of TDS exceeded than the target value due to three expected reasons i) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ, and ii) influence by water from the downstream due to flow back by tidal fluctuation iii) surface water run-off from bare land in Zone B.

*8Remark: For the monitoring point of SW2 and SW-7, the result of total coliform exceeded than the target value due to three expected reasons i) natural bacteria existed in discharged creek because there are various kinds of vegetation of creature such as birds, and small animals in and along the discharged creek and retention pond ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect. Total coliforms do not affect human health directly, self-monitoring was carried out to identify health impact by coliform bacteria. As for the result of E-Coli SW-7 was 4. It is considered that there is no significant impact to human health.

*5 Remark: For the monitoring point of SW-4 and SW-7, the result of pH exceeded due to expected reason i) might be wastewater discharged that contains detergents and soap-based products from the squatter houses, and ii) might be wastewater discharged from local industrial zone.

*6 Remark: Recommendation from JICA Environmental expert (TSMC), to be more emphasized on Environmental and analyzing only.

*7 Remark: For the monitoring point of GW-2, the results of iron exceeded due to expected reason i) it may be due to corrosion of pipe because the water is pumped through the iron pipelines buried underneath the ground.

2) (a) Water Quality – April 2020

Measurement Point: Effluent of Wastewater (SW-2 and SW-4 are attached as reference point only and they are natural creek water which are combine all the wastewater from the Local industrial water and domestic water from existing living environment. SW-7 is the main discharging point. GW-2 is also as reference point for monitoring of existing tube well located in the Monastery Compound near Zone-B area)

- 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 (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
SW-2 (reference point)	Temperature	°C	27	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH*3	-	9.7	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	116	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.85	-	-		Instrument Analysis Method	
	BOD_5	mg/L	23.38	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	83	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100 ml	1300	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease		<3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Color	TCU	24.79	-	150		APHA 2120C Method	
	Odor	TON	2	-	-		APHA 2150 B Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequency	Method	Note (Reason of excess of the standard)
	Total Dissolved solids (TDS) *6	mg/L	1878	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180 C)	
	Iron*6	mg/L	2.660	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*6	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
SW-4 (reference point)	Temperature	℃	30	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	8.6	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	276	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	8.74	-	-		Instrument Analysis Method	
	BOD_5	mg/L	21	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	64	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100 ml	54000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	<3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Color	TCU	10.63	-	150		APHA 2120C Method	
	Odor	TON	2	-	-		APHA 2150 B Method	
	Total Dissolved solids (TDS)*6	mg/L	714	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180 C)	
	Iron*5, *6	mg/L	10.54	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*6	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequency	Method	Note (Reason of excess of the standard)
SW-7 (Discharged Point)	Temperature	°C	35	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	9	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	92	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	13.63	-	-		Instrument Analysis Method	
	BOD_5	mg/L	14.83	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	41	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100 ml	7900	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Color	TCU	4.84	-	150		APHA 2120C Method	
	Odor	TON	1.4	-	-		APHA 2150 B Method	
	Total Dissolved solids (TDS) *3,*5	mg/L	4042	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron*6	mg/L	2.286	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*6	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
GW-2	Temperature	°C	27	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.1	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L	4	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	8.5	-	-		Instrument Analysis Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
(reference point)	BOD_5	mg/L	3.29	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	2.4	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100 ml	23	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Color	TCU	24.95	-	150		APHA 2120C Method	
	Odor	TON	1	-	-		APHA 2150 B Method	
	Total Dissolved solids (TDS) *3	mg/L	146	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron*3,*4	mg/L	4.998	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*3	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	

*1Remark: Reference to the Water and Wastewater Quality Monitoring Report (April 2020)

*2Remark: Referred to the National Emission Quality Guideline (NEQG) 29th December 2015

*3Remark: For the monitoring point of SW2,SW-4 and SW-7, the result of SS exceeded and SW-7 results of TDS exceeded than the target value due to three expected reasons i) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ, and ii) influence by water from the downstream due to flow back by tidal fluctuation iii) surface water run-off from bare land in Zone B.

*4Remark: For the monitoring point of SW2, SW-4 and SW-7 the result of total coliform exceeded than the target value due to three expected reasons i) natural bacteria existed in discharged creek because there are various kinds of vegetation of creature such as birds, and small animals in and along the discharged creek and retention pond ii)

wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect. Total coliforms do not affect human health directly, self-monitoring was carried out to identify health impact by coliform bacteria. As for the result of E-Coli SW-7 was 2. It is considered that there is no significant impact to human health.

*5 Remark: For the monitoring point of SW-4, the result of iron exceeded than the target value due to the influence of natural origin i) iron is used as a construction material and in the rainy season the water run-off from the construction sites may contain iron particles ii) influence of natural origin (iron can reach out from soil by run-off)

*6 Remark: Recommendation from JICA Environmental expert (TSMC) , to be more emphasized on Environmental and analyzing only.

*7 Remark: For the monitoring point of GW-2, the results of iron exceeded due to expected reason i) it may be due to corrosion of pipe because the water is pumped through the iron pipelines buried underneath the ground.

*8 Remark: For the monitoring point of SW-2, the result of pH exceeded due to expected reason i) might be wastewater discharged that contains detergents and soap-based products from the squatter houses, and ii) might be wastewater discharged from local industrial zone.

2) (b) Water Quality – June 2020

Measurement Point: Effluent of Wastewater (SW-2 and SW-4 are attached as reference point only and they are natural creek water which are combine all the wastewater from the Local industrial water and domestic water from existing living environment. SW-7 is the main discharging point. GW-2 is also as reference point for monitoring of existing tube well located in the Monastery Compound near Zone-B area)

- 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 (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	Temperature	°C	28	< 3 (increase)	≤ 35		Instrument Analysis Method	
	pH	-	8.2	6-9	6–9	Once per	Instrument Analysis Method	Refer to water
	SS*3	mg/L	104	50	Max 50	6 months	APHA 2540 D Method	quality report
	DO	mg/L	8.41	-	-		Instrument Analysis Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
SW-2 (reference point)	BOD (5)	mg/L	15.12	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	64.0	250	Max 125		APHA 5220D Method	
	Total Coliform*3	MPN/100 ml	35000	400	Max 400		APHA 9221B Method	
	T-N	mg/L	3.5	-	Max 80		HACH Method 10072 Method	
	T-P	mg/L	0.29	2	Max 2		APHA 4500-P E Method	
	Color	TCU	21.45	-	Max 150		APHA 2120C Method	
	Odor	TON	1.4	-	-		APHA 2150 B Method	
	Oil and Grease	mg/L	3.3	10	Max 10		APHA 5520B Method	
	Mercury	mg/L	≤ 0.002	0.01	Max 0.005		APHA 3120 B Method	
	Zinc	mg/L	0.026	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.01	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	0.008	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.002	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.01	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.002	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	0.052	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	0.002	0.5	Max 0.2		APHA 3120 B Method	
	Cyanide	mg/L	< 0.002	0.1	Max 0.1		HACH 8027 Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	Total Cyanide	mg/L	< 0.002	1	Max 1		APHA 4500-CN-C Method	
	Free Chlorine	mg/L	0.2	-	Max 1		APHA 4500-CL G Method	
	Sulphide (S_1 -)	mg/L	0.098	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.074	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	0.007	0.5	Max 0.5		USEPA Method 420.1	
	Iron	mg/L	2.000	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids	mg/L	790	-	Max 2000		APHA 2540 C Method	
	Total Residual Chlorine	mg/L	0.2	0.2	Max 0.2		APHA 4500-CL G Method	
	Chromium (Hexavalent)	mg/L	< 0.05	0.1	Max 0.1		ISO 11083:1994 Method	
	Ammonia	mg/L	0.19	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.190	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Temperature	°C	26	< 3 (increase)	≤ 35		Instrument Analysis Method	
	pH	-	7.2	6-9	6~9		Instrument Analysis Method	
	SS*3	mg/L	92	50	Max 50	Once per	APHA 2540 D Method	
	DO	mg/L	5.01	-	-	6 months	Instrument Analysis Method	
	BOD (5)	mg/L	8.50	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	27.0	250	Max 125		APHA 5220D Method	Refer to water

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
SW-4 (reference point)	Total Coliform*4	MPN/100 ml	24000	400	Max 400		APHA 9221B Method	quality report
	T-N	mg/L	2.6	-	Max 80		HACH Method 10072 Method	
	T-P	mg/L	< 0.05	2	Max 2		APHA 4500-P E Method	
	Color	TCU	4.71	-	Max 150		APHA 2120C Method	
	Odor	TON	1.4	-	-		APHA 2150 B Method	
	Oil and Grease	mg/L	< 3.1	10	Max 10		APHA 5520B Method	
	Mercury	mg/L	≤ 0.002	0.01	Max 0.005		APHA 3120 B Method	
	Zinc	mg/L	0.068	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.01	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	0.028	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.002	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.01	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.002	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	0.016	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	0.118	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	0.016	0.5	Max 0.2		APHA 3120 B Method	
	Cyanide	mg/L	< 0.002	0.1	Max 0.1		HACH 8027 Method	
	Total Cyanide	mg/L	< 0.002	1	Max 1		APHA 4500-CN-C Method	
	Free Chlorine	mg/L	< 0.1	-	Max 1		APHA 4500-CL G Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	Sulphide (S_2 -)	mg/L	0.103	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.030	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	0.009	0.5	Max 0.5		USEPA Method 420.1	
	Iron*5	mg/L	4.390	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids*3	mg/L	2392	-	Max 2000		APHA 2540 C Method	
	Total Residual Chlorine	mg/L	< 0.1	0.2	Max 0.2		APHA 4500-CL G Method	
	Chromium (Hexavalent)	mg/L	< 0.05	0.1	Max 0.1		ISO 11083:1994 Method	
	Ammonia	mg/L	0.91	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.327	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Temperature	°C	30	< 3 (increase)	≤ 35		Instrument Analysis Method	
	pH	-	8.4	6-9	6~9		Instrument Analysis Method	
	SS*3	mg/L	188	50	Max 50		APHA 2540 D Method	
	DO	mg/L	8.72	-	-	Once per	Instrument Analysis Method	Refer to water
	BOD (5)	mg/L	10.59	50	Max 30	6 months	APHA 5210 B Method	quality report
	COD (Cr)	mg/L	29.0	250	Max 125		APHA 5220D Method	
	Total Coliform*4	MPN/100 ml	7900	400	Max 400		APHA 9221B Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	T-N	mg/L	1.7	-	Max 80		HACH Method 10072 Method	
	T-P	mg/L	< 0.05	2	Max 2		APHA 4500-P E Method	
	Color	TCU	4.11	-	Max 150		APHA 2120C Method	
	Odor	TON	1.4	-	-		APHA 2150 B Method	
SW-7	Oil and Grease	mg/L	< 3.1	10	Max 10		APHA 5520B Method	
	Mercury	mg/L	≤ 0.002	0.01	Max 0.005		APHA 3120 B Method	
	Zinc	mg/L	0.108	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.01	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	0.028	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.01	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.002	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	0.058	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	0.094	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	0.026	0.5	Max 0.2		APHA 3120 B Method	
	Cyanide	mg/L	< 0.002	0.1	Max 0.1		HACH 8027 Method	
	Total Cyanide	mg/L	< 0.002	1	Max 1		APHA 4500-CN-C Method	
	Free Chlorine	mg/L	< 0.1	-	Max 1		APHA 4500-CL G Method	
	Sulphide (S_2 -)	mg/L	0.047	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.025	-	Max 1		HACH 8110 Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	Phenols	mg/L	0.003	0.5	Max 0.5		USEPA Method 420.1	
	Iron*5	mg/L	8.570	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids*3	mg/L	3374	-	Max 2000		APHA 2540 C Method	
	Total Residual Chlorine	mg/L	< 0.1	0.2	Max 0.2		APHA 4500-CL G Method	
	Chromium (Hexavalent)	mg/L	< 0.05	0.1	Max 0.1		ISO 11083:1994 Method	
	Ammonia	mg/L	0.37	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	≤ 0.014	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
GW-2 (reference point)	Temperature	°C	28	< 3 (increase)	≤ 35	Once per 6 months	Instrument Analysis Method	Refer to water quality report
	pH	-	6.6	6-9	6~9		Instrument Analysis Method	
	SS	mg/L	4	50	Max 50		APHA 2540 D Method	
	DO	mg/L	6.66	-	-		Instrument Analysis Method	
	BOD (5)	mg/L	4.60	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	9.0	250	Max 125		APHA 5220D Method	
	Total Coliform*7	MPN/100 ml	540	400	Max 400		APHA 9221B Method	
	T-N	mg/L	0.8	-	Max 80		HACH Method 10072 Method	
	T-P	mg/L	0.69	2	Max 2		APHA 4500-P E Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	Color	TCU	13.07	-	Max 150		APHA 2120C Method	
	Odor	TON	1	-	-		APHA 2150 B Method	
	Oil and Grease	mg/L	< 3.1	10	Max 10		APHA 5520B Method	
	Mercury	mg/L	≤ 0.002	0.01	Max 0.005		APHA 3120 B Method	
	Zinc	mg/L	0.004	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.01	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.002	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.01	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.002	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	0.006	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	≤ 0.002	0.5	Max 0.2		APHA 3120 B Method	
	Cyanide	mg/L	< 0.002	0.1	Max 0.1		HACH 8027 Method	
	Total Cyanide	mg/L	< 0.002	1	Max 1		APHA 4500-CN-C Method	
	Free Chlorine	mg/L	< 0.1	-	Max 1		APHA 4500-CL G Method	
	Sulphide (S_2 -)	mg/L	0.005	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.005	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	< 0.002	0.5	Max 0.5		USEPA Method 420.1	
	Iron*4	mg/L	3.684	3.5	Max 3.5		APHA 3120 B Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	Total Dissolved Solids	mg/L	126	-	Max 2000		APHA 2540 C Method	
	Total Residual Chlorine	mg/L	< 0.1	0.2	Max 0.2		APHA 4500-CL G Method	
	Chromium (Hexavalent)	mg/L	< 0.05	0.1	Max 0.1		ISO 11083:1994 Method	
	Ammonia	mg/L	0.25	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.115	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	

*1Remark: Reference to the Water and Wastewater Quality Monitoring Report (June 2020)

*2Remark: Referred to the National Emission Quality Guideline (NEQG) 29th December 2015

*3Remark: For the monitoring point of SW2, SW-4 and SW-7, the result of SS exceeded and SW4 and SW7 the result of TDS exceeded than the target value due to three expected reasons i) soil erosion caused by construction of factories in Zone-B and eroded soil particles may contain soluble compounds that can dissolve in water ii) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ, and iii) influence by water from the downstream due to flow back by tidal fluctuation.

*4Remark: For the monitoring point of SW2, SW4 and SW-7, the result of total coliform exceeded than the target value due to three expected reasons i) natural bacteria existed in discharged creek because there are various kinds of vegetation of creature such as birds, and small animals in and along the discharged creek and retention pond ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect. Total coliforms do not affect human health directly, self-monitoring was carried out to identify health impact by coliform bacteria. As for the result of E-Coli SW-7 was < 1.8. It is considered that there is no significant impact t

human health.

[5] Remark: For the monitoring point of SW-4 and SW-7, the result of iron exceeded due to expected reason i) due to influence of natural origin (iron can reach out form the soil by run-off). Japan Standard for living environment for iron is 10mg/L. Comparison with living environment standard value in Japan, iron results in (SW-4 and SW-7) are lower than the standard value and therefore, it could be considered that there is no significant impact on living environment.

[6] Remark: For the monitoring point of GW-2, the results of iron exceeded due to expected reason i) it may be due to corrosion of pipe because the water is pumped through the iron pipelines buried underneath the ground.

[7] Remark: For the monitoring point of GW-2, the results of total coliform exceeded due to expected reason i) the poor maintenance of well which can increase the risk of bacteria and other harmful organisms ii) the well was not operated regularly and was not use for long time.

3) Soil Contamination (only operation phase)

Situations environmental report from tenants

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

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

Contents of Issues on Soil Contamination	Countermeasures

Remark: Soil contamination survey will be done after the whole Zone-B is operation stage.

4) Noise Level (June 2020)

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max)	Country's Standard	Target value to be applied*	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
Residential Area NV-2	Leq (day)	dB(A)	53	56	Refer to NEQG Article 1.3	75	Refer the section 2.4 in EIA main report	One time / 3 months		
	Leq (evening)	dB(A)	51	52		60				
	Leq(night)	dB(A)	52	54		55				
Along the road (NV-1)	Leq (day)	dB(A)	65	67		75				
	Leq(night)	dB(A)	54	58		70				

***Remarks:** Referred to the tentative target value of ambient air quality (EIA Report for industrial area, Table 2.4-8), Reference to the noise and vibration monitoring report (June 2020)

Complaints from Residents

- Are there any complaints 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 Complaints from Residents	Countermeasures

5) Solid Waste

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

Are there any wastes if 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.

Item	Date	Generated from	Unit	Value	Solid Waste Management Activities

Amount of Sludge	Feb-2020	General Waste	Kg	1580	Waste disposing to Golden DOWA Eco-System Myanmar Co., Ltd
Amount of Sludge	March-2020	General Waste	Kg	1000	YCDC
Amount of Sludge	April-2020	General Waste	Kg	2980	Waste disposing to Golden DOWA Eco-System Myanmar Co., Ltd
Amount of Sludge	May-2020	General Waste	Kg	800	Waste disposing to Golden DOWA Eco-System Myanmar Co., Ltd
Amount of Sludge	June-2020	General Waste	Kg	740	Waste disposing to Golden DOWA Eco-System Myanmar Co., Ltd
Amount of Sludge	July-2020	General Waste	Kg	680	Waste disposing to Golden DOWA Eco-System Myanmar Co., Ltd
Amount of Sludge	Aug-2020	General Waste	Kg	900	Waste disposing to Golden DOWA Eco-System Myanmar Co., Ltd

Remarks: Waste amount is not only in TSEZ-B only but also combine with Admin Complex General Waste.

6) (a) Ground Subsidence Hydrology (GPS Location 16.67 N, 96.29E)

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
5- March -2020	210	m^3/ week	+ 6.299	m	
12- March -2020	196	m^3/ week	+ 6.300	m	
19- March -2020	218	m^3/ week	+ 6.301	m	
26- March -2020	186	m^3/ week	+ 6.302	m	

Remarks: Water consumption from tube well is existing in Zone-B phase-1 & 2 (operation) and the purpose is only for construction activities not for operation phase.

6) (b) Ground Subsidence Hydrology (GPS Location 16.67 N, 96.29E)

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
2- April -2020	196	m^3/ week	+ 6.300	m	
9- April-2020	116	m^3/ week	+ 6.301	m	
16- April -2020	90	m^3/ week	+ 6.299	m	

23- April -2020	110	m^3/ week	+ 6.299	m	
30- April -2020	121	m^3/ week	+ 6.298	m	

Remarks: Water consumption from tube well is existing in Zone-B phase-1 & 2 (operation) and the purpose is only for construction activities not for operation phase.

6) (c) Ground Subsidence Hydrology (GPS Location 16.67 N, 96.29E)

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
7- May -2020	123	m^3/ week	+ 6.299	m	
14- May -2020	142	m^3/ week	+ 6.301	m	
21- May -2020	116	m^3/ week	+ 6.302	m	
28- May -2020	108	m^3/ week	+ 6.298	m	

Remarks: Water consumption from tube well is existing in Zone-B phase-1 & 2(operation) and the purpose is only for construction activities not for operation phase.

6) (d) Ground Subsidence Hydrology (GPS Location 16.67 N, 96.29E)

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
4- June -2020	110	m^3/ week	+ 6.300	m	
11- June -2020	133	m^3/ week	+ 6.301	m	
18- June -2020	124	m^3/ week	+ 6.298	m	
25- June -2020	145	m^3/ week	+ 6.300	m	

Remarks: Water consumption from tube well is existing in Zone-B phase-1 & 2 (operation) and the purpose is only for construction activities not for operation phase.

6) (e) Ground Subsidence Hydrology (GPS Location 16.67 N, 96.29E)

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
2- July -2020	113	m^3/ week	+ 6.301	m	
9- July -2020	124	m^3/ week	+ 6.298	m	
16- July -2020	135	m^3/ week	+ 6.299	m	
23- July -2020	118	m^3/ week	+ 6.300	m	
30- July -2020	121	m^3/ week	+ 6.298	m	

Remarks: Water consumption from tube well is existing in Zone-B phase-1 & 2 (operation) and the purpose is only for construction activities not for operation phase.

6) (f) Ground Subsidence Hydrology (GPS Location 16.67 N, 96.29E)

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
6- August -2020	112	m^3/ week	+ 6.299	m	
13- August -2020	103	m^3/ week	+ 6.301	m	
20- August -2020	128	m^3/ week	+ 6.302	m	
27- August -2020	124	m^3/ week	+ 6.297	m	

Remarks: Water consumption from tube well is existing in Zone-B phase-1 & 2 (operation) and the purpose is only for construction activities not for operation phase.

7) Offensive Odor (only operation phase)

Complaints from Residents

- Are there any complaints 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 Complaints from Residents	Countermeasures

Situations environmental report from tenants

- 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

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

9) Resettlement Works for Project Affected Persons (PAPs) and Common Assets

Information from TSMC

- Please describe the progress and remarkable issues (if any) to fill in below the table.

Resettlement Works		Progress in Narrative	Remarkable Issues
Projected Affected Persons	Land Acquisition and Relocation		Have already solved
	Income Restoration Program		
Common Assets	Relocation		

- Are there any grievances submitted, solved and pending regarding resettlement works? ■ Yes, □ No
  If yes, please describe the contents of grievances to fill in below the table.

Contents of Grievance	Response/ Countermeasures
There were 2 grievance received during March 2020 to May 2020. These complains are about "Labor" issue.	Labor Department made a meeting and negotiated these two complains on 23th June 2020. These two grievances have been resolved on 23th June 2020.
There were 3 grievance received during June 2020 to August 2020. These complains are about "Compensation", "Labor (recruitment, salary, working hours/condition, etc)" and "Environment" issue.	All complains are under investigation on track status.

10) CSR activities such as Community Support Program
- Are there any CSR activities implemented in this monitoring period? ■ Yes, □ No

If yes, please describe the outline of CSR activities implemented to fill in below the table.

Date	Activities	Description (Location, Participant etc)
March 2020	Monthly Scholarship Support	Including 15 students from neighboring community
	Fencing at Thilawa Kone Tan	BEPS No.1 Thilawa Kone Tan, Shwe Pyi tar Yar Village
	Donation for Paritta Sutta Recitation	At Zone A
	Homage Paying to elders from Kyauk Tan Township)	Including 43 persons from 5 village which are Nyaung Wine, Thida Myaing, Shwe Pyi Tar Yar, Shwee Pyouk, Aye Mya Thida
April 2020	Donation for partition work in isolaton room	Thalyin Hospital
May 2020	Donation for Aircon installation at Thanlyin Fever Clinic	Thanlyin Hospital
July 2020	Providing new bath room, W.C, painting work for renovation of isolated rooms at Thanlyin Hospital	Thanlyin Hospital
August 2020	Stationaries and school items donation	BEHS No.1, Ye Tat Yin, Aye Mya Thida Ward
	Distribution of plastic boxes for multipurpose use	Aye Mya Thida Ward, Shwe Pyi Tar Yar Ward, Shwe Pyouk Ward and BEHS No.1, Ye Tat Yin

End of Document

Thilawa Special Economic Zone

Zone B– Phase 1 & 2 (Operation phase)

Appendix

Water and Waste Water Monitoring Report

February 2020

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1 & 2 OPERATION STAGE)

(Bi-Monthly Monitoring)

February 2020

Myanmar Koei International Ltd.

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CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone B 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 four sampling points are set for water quality survey, named SW-2, SW-4, SW-7, and GW-2 have been monitored in Thilawa SEZ and its surrounding area in timely manner. Among the four locations, SW-7 is main discharged point of Zone B during the construction stage. Moreover, GW-2 is monitored as a reference of existing tube well which located in the monastery compound of Phalan village. 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 to cover the environmental monitoring plan of the EIA report.

Water quality sampling was carried out at four locations. Among the four locations, water flow measurement was carried out at one location (SW-4) 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-2	SW-4	SW-7	GW-2	Remarks
1	Water Temperature	○	○	○	○	On-site measurement
2	pH	○	○	○	○	On-site measurement
3	DO	○	○	○	○	On-site measurement
4	$BOD_{(5)}$	○	○	○	○	Laboratory analysis
5	$COD_{(Cr)}$	○	○	○	○	Laboratory analysis
6	Total Nitrogen	○	○	○	○	Laboratory analysis
7	Suspended Solids	○	○	○	○	Laboratory analysis
8	Total Coliform	○	○	○	○	Laboratory analysis
9	Total Phosphorous	○	○	○	○	Laboratory analysis
10	Color	○	○	○	○	Laboratory analysis
11	Odor	○	○	○	○	Laboratory analysis
12	Oil and Grease	○	○	○	○	Laboratory analysis
13	Total Dissolved solids (TDS) (Self-monitoring)	○	○	○	○	Laboratory analysis
14	Iron (Self-monitoring)	○	○	○	○	Laboratory analysis
15	Mercury (Self-monitoring)	○	○	○	○	Laboratory analysis
16	Escherichia Coli (Self-monitoring)	-	-	○	○	Laboratory analysis
17	Flow Rate	-	○	-	-	On-site measurement

Source: Myanmar Koei International Ltd.

2.2 Description of Sampling Points

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

Table 2.2-1 Outline of Sampling Points

No.	Station	Detailed Information
1	SW-2	**Coordinate**- N - 16° 40' 20.69", E - 96° 17' 18.04"
		Location - Upstream of Shwe Pyauk Creek
		Survey Item - Surface water sampling
2	SW-4	**Coordinate**- N - 16° 39' 42.84", E - 96° 16' 27.42"
		Location - Downstream of Shwe Pyauk Creek
		Survey Item - Surface water sampling and water flow rate measurement.
3	SW-7	**Coordinate** - N - 16° 40' 13.25", E - 96° 17' 5.66"
		Location – Outlet of retention pond of Zone B construction site before connecting to Shwe Pyauk Creek
		Survey Item - Discharge water sampling and water flow rate measurement
4	GW-2	**Coordinate** - N - 16° 39' 25.30", E - 96° 17' 15.60"
		Location - In the monastery compound of Phalan village
		Survey Item - Ground water sampling

Source: Myanmar Koei International Ltd.

SW-2 (Reference Point)

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

SW-4 (Reference Point)

SW-4 was collected at the downstream of Shwe Pyauk creek, after mixing of discharge water from local industrial zone, construction site of Zone B and Zone A, which is flowing from east to west and then entering into the Yangon River. The distance is about 2.15 km downstream of SW-2. This sampling point is located in the west of Zone B area and in the south of Dagon-Thilawa road. The surrounding areas are Zone A in the northeast, local industrial zone in the east and paddy fields in the south and west respectively.

SW-7 (Discharged Point)

SW-7 is main discharged point of Zone B during construction stage. The distance is about 434 m downstream of SW-2. This sampling point is located at outlet of retention pond of Zone B, in the north of Zone B area and in the south of Dagon-Thilawa road. The surrounding areas are Zone A in the north and local industrial zone in the east respectively.

GW-2 (Reference of Existing Tube Well)

GW-2 was collected from tube well as ground water sample. It is located in the monastery compound of Phalan village. The surrounding areas are Thilawa SEZ Zone A in the north, Phalan village in the south and fields in the west and local industrial zone in the northeast and construction of Thilawa SEZ Zone B in the east and northeast respectively.

2.3 Monitoring Method

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

Table 2.3-1 Analytic Method for Water Quality

No.	Parameter	Method
1	Water Temperature	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
2	pH	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
3	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	Odor	APHA 2150 B (Threshold Odor Test)
12	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)
13	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
14	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
15	Total Dissolved solids (TDS)	APHA 2540C (Total Dissolved Solids Dried at 180°C Method)
16	Escherichia Coli	APHA 9221 F (Escherichia Coli Procedure Using Fluorogenic Substrate)
17	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 17 February 2020 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar on 17 February 2020 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	17/02/2020 08:31
2	SW-4	17/02/2020 11:32
3	SW-7	17/02/2020 14:13
4	GW-2	17/02/2020 15:01

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
17/02/2020	05:50	0.95	Low Tide
	11:10	4.13	High Tide
	17:58	1.27	Low Tide
	23:48	4.45	High Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2020

2.5 Monitoring Results

Results of water quality monitoring at discharged point and discharged creek are summarized in Table 2.5-1. Analytical results of the laboratory are described in Appendix-2, Appendix-3 and Appendix-4. The results were compared with the target value of effluent water quality discharged to water body stipulated in the EIA report.

2.5.1 Results of Discharged Point and Discharged Creek

As the comparison with the target value, the results of pH, SS, TDS and total coliform exceeded the target value. As for the result of pH, results at the surface water monitoring point (SW-4 and SW-7) exceeded the target value due to two expected reasons; i) might be wastewater discharged from of local industrial zone, and ii) might be domestic wastewater discharge that contains detergents and soap-based products. Results at the surface water monitoring point (SW-7) exceeded the target value due to two expected reasons; i) might be due to the water polluted with concrete washout water discharge from construction sites of Zone B, (ii) might be due to the water storage for a long period of time and presence of algae in the stored water.

As for the result of SS and TDS results at the surface water monitoring points (SW-4 and SW-7) exceeded the target value. The exceed results for SS and TDS maybe due to three expected reasons; i) soil erosion caused by construction of factories in Zone B and eroded soil particles may contain soluble compounds that can dissolve in water, ii) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ, and iii) influence by water from the downstream due to flow back by tidal fluctuation.

As for the result of total coliform of surface water, results at surface water monitoring points (SW-2 and SW-7) exceeded the target value due to three expected reasons; i) natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds and small animals in and along the discharged creek and ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect.

Since the composition of the total coliform include bacteria from natural origin, and even after total coliform do not affect human health directly, self-monitoring for E. Coli analysis was carried out to identify health impact by coliform bacteria. As for the result of E.Coli of surface water at SW-7, the result was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of SW-7 but it is considered that there is no significant impact on human health.

Table 2.5-1 Results of Water Quality Monitoring at Discharged point and Discharged Creek

No.	Parameters	Unit	SW-2	SW-4	SW-7	Target Value (Reference Value for Self-Monitoring)
1	Water Temperature	˚C	25	28	33	≤ 35
2	pH	-	7.9	9.6	9.3	6~9
3	Suspended Solid (SS)	mg/L	44	64	56	50
4	Dissolved Oxygen (DO)	mg/L	2.03	8.79	7.91	-
5	$BOD_{(5)}$	mg/L	3.01	6.27	6.10	30
6	$COD_{(Cr)}$	mg/L	48	35.3	32.5	125
7	Total Coliform	MPN/100ml	24000	140	1400	400
8	Total Nitrogen (T-N)	mg/L	1.9	4	2.4	80
9	Total Phosphorous (T-P)	mg/L	0.11	< 0.05	< 0.050	2
10	Color	TCU (True Color Unit)	22.19	7.85	5.13	150
11	Odor	TON (Threshold Odor Number)	2	2	2	-
12	Oil and Grease	mg/L	< 3.1	< 3.1	< 3.1	10
13	Mercury	mg/L	≤ 0.002	≤ 0.002	≤ 0.002	0.005
14	Iron	mg/L	1.610	1.148	1.516	3.5
15	Total Dissolved solids (TDS)	mg/L	946	3762	3798	2000
16	Escherichia Coli	MPN/100ml	-	-	4.0	(1000)* (CFU/100ml)
17	Flow Rate	m^3/s	-	0.05	-	-

Note: Red color means exceeded value than target value

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

Source: Myanmar Koei International Ltd.

2.5.2 Result of Reference Tube Well

Result of water quality monitoring at reference tube well monitoring point is shown in Table 2.5-2. As the comparison with the target value, the result of iron exceeded the target value.

As for the result of the iron, the result at the monitoring point of reference tube well (GW-2) exceeded the target value. It may be due to the corrosion of pipes because the water is pumped through the iron pipelines buried underneath the ground. However, since it cannot reach to the conclusion of what is the reason for this result, the periodic monitoring will be necessary.

Table 2.5-2 Results of Water Quality Monitoring at Reference Tube Well

No.	Parameters	Unit	GW-2	Target Value (Reference Value for Self-Monitoring)
1	Water Temperature	°C	31	≤ 35
2	pH	-	7.3	6-9
3	Suspended Solid (SS)	mg/L	2	50
4	Dissolved Oxygen (DO)	mg/L	3.87	-
5	$BOD_{(5)}$	mg/L	0.81	30
6	$COD_{(Cr)}$	mg/L	< 0.7	125
7	Total Coliform	MPN/100ml	33	400
8	Total Nitrogen (T-N)	mg/L	1.3	80
9	Total Phosphorous (T-P)	mg/L	0.67	2
10	Color	TCU (True Color Unit)	3.00	150
11	Odor	TON (Threshold Odor Number)	1	-
12	Oil and Grease	mg/L	< 3.1	10
13	Mercury	mg/L	≤ 0.002	0.005
14	Iron	mg/L	7.050	3.5
15	Total Dissolved solids (TDS)	mg/L	128	2000
16	Escherichia Coli	MPN/100ml	< 1.8	(100)* (CFU/100ml)
17	Flow Rate	m^3/s	-	-

Note: Red color means exceeded value than target value

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

Source: Myanmar Koei International Ltd

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As described in Chapter 2 (Section 2.5), the results of pH, SS and TDS at (SW-4 and SW-7), total coliform at (SW-2 and SW-7) in surface water and iron at (GW-2) in ground water exceeded the target value in this monitoring period for operation stage of Thilawa SEZ Zone B.

There are some possible reasons for exceeding the target values of pH, SS and TDS at (SW-4 and SW-7) and total coliform at (SW-2 and SW-7). They are by i) natural origin such as natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds and small animals in and along the discharged creek, ii) wastewater from the local industrial zone outside of Thilawa SEZ, iii) delivered from surrounding area by tidal effect iv) might be domestic wastewater discharge from local industrial zone that contains detergents and soap-based products, v) might be due to the water polluted with concrete washout water discharge from construction sites of Zone B, (vi) might be due to the water storage for a long period of time and presence of algae in the stored water.

As for the result of the iron, the result at the monitoring point of reference tube well (GW-2) exceeded the target value due to expected reason. It may be due to the corrosion of pipes because the water is pumped through the iron pipelines buried underneath the ground. However, since it cannot reach to the conclusion of what is the reason for this result, the periodic monitoring will be necessary.

As for future subject for main discharged points of Thilawa SEZ Zone B, the following action may be taken to maintain the target value of pH, SS, TDS, total coliform, iron and appropriate water quality monitoring:

1) To continue monitoring Escherichia coli (E. coli) level to identify health impact by coliform bacteria,
2) To monitor the possibility of the overflow water from construction sites and
3) To monitor the possibility of the domestic wastewater from construction sites.

End of the Document

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APPENDIX-1 FIELD SURVEY PHOTOS

FOR DISCHARGED POINT OF THILAWA SEZ ZONE B

Surface water sampling and onsite measurement at SW-7

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

Surface water sampling and onsite measurement at SW-2

Surface water sampling and onsite measurement at SW-4

Ground water sampling and onsite measurement at GW-2

APPENDIX-2 LABORATORY RESULTS

FOR DISCHARGED POINT

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Report No. : GEM-LAB-202002180
Revision No. : 1
Report Date : 28 February, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-SW-T-0217
Sample No. : W-2002124
Waste Profile No. :
Sampling Date : 17 February, 2020
Sampling By : Customer
Sample Received Date : 17 February, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	56	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.10	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	32.5	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	1400	1.8
5	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.4	0
6	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.050	0.050
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	5.13	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	0
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002

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

Analysed By :

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

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Report No. : GEM-LAB-202002177
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Report Date : 14 March, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-SW-2-0217 Sampling Date : 17 February, 2020
Sample No. : W-2002121 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 17 February, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	44	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.01	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	48	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	24000	1.8
5	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.5	0
6	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.11	0.050
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	22.19	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	0
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

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

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Report No : GEM-LAB-2020021781
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Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 38/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-SW-4-0217 — Sampling Date : 17 February, 2020
Sample No : W-2002122 — Sampling By : Customer
Waste Profile No : - — Sample Received Date : 17 February, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	64	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	6.87	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	35.3	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	140	1.8
5	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	4	0
6	Total Phosphorous	APHA 4500-P.E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	7.85	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	0
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

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

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Report No. : GEM-LAB-2020021B1
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Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 38/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-GW-2-0217 Sampling Date : 17 February, 2020
Sample No. : W-2002125 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 17 February, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	2	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	0.81	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	< 0.7	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	33	1.8
5	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.3	0
6	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.67	0.050
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	3.00	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	0
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

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

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

FOR DISCHARGED POINT

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Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No, 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description

Sample Name : MKI-SW-7-0217 Sampling Date : 17 February, 2020
Sample No. : W-2002115 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 17 February, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	4.0	1.8

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

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Tomoya Suzuki Feb 28, 2020
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MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGED POINTS AND BASELINE OF TUBE WELL

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Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description

Sample Name : MKI-GW-2-0217
Sample No. : W-2002117
Waste Profile No. : -
Sampling Date : 17 February, 2020
Sampling By : Customer
Sample Received Date : 17 February, 2020

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

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

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MJTD

APPENDIX-4 LABORATORY RESULTS (SELF-MONITORING)

FOR DISCHARGED POINT

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
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Report No. : GEM-LAB-2020021BB
Revision No. : 1
Report Date : 28 February, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No, 35/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-SW-7-0217 Sampling Date : 17 February, 2020
Sample No. : W-2002132 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 17 February, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	3758	-
2	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
3	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	1.516	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 :

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Assistant Manager

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Feb 28, 2020
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Approved By :

Yoshiyuki Narabe Feb 28, 2020
Manager

JAPAN THILAWA DEVELOPMENT LIMITED MJTD MYANMAR

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

DOWA

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motivate our planet

Report No. : GEM-LAB-202002185
Revision No. : 1
Report Date : 28 February, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 38/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-SW-2-0217 Sampling Date : 17 February, 2020
Sample No. : W-2002129 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 17 February, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	946	-
2	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
3	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	1.610	0.002

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

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Report No. : GEM-LAB-2020021B6
Revision No. : 1
Report Date : 28 February, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tarmwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-SW-4-0217
Sample No. : W-2002130
Waste Profile No. : -
Sampling Date : 17 February, 2020
Sampling By : Customer
Sample Received Date : 17 February, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	3762	-
2	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
3	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	1.148	0.002

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

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Report No. : GEM-LAB-202002189
Revision No. : 1
Report Date : 28 February, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-GW-2-0217
Sample No. : W-2002133
Waste Profile No. : -
Sampling Date : 17 February, 2020
Sampling By : Customer
Sample Received Date : 17 February, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	128	-
2	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
3	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	7.050	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 :

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MYANMA JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

Thilawa Special Economic Zone

Zone B– Phase 1 & 2 (Operation phase)

Appendix

Water and Waste Water Monitoring Report

April 2020

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1 & 2 OPERATION STAGE)

(Bi-Monthly Monitoring)

April 2020

Myanmar Koei International Ltd.

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CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone B 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 four sampling points are set for water quality survey, named SW-2, SW-4, SW-7 and GW-2 have been monitored in Thilawa SEZ and its surrounding area in timely manner. Among the four locations, SW-7 is main discharged point of Zone B during the operation stage. Moreover, GW-2 is monitored as a reference of existing tube well which located in the monastery compound of Phalan village. 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 to cover the environmental monitoring plan of the EIA report.

Water quality sampling was carried out at four locations. Among the four locations, water flow measurement was carried out at one location (SW-4) 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-2	SW-4	SW-7	GW-2	Remarks
1	Water Temperature	○	○	○	○	On-site measurement
2	pH	○	○	○	○	On-site measurement
3	DO	○	○	○	○	On-site measurement
4	$BOD_{(5)}$	○	○	○	○	Laboratory analysis
5	$COD_{(Cr)}$	○	○	○	○	Laboratory analysis
6	Total Nitrogen	○	○	○	○	Laboratory analysis
7	Suspended Solids	○	○	○	○	Laboratory analysis
8	Total Coliform	○	○	○	○	Laboratory analysis
9	Total Phosphorous	○	○	○	○	Laboratory analysis
10	Color	○	○	○	○	Laboratory analysis
11	Odor	○	○	○	○	Laboratory analysis
12	Oil and Grease	○	○	○	○	Laboratory analysis
13	Total Dissolved solids (TDS) (Self-monitoring)	○	○	○	○	Laboratory analysis
14	Iron (Self-monitoring)	○	○	○	○	Laboratory analysis
15	Mercury (Self-monitoring)	○	○	○	○	Laboratory analysis
16	Escherichia Coli (Self-monitoring)	-	-	○	○	Laboratory analysis
17	Flow Rate	-	○	-	-	On-site measurement

Source: Myanmar Koei International Ltd

2.2 Description of Sampling Points

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

Table 2.2-1 Outline of Sampling Points

No.	Station	Detailed Information
1	SW-2	**Coordinate**- N - 16° 40' 20.69", E - 96° 17' 18.04"
		Location - Upstream of Shwe Pyauk Creek
		Survey Item - Surface water sampling
2	SW-4	**Coordinate**- N - 16° 39' 42.84", E - 96° 16' 27.42"
		Location - Downstream of Shwe Pyauk Creek
		Survey Item - Surface water sampling and water flow rate measurement
3	SW-7	**Coordinate** - N - 16° 40' 13.25", E - 96° 17' 5.66"
		Location – Outlet of retention pond of Zone B construction site before connecting to Shwe Pyauk Creek
		Survey Item - Discharge water sampling
4	GW-2	**Coordinate** - N - 16° 39' 25.30", E - 96° 17' 15.60"
		Location - In the monastery compound of Phalan village
		Survey Item - Ground water sampling

Source: Myanmar Koei International Ltd

SW-2 (Reference Point)

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

SW-4 (Reference Point)

SW-4 was collected at the downstream of Shwe Pyauk creek, after mixing of discharge water from local industrial zone, construction site of Zone B and Zone A, which is flowing from east to west and then entering into the Yangon River. The distance is about 2.15 km downstream of SW-2. This sampling point is located in the west of Zone B area and in the south of Dagon-Thilawa road. The surrounding areas are Zone A in the northeast, local industrial zone in the east and paddy fields in the south and west respectively.

SW-7 (Discharged Point)

SW-7 is main discharged point of Zone B during operation stage. The distance is about 434 m downstream of SW-2. This sampling point is located at outlet of retention pond of Zone B, in the north of Zone B area and in the south of Dagon-Thilawa road. The surrounding areas are Zone A in the north and local industrial zone in the east respectively.

GW-2 (Reference of Existing Tube Well)

GW-2 was collected from tube well as ground water sample. It is located in the monastery compound of Phalan village. The surrounding areas are Thilawa SEZ Zone A in the north, Phalan village in the south and fields in the west and local industrial zone in the northeast and construction of Thilawa SEZ Zone B in the east and northeast respectively.

2.3 Monitoring Method

All water samples were collected with cleaned sampling bottles 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 "JFE Digital Current Meter".

Table 2.3-1 Analytic Method for Water Quality

No.	Parameter	Method
1	Water Temperature	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
2	pH	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
3	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	Odor	APHA 2150 B (Threshold Odor Test)
12	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)
13	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
14	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
15	Total Dissolved solids (TDS)	APHA 2540C (Total Dissolved Solids Dried at 180°C Method)
16	Escherichia Coli	APHA 9221 F (Escherichia Coli Procedure Using Fluorogenic Substrate)
17	Flow Rate	Detection of Electromagnetic Elements (Real-time measurement by AEM 213-D Digital Current Meters)

Source: Myanmar Koei International Ltd.

2.4 Monitoring Period

Water quality and water flow rate monitoring were conducted on 2 April 2020 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar on 2 April 2020 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	2/04/2020 09:29
2	SW-4	2/04/2020 12:01
3	SW-7	2/04/2020 12:39
4	GW-2	2/04/2020 15:00

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
2/04/2020	05:06	1.13	Low Tide
	11:04	3.91	High Tide
	17:25	1.66	Low Tide
	23:18	4.22	High Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2020

2.5 Monitoring Results

Results of water quality monitoring at discharged point and discharged creek are summarized in Table 2.5-1. Analytical results of the laboratory are described in Appendix-2, Appendix-3 and Appendix-4. The results were compared with the target value of effluent water quality discharged to water body stipulated in the EIA report.

2.5.1 Results of Discharged Point and Discharged Creek

As the comparison with the target value, the results of pH, Suspended Solid (SS), TDS, total coliform and iron exceeded the target value. As for the result of pH, results at the surface water monitoring point (SW-2) exceeded the target value due to two expected reasons; i) might be wastewater discharged that contains detergents and soap-based products from the squatter houses, and ii) might be wastewater discharged from local industrial zone.

As for the result of SS, results at the surface water monitoring points (SW-2, SW-4 and SW-7) exceeded the target value. As for the result of TDS, results at the surface water monitoring point (SW-7) exceeded the target value. The exceed results for SS and TDS maybe due to three expected reasons; i) soil erosion caused by construction of factories in Zone B and eroded soil particles may contain soluble compounds that can dissolve in water, ii) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ, and iii) influence by water from the downstream due to flow back by tidal fluctuation.

As for the result of total coliform of surface water, results at surface water monitoring points (SW-2, SW-4 and SW-7) exceeded the target value due to three expected reasons; i) natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds and small animals in and along the discharged creek and ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect.

Since the composition of the total coliform include bacteria from natural origin, and even after total coliform do not affect human health directly, self-monitoring for E. Coli analysis was carried out to identify health impact by coliform bacteria. As for the result of E.Coli of surface water at (SW-7), the result was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of (SW-7) but it is considered that there is no significant impact on human health.

As for the result of iron, the result at the monitoring point of surface water monitoring point (SW-4) exceeded the target value maybe due to the influence of natural origin (iron can reach out from soil by run-off). In Yangon, soil is naturally rich in iron. As the comparison with the living environment standard values (10 mg/L) in Japan, iron result (10.540 mg/L) in (SW-4) is slightly higher than the standard value.

Table 2.5-1 Results of Water Quality Monitoring at Discharged point and Discharged Creek

No.	Parameters	Unit	SW-2	SW-4	SW-7	Target Value (Reference Value for Self-Monitoring)
1	Water Temperature	°C	27	30	35	≤ 35
2	pH	-	9.7	8.6	9.0	6–9
3	Suspended Solid (SS)	mg/L	116	276	92	50
4	Dissolved Oxygen (DO)	mg/L	4.85	8.74	13.68	-
5	$BOD_{(5)}$	mg/L	23.38	21.00	14.83	30
6	$COD_{(Cr)}$	mg/L	83	64	41	125
7	Total Coliform	MPN/100ml	1300	54000	7900	400
8	Total Nitrogen (T-N)	mg/L	5	5	0.8	80
9	Total Phosphorous (T-P)	mg/L	0.76	0.22	< 0.05	2
10	Color	TCU (True Color Unit)	24.79	10.63	4.84	150
11	Odor	TON (Threshold Odor Number)	2	2	1.4	-
12	Oil and Grease	mg/L	< 3.1	< 3.1	< 3.1	10
13	Mercury	mg/L	≤ 0.002	≤ 0.002	≤ 0.002	0.005
14	Iron	mg/L	2.660	10.540	2.286	3.5
15	Total Dissolved solids (TDS)	mg/L	1878	714	4042	2000
16	Escherichia Coli	MPN/100ml	-	-	2.0	(1000)* (CFU/100ml)
17	Flow Rate	m^3/s	-	0.49	-	-

Note: Red color means exceeded value than target value.

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

Source: Myanmar Koei International Ltd.

2.5.2 Result of Reference Tube Well

Result of water quality monitoring at reference tube well monitoring point is shown in Table 2.5-2. As the comparison with the target value, the result of iron exceeded the target value.

As for the result of the iron, the result at the monitoring point of reference tube well (GW-2) exceeded the target value. It may be due to the corrosion of pipes because the water is pumped through the iron pipelines buried underneath the ground.

Table 2.5-2 Results of Water Quality Monitoring at Reference Tube Well

No.	Parameters	Unit	GW-2	Target Value (Reference Value for Self-Monitoring)
1	Water Temperature	°C	27	≤ 35
2	pH	-	7.1	6~9
3	Suspended Solid (SS)	mg/L	4	50
4	Dissolved Oxygen (DO)	mg/L	8.50	-
5	$BOD_{(5)}$	mg/L	3.29	30
6	$COD_{(Cr)}$	mg/L	2.4	125
7	Total Coliform	MPN/100ml	23	400
8	Total Nitrogen (T-N)	mg/L	< 0.5	80
9	Total Phosphorous (T-P)	mg/L	0.67	2
10	Color	TCU (True Color Unit)	24.95	150
11	Odor	TON (Threshold Odor Number)	1	-
12	Oil and Grease	mg/L	< 3.1	10
13	Mercury	mg/L	≤ 0.002	0.005
14	Iron	mg/L	4.998	3.5
15	Total Dissolved solids (TDS)	mg/L	146	2000
16	Escherichia Coli	MPN/100ml	< 1.8	(100)* (CFU/100ml)
17	Flow Rate	m^3/s	-	-

Note: Red color means exceeded value than target value

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

Source: Myanmar Koei International Ltd.

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As described in Chapter 2 (Section 2.5), the results of pH at SW-2, SS and total coliform at (SW-2, SW-4 and SW-7), TDS at (SW-7) and iron at (SW-4) in surface water and iron at (GW-2) in ground water exceeded the target value in this monitoring period for operation stage of Thilawa SEZ Zone B.

There are some possible reasons for exceeding the target values of pH at SW-2, SS and total coliform at (SW-2, SW-4 and SW-7) and TDS at (SW-7). They are by i) natural origin such as natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds and small animals in and along the discharged creek, ii) wastewater from the local industrial zone outside of Thilawa SEZ, iii) delivered from surrounding area by tidal effect, iv) might be domestic wastewater discharge that contains detergents and soap-based products from the squatter houses and v) soil erosion caused by construction of factories in Zone B and eroded soil particles may contain soluble compounds that can dissolve in water.

As for the result of iron, the result at the monitoring point of surface water (SW-4) exceeded the target value maybe due to the influence of natural origin (iron can reach out from soil by run-off). In Yangon, soil is naturally rich in iron. As the comparison with the living environment standard values (10 mg/L) in Japan, iron result (10.540 mg/L) in SW-4 is slightly higher than the standard value.

As for the result of the iron, the result at the monitoring point of reference tube well (GW-2) exceeded the target value due to expected reason. It may be due to the corrosion of pipes because the water is pumped through the iron pipelines buried underneath the ground.

As for future subject for main discharged points of Thilawa SEZ Zone B, the following action may be taken to maintain the target value of SS, TDS and total coliform and appropriate water quality monitoring:

1) To continue monitoring Escherichia coli (E. coli) level to identify health impact by coliform bacteria,
2) To monitor the possibility of the overflow water from construction sites and
3) To monitor the possibility of the domestic wastewater from construction sites.

End of the Document

APPENDIX-1 FIELD SURVEY PHOTOS

FOR DISCHARGED POINT OF THILAWA SEZ ZONE B

Surface water sampling and onsite measurement at SW-7

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

Surface water sampling and onsite measurement at SW-2

Surface water sampling and onsite measurement at SW-4

Ground water sampling and onsite measurement at GW-2

APPENDIX-2 LABORATORY RESULTS

FOR DISCHARGED POINT

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Report No. : GEM-LAB-202004084
Revision No. : 1
Report Date : 9 April, 2020
Application No : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 38/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI SW-7-0402 — Sampling Date : 2 April, 2020
Sample No. : W-2004054 — Sampling By : Customer
Waste Profile No : - — Sample Received Date : 2 April, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	92	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	14.83	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	41	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	7900	1.8
5	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	0.8	0
6	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	4.84	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1.4	0
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002

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

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Approved By

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MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
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FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGED POINTS AND BASELINE OF DISCHARGED CREEK

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Report No. : GEM-LAB-202004081
Revision No. : 1
Report Date : 9 April, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-SW-2-0402 Sampling Date : 2 April, 2020
Sample No. : W-2004051 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 2 April, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	116	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	23.38	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	83	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	1300	1.8
5	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	5	0.5
6	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.76	0.05
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	24.79	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	0
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

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

Analysed By :

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Assistant Manager

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Approved By :

Hideki Yohno April 9, 2020
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MYANMAR THILAWA DEVELOPMENT LIMITED MJTD

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Doc No. GEM-LB-R004E/00

Report No. : GEM-LAB-2020040B2
Revision No. : 1
Report Date : 9 April, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 35/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description

Sample Name : MKI-SW-4-0402
Sample No : W-2004052
Waste Profile No. :
Sampling Date : 2 April, 2020
Sampling By : Customer
Sample Received Date : 2 April, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	276	
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	21.00	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	64	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	54000	1.8
5	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	5	0.5
6	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.22	0.05
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	10.63	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	0
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

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

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Report No. : GEM-LAB-202004085
Revision No. : 1
Report Date : 9 April, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-GW-2-0402 Sampling Date : 2 April, 2020
Sample No. : W-2004055 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 2 April, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	4	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.29	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	2.4	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	23	1.8
5	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	< 0.5	0.5
6	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.67	0.05
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	24.95	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	0
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

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

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Managing Director

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

FOR DISCHARGED POINT

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Report No. : GEM-LAB-202004094
Revision No. : 1
Report Date : 9 April, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description

Sample Name : MKI-SW-7-0402 — Sampling Date : 2 April, 2020
Sample No. : W-2004064 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 2 April, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	2.0	1.8

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

Analysed By :

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Approved By :

Hideki Yomo April 9, 2020
Managing Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGED POINTS AND BASELINE OF TUBE WELL

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Report No. : GEM-LAB-202004096
Revision No. : 1
Report Date : 9 April, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)

Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar

Project Name : Environment Monitoring report for Zone A & B

Sample Description

Sample Name : MKI-GW-2-0402
Sample No. : W-2004066
Waste Profile No : -

Sampling Date : 2 April, 2020
Sampling By : Customer
Sample Received Date : 2 April, 2020

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

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

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APPENDIX-4 LABORATORY RESULTS (SELF-MONITORING)

FOR DISCHARGED POINT

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Doc No: GEM-LB-R004E/00
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Report No. : GEM-LAB-202004097
Revision No. : 1
Report Date : 9 April, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Phi Sein Condominium, Phi Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-SW-7-0402
Sample No. : W-2004067
Waste Profile No. : -
Sampling Date : 2 April, 2020
Sampling By : Customer
Sample Received Date : 2 April, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	4042	-
2	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
3	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	2.288	0.002

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

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

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Doc No: GEM-LR-R004E/00
Page1of1

Report No. : GEM-LAB-202004089
Revision No. : 1
Report Date : 9 April, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pha Sein Condominium, Pha Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-SW-2-0402 Sampling Date : 2 April, 2020
Sample No. : W-2004059 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 2 April, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	1878	-
2	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
3	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	2.660	0.002

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

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Doc No: GEM-LB-R004(D)
Page 1 of 1

Report No. : GEM-LAB-202004090
Revision No. : 1
Report Date : 9 April, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Kogi International LTD (MKI)
Address : No. 80/A, 1st Floor, Grand Phu Sein Condominium, Phu Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-SW-4 0217
Sample No : W-2004060
Waste Profile No. :
Sampling Date : 2 April, 2020
Sampling By : Customer
Sample Received Date : 2 April, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	714	-
2	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
3	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	10.545	0.002

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

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Report No. : GEM-LAB-202004098
Revision No. : 1
Report Date : 9 April, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description

Sample Name : MKI-GW-2-0402 — Sampling Date : 2 April, 2020
Sample No. : W-2004068 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 2 April, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	146	-
2	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
3	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	4.998	0.002

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

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MJTD

Thilawa Special Economic Zone

Zone B– Phase 1 & 2 (Operation phase)

Appendix

Water and Waste Water Monitoring Report

June 2020

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1 & 2 OPERATION STAGE)

(Bi-Annually Monitoring)

June 2020

Myanmar Koei International Ltd.

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CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone B 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 four sampling points are set for water quality survey, named SW-2, SW-4, SW-7 and GW-2 have been monitored in Thilawa SEZ and its surrounding area in timely manner. Among the four locations, SW-7 is main discharged point of Zone B during the operation stage. Moreover, GW-2 is monitored as a reference of existing tube well which located in the monastery compound of Phalan village. Location of sampling points for water quality monitoring is shown in Figure 1.1-1.

Source: Google Earth

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 to cover the environmental monitoring plan of the EIA report.

Water quality sampling was carried out at four locations. Among the four locations, water flow measurement was carried out at three locations (SW-2, SW-4 and SW-7) 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-2	SW-4	SW-7	GW-2	Remarks
1	Water Temperature	○	○	○	○	On-site measurement
2	pH	○	○	○	○	On-site measurement
3	DO	○	○	○	○	On-site measurement
4	$BOD_{(5)}$	○	○	○	○	Laboratory analysis
5	$COD_{(Cr)}$	○	○	○	○	Laboratory analysis
6	Total Nitrogen	○	○	○	○	Laboratory analysis
7	Suspended Solids	○	○	○	○	Laboratory analysis
8	Total Coliform	○	○	○	○	Laboratory analysis
9	Total Phosphorous	○	○	○	○	Laboratory analysis
10	Color	○	○	○	○	Laboratory analysis
11	Odor	○	○	○	○	Laboratory analysis
12	Zinc	○	○	○	○	Laboratory analysis
13	Arsenic	○	○	○	○	Laboratory analysis
14	Chromium	○	○	○	○	Laboratory analysis
15	Cadmium	○	○	○	○	Laboratory analysis
16	Selenium	○	○	○	○	Laboratory analysis
17	Lead	○	○	○	○	Laboratory analysis
18	Copper	○	○	○	○	Laboratory analysis
19	Barium	○	○	○	○	Laboratory analysis
20	Nickel	○	○	○	○	Laboratory analysis
21	Cyanide	○	○	○	○	Laboratory analysis
22	Total Cyanide	○	○	○	○	Laboratory analysis
23	Free Chlorine	○	○	○	○	Laboratory analysis
24	Sulphide	○	○	○	○	Laboratory analysis
25	Formaldehyde	○	○	○	○	Laboratory analysis
26	Phenols	○	○	○	○	Laboratory analysis
27	Total Residual Chlorine	○	○	○	○	Laboratory analysis
28	Chromium (Hexavalent)	○	○	○	○	Laboratory analysis
29	Ammonia	○	○	○	○	Laboratory analysis
30	Fluoride	○	○	○	○	Laboratory analysis
31	Silver	○	○	○	○	Laboratory analysis
32	Oil and Grease	○	○	○	○	Laboratory analysis
33	Total Dissolved Solids	○	○	○	○	Laboratory analysis
34	Iron	○	○	○	○	Laboratory analysis
35	Mercury	○	○	○	○	Laboratory analysis
36	Escherichia Coli	-	-	○	○	Laboratory analysis
37	Flow Rate	○	○	○	-	On-site measurement

Source: Myanmar Koei International Ltd.

2.2 Description of Sampling Points

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

Table 2.2-1 Outline of Sampling Points

No.	Station	Detailed Information
1	SW-2	**Coordinate**- N - 16° 40' 20.69", E - 96° 17' 18.04"
		Location - Upstream of Shwe Pyauk Creek
		Survey Item - Surface water sampling and water flow rate measurement.
2	SW-4	**Coordinate**- N - 16° 39' 42.84", E - 96° 16' 27.42"
		Location - Downstream of Shwe Pyauk Creek
		Survey Item – Surface water sampling and water flow rate measurement.
3	SW-7	**Coordinate** - N - 16° 40' 13.23", E - 96° 17' 5.66"
		Location – Outlet of retention pond of Zone B construction site before connecting to Shwe Pyauk Creek
		Survey Item - Discharge water sampling and water flow rate measurement.
4	GW-2	**Coordinate** - N - 16° 39' 25.30", E - 96° 17' 15.60"
		Location - In the monastery compound of Phalan village
		Survey Item - Ground water sampling.

Source: Myanmar Koei International Ltd.

SW-2 (Reference Point)

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

SW-4 (Reference Point)

SW-4 was collected at the downstream of Shwe Pyauk creek, after mixing of discharge water from local industrial zone, construction site of Zone B and Zone A, which is flowing from east to west and then entering into the Yangon River. The distance is about 2.15 km downstream of SW-2. This sampling point is located in the west of Zone B area and in the south of Dagon-Thilawa road. The surrounding areas are Zone A in the northeast, local industrial zone in the east and paddy fields in the south and west respectively.

SW-7 (Discharged Point)

SW-7 is main discharged point of Zone B during operation stage. The distance is about 434 m downstream of SW-2. This sampling point is located at outlet of retention pond of Zone B, in the north of Zone B area and in the south of Dagon-Thilawa road. The surrounding areas are Zone A in the north and local industrial zone in the east respectively.

GW-2 (Reference of Existing Tube Well)

GW-2 was collected from tube well as ground water sample. It is located in the monastery compound of Phalan village. The surrounding areas are Thilawa SEZ Zone A in the north, Phalan village in the south and fields in the west and local industrial zone in the northeast and operation of Thilawa SEZ Zone B in the east and northeast respectively.

2.3 Monitoring Method

All water samples were collected with cleaned sampling bottles 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 "JFE Digital Current Meter".

Table 2.3-1 Analytic Method for Water Quality

No.	Parameter	Method
1	Water Temperature	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
2	pH	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
3	Suspended Solids (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 5220D (Close Reflux Colorimetric Method)
7	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)
8	Total Nitrogen (T-N)	HACH Method 10072(TNT Persulfate Digestion Method)
9	Total Phosphorous (T-P)	APHA 4500-P E (Ascorbic Acid Method)
10	Color	APHA 2120C (Spectrophotometric Method)
11	Odor	APHA 2150 B (Threshold Odor Test)
12	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)
13	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
14	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
15	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
16	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
17	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
18	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
19	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
20	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
21	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
22	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
23	Cyanide	HACH 8027 (Pyridine-Pyrazalone Method)
24	Total Cyanide	Distillation process: APHA 4500-CN-C. Total Cyanide after Distillation, Determine cyanide Concentration Process: HACH 8027 (Pyridine – Pyrazalone Method)
25	Free Chlorine	APHA 4500-CL G (DPD Colorimetric Method)
26	Sulphide	HACH 8131 (USEPA Methylene Blue Method)
27	Formaldehyde	HACH 8110 (MBTH Method)
28	Phenols	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4-AAP With Distillation))
29	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
30	Total Dissolved Solids	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)
31	Total Residual Chlorine	APHA 4500-CL G (DPD Colorimetric Method)
32	Chromium (Hexavalent)	ISO 11083:1994 (Determination of chromium (VI) Spectrometric method using 1,5-diphenylcarbazide)
33	Ammonia	HACH Method 10205 (Salicylate TNT Plus Method)
34	Fluoride	APHA 4110 B (Ion Chromatography with Chemical Suppression of Eluent Conductivity)
35	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
36	Escherichia Coli	APHA 9221 F (Escherichia Coli Procedure Using Fluorogenic Substrate)
37	Flow Rate	Detection of Electromagnetic Elements (Real-time measurement by AEM 213-D Digital Current Meters)

Source: Myanmar Koei International Ltd.

2.4 Monitoring Period

Water quality and water flow rate monitoring were conducted on 3 June 2020 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar on 3 June 2020 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	3/06/2020 09:09
2	SW-4	3/06/2020 08:26
3	SW-7	3/06/2020 09:37
4	GW-2	3/06/2020 12:12

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
3/06/2020	02:18	5.42	High Tide
	09:28	0.74	Low Tide
	14:35	5.96	High Tide
	22:21	0.80	Low Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2020.

2.5 Monitoring Results

Results of water quality monitoring at discharged point and discharged creek are summarized in Table 2.5-1. Analytical results of the laboratory are described in Appendix-2 and Appendix-3. The results were compared with the target value of effluent water quality discharged to water body stipulated in the EIA report.

2.5.1 Results of Discharged Point and Discharged Creek

As the comparison with the target value, the results of Suspended Solid (SS), Total Dissolved Solids (TDS), total coliform and iron exceeded the target value. As for the result of SS, results at the surface water monitoring points (SW-2, SW-4 and SW-7) exceeded the target value. As for the result of TDS, results at the surface water monitoring point (SW-4 and SW-7) exceeded the target value. The exceed results for SS and TDS maybe due to three expected reasons; i) soil erosion caused by construction of factories in Zone B and eroded soil particles may contain soluble compounds that can dissolve in water, ii) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ, and iii) influence by water from the downstream due to flow back by tidal fluctuation.

As for the result of total coliform of surface water, results at surface water monitoring points (SW-2, SW-4 and SW-7) exceeded the target value due to three expected reasons; i) natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds and small animals in and along the discharged creek and ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect.

Since the composition of the total coliform include bacteria from natural origin, and even after total coliform do not affect human health directly, self-monitoring for E. Coli analysis was carried out to identify health impact by coliform bacteria. As for the result of E.Coli of surface water at (SW-7), the result was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of (SW-7) but it is considered that there is no significant impact on human health.

As for the result of iron, the result at the monitoring point of surface water monitoring point (SW-4 and SW-7) exceeded the target value due to the influence of natural origin (iron can reach out from the soil by run-off). Japan set effluent standards for two items as follows; i) health item and ii) living environment item. In the health item, there is no standard value for iron. On the other hand, for the living environment item, the standard value for soluble iron level is 10 mg/l. As the comparison with the living environment standard value in Japan, iron results in (SW-4 and SW-7) are lower than the standard value. Therefore, it can be considered that there is no significant impact on the living environment.

Table 2.5-1 Results of Water Quality Monitoring at Discharged point and Discharged Creek

No.	Parameters	Unit	SW-2	SW-4	SW-7	Target Value (Reference Value for Self-Monitoring)
1	Water Temperature	°C	28	26	30	≤ 35
2	pH	-	8.2	7.2	8.4	6~9
3	Suspended Solid (SS)	mg/L	104	92	188	50
4	Dissolved Oxygen (DO)	mg/L	8.41	5.01	8.72	-
5	BOD (5)	mg/L	15.12	8.50	10.59	30
6	COD (Cr)	mg/L	64.0	27.0	29.0	125
7	Total Coliform	MPN/100ml	35000	24000	7900	400
8	Total Nitrogen (T-N)	mg/L	3.5	2.6	1.7	80
9	Total Phosphorous (T-P)	mg/L	0.29	< 0.05	< 0.05	2
10	Color	TCU (True Color Unit)	21.45	4.71	4.11	150
11	Odor	TON (Threshold Odor Number)	1.4	1.4	1.4	-
12	Oil and Grease	mg/L	3.3	< 3.1	< 3.1	10
13	Mercury	mg/L	≤ 0.002	≤ 0.002	≤ 0.002	0.005
14	Zinc	mg/L	0.026	0.068	0.108	2
15	Arsenic	mg/L	≤ 0.01	≤ 0.01	≤ 0.01	0.1
16	Chromium	mg/L	0.008	0.028	≤ 0.002	0.5
17	Cadmium	mg/L	≤ 0.002	≤ 0.002	0.028	0.03
18	Selenium	mg/L	≤ 0.01	≤ 0.01	≤ 0.01	0.02
19	Lead	mg/L	≤ 0.002	≤ 0.002	≤ 0.002	0.1
20	Copper	mg/L	≤ 0.002	0.016	0.058	0.5
21	Barium	mg/L	0.052	0.118	0.094	1
22	Nickel	mg/L	0.002	0.016	0.026	0.2
23	Cyanide	mg/L	< 0.002	< 0.002	< 0.002	0.1
24	Total Cyanide	mg/L	< 0.002	< 0.002	< 0.002	1
25	Free Chlorine	mg/L	0.2	< 0.1	< 0.1	1
26	Sulphide	mg/L	0.098	0.103	0.047	1
27	Formaldehyde	mg/L	0.074	0.030	0.025	1
28	Phenols	mg/L	0.007	0.009	0.003	0.5
29	Iron	mg/L	2.000	4.390	8.570	3.5
30	Total Dissolved Solids	mg/L	790	2392	3374	2000
31	Total Residual Chlorine	mg/L	0.2	< 0.1	< 0.1	0.2
32	Chromium (Hexavalent)	mg/L	< 0.05	< 0.05	< 0.05	0.1
33	Ammonia	mg/L	0.19	0.91	0.37	10
34	Fluoride	mg/L	0.190	0.327	≤ 0.014	20
35	Silver	mg/L	≤ 0.002	≤ 0.002	≤ 0.002	0.5
36	Escherichia Coli	MPN/100ml	-	-	< 1.8	(1000)* (CFU/100ml)
37	Flow Rate	m^3/s	0.01	1.11	0.10	-

Note: Red color means exceeded value than target value.

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

Source: Myanmar Koei International Ltd.

2.5.2 Result of Reference Tube Well

Result of water quality monitoring at reference tube well monitoring point is shown in Table 2.5-2. As the comparison with the target value, the result of total coliform and iron exceeded the target value.

As for the result of total coliform in ground water, results at (GW-2) slightly exceeded the target value. It may be possible due to expected reasons i) the poor maintenance of well which can increase the risk of bacteria and other harmful organisms ii) the well was not operated regularly and was not use for long time. However, the result of E.coli of (GW-2) was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of (GW-2) but it is considered that there is no significant impact on human health.

As for the result of the iron, the result at the monitoring point of reference tube well (GW-2) slightly exceeded the target value. It may be due to the corrosion of pipes because the water is pumped through the iron pipelines buried underneath the ground.

Table 2.5-2 Results of Water Quality Monitoring at Reference Tube Well

No.	Parameters	Unit	GW-2	Target Value (Reference Value for Self-Monitoring)
1	Water Temperature	℃	28	≤ 35
2	pH	-	6.6	6–9
3	Suspended Solid (SS)	mg/L	4	50
4	Dissolved Oxygen (DO)	mg/L	6.66	-
5	BOD (5)	mg/L	4.60	30
6	COD (Cr)	mg/L	9.0	125
7	Total Coliform	MPN/100ml	540	400
8	Total Nitrogen (T-N)	mg/L	0.8	80
9	Total Phosphorous (T-P)	mg/L	0.69	2
10	Color	TCU (True Color Unit)	13.07	150
11	Odor	TON (Threshold Odor Number)	1	-
12	Oil and Grease	mg/L	< 3.1	10
13	Mercury	mg/L	≤ 0.002	0.005
14	Zinc	mg/L	0.004	2
15	Arsenic	mg/L	≤ 0.01	0.1
16	Chromium	mg/L	≤ 0.002	0.5
17	Cadmium	mg/L	≤ 0.002	0.03
18	Selenium	mg/L	< 0.01	0.02
19	Lead	mg/L	≤ 0.002	0.1
20	Copper	mg/L	≤ 0.002	0.5
21	Barium	mg/L	0.006	1
22	Nickel	mg/L	≤ 0.002	0.2
23	Cyanide	mg/L	< 0.002	0.1
24	Total Cyanide	mg/L	< 0.002	1
25	Free Chlorine	mg/L	< 0.1	1
26	Sulphide	mg/L	0.005	1
27	Formaldehyde	mg/L	0.005	1
28	Phenols	mg/L	< 0.002	0.5
29	Iron	mg/L	3.684	3.5
30	Total Dissolved Solids	mg/L	126	2000
31	Total Residual Chlorine	mg/L	< 0.1	0.2
32	Chromium (Hexavalent)	mg/L	< 0.05	0.1
33	Ammonia	mg/L	0.25	10
34	Fluoride	mg/L	0.115	20
35	Silver	mg/L	≤ 0.002	0.5
36	Escherichia Coli	MPN/100ml	< 1.8	(100)* (CFU/100ml)
37	Flow Rate	m^3/s	-	-

Note: Red color means exceeded value than target value.
*Note: Based on the water utilization at monitoring point for ground water, B1(Irrigation water) of National Technical Regulation on Surface Water Quality in Vietnam (No. QCVN 08: 2008/BTNMT) is set as a reference value of self-monitoring for ground water monitoring.
Source: Myanmar Koei International Ltd.

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As described in Chapter 2 (Section 2.5), the results of Suspended Solids (SS) and total coliform at (SW-2, SW-4 and SW-7), Total Dissolved Solids (TDS) and iron at (SW-4 and SW-7) in surface water and iron and total coliform at (GW-2) in ground water exceeded the target value in this monitoring period for operation stage of Thilawa SEZ Zone B.

There are some possible reasons for exceeding the target values of SS and total coliform at (SW-2, SW-4 and SW-7) and TDS at (SW-4 and SW-7). They are by i) natural origin such as natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds and small animals in and along the discharged creek, ii) wastewater from the local industrial zone outside of Thilawa SEZ, iii) delivered from surrounding area by tidal effect and iv) soil erosion caused by construction of factories in Zone B and eroded soil particles may contain soluble compounds that can dissolve in water.

As for the result of iron, the result at the monitoring point of surface water (SW-4 and SW-7) exceeded the target value maybe due to the influence of natural origin (iron can reach out from soil by run-off). In Yangon, soil is naturally rich in iron. Japan set effluent standards for two items as follows; i) health item and ii) living environment item. In the health item, there is no standard value for iron. On the other hand, for the living environment item, the standard value for soluble iron level is 10 mg/l. As the comparison with the living environment standard value in Japan, iron results in (SW-4 and SW-7) are lower than the standard value. Therefore, it can be considered that there is no significant impact on the living environment. However, since it cannot reach to the conclusion of what is the reason for this result, the periodic monitoring will be necessary.

As for the result of total coliform in ground water, results at (GW-2) exceeded the target value. It may be possible due to expected reasons i) the poor maintenance of well which can increase the risk of bacteria and other harmful organisms ii) the well was not operated regularly and was not use for long time. However, the result of E.coli of (GW-2) was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of (GW-2) but it is considered that there is no significant impact on human health.

As for the result of the iron, the result at the monitoring point of reference tube well (GW-2) exceeded the target value due to expected reason. It may be due to the corrosion of pipes because the water is pumped through the iron pipelines buried underneath the ground.

As for future subject for main discharged points of Thilawa SEZ Zone B, the following action may be taken to maintain the target value of SS, TDS, total coliform, iron and appropriate water quality monitoring:

1) To continue monitoring Escherichia coli (E. coli) level to identify health impact by coliform bacteria,
2) To monitor the possibility of the overflow water from construction sites and
3) To monitor the possibility of the domestic wastewater from construction sites.

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APPENDIX-1 FIELD SURVEY PHOTOS

FOR DISCHARGED POINT OF THILAWA SEZ ZONE B

Surface water sampling and onsite measurement at SW-7

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

Surface water sampling and onsite measurement at SW-2

Surface water sampling and onsite measurement at SW-4

Ground water sampling and onsite measurement at GW-2

APPENDIX-2 LABORATORY RESULTS

FOR DISCHARGED POINT

DOWA

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Page 1 of 1

Report No. : GEM-LAB-202006121
Revision No. : 1
Report Date : 18 June, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 38/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-SW-1-0603 | Sampling Date : 3 June, 2020
Sample No. : W-2006048 | Sampling By : Customer
Waste Profile No. : - | Sample Received Date : 3 June, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C method)	mg/l	188	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	10.59	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	28.2	3.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	7900	1.8
5	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.7	0.5
7	Total Phosphorus	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	4.11	0.05
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1.4	0
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	1334	-
11	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
12	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.108	0.002
13	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
14	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
15	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.028	0.002
16	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
17	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
18	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.058	0.002
19	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.084	0.002
20	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.026	0.002
21	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
22	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	8.570	0.002
23	Cyanide	HACH 8027 (Pyridine -Pyrazalone Method	mg/l	< 0.002	0.002
24	Total Cyanide	Distillation Process:APHA 4500-CN⁻-C, Total Cyanide after Distillation, Determine Cyanide Concentration Process: HACH 8027 (Pyridine -Pyrazalone Method)	mg/l	< 0.002	0.002
25	Ammonia	HACH Method 10205 (Silicylate TNT Plus Method)	mg/l	0.37	0.02
26	Hexavalent Chromium (Cr6+)	ISO 11083:1994 (Determination of chromium(VI) Spectrometric method using 1,5-diphenylcarbazide)	mg/l	< 0.05	0.05
27	Fluoride	APHA 4110 B (Ion Chromatography with Chemical Suppression of Eluent Conductivity)	mg/l	≤ 0.014	0.014
28	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	< 0.1	0.1
29	Total Residual Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	< 0.1	0.1
30	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.047	0.005
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.025	0.003
32	Phenols	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP With Distillation))	mg/l	0.003	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 :

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Approved By :

Managing Director

MJTD

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

DOWA

[illegible]

Report No. : [illegible]
Revision No. : 1
Report Date : 18 June, 2020
Application No. : [illegible]

Analysis Report

Client Name : Myanmar Koei International Ltd. (MKI)
Address : No. 302, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environmental Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-SW-2-0012
Sample No. : [illegible]
Waste Profile No. :
Sampling Date : 3 June, 2020
Sampling By : Customer
Sample Received Date : 3 June, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	104	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	15.12	0.00
3	COD (Cr)	APHA 5220D (Closed Reflux Colorimetric Method)	mg/l	64.0	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	33000	1.8
5	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	3.1	3.1
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	3.5	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.26	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	21.45	0.50
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1.4	0
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	786	-
11	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
12	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.026	0.002
13	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
14	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.008	0.002
15	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
16	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
17	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
18	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
19	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.051	0.002
20	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.003	0.002
21	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
22	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	1.00	0.002
23	Cyanide	HACH 8027 (Pyridine-Pyrazalone Method)	mg/l	< 0.002	0.002
24	Total Cyanide	Distillation Process APHA 4500-CN- C Total Cyanide after Distillation, Determine Cyanide Concentration Process: HACH 8027 (Pyridine-Pyrazalone Method)	mg/l	< 0.002	0.002
25	Ammonia	HACH Method 10205 (Simplified TNT Plus Method)	mg/l	0.19	0.02
26	Hexavalent Chromium (Cr6+)	ISO 11083:1994 (Determination of chromium(VI) Spectrometric method using 1,5-diphenylcarbazide)	mg/l	< 0.05	0.05
27	Fluoride	APHA 4110 B (Ion Chromatography with Chemical Suppression of Eluent Conductivity)	mg/l	0.190	0.024
28	Free Chlorine	APHA 4500 Cl G (DPD Colorimetric Method)	mg/l	0.1	0.1
29	Total Residual Chlorine	APHA 4500 Cl G (DPD Colorimetric Method)	mg/l	0.1	0.1
30	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.098	0.025
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.074	0.010
32	Phenols	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, 22nd edition

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June 18, 2020
GEM

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Assistant Manager

Approved By
[illegible]
Managing Director
June 18, 2020

MJTD
MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

DOWA

Report No. : GEM-LAB-202006119
Revision No. : 1
Report Date : 18 June, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 38/A, 1st Floor, Grand Mya Sein Condominium, Phu Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-SW-4-0603 | Sampling Date : 3 June, 2020
Sample No. : W-2006046 | Sampling By : Customer
Waste Profile No. : - | Sample Received Date : 3 June, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	93	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	8.50	1.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	27.0	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	24000	1.8
5	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	< 3.1	3.1
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.6	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.03	0.03
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	4.71	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1.4	0
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	2392	-
11	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
12	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.088	0.002
13	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
14	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.028	0.002
15	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
16	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
17	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
18	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.016	0.002
19	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.118	0.002
20	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.016	0.002
21	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
22	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	4.390	0.002
23	Cyanide	HACH 8027 (Pyridine - Pyrazalone Method)	mg/l	< 0.002	0.002
24	Total Cyanide	Distillation Process APHA 4500-CN- C. Total Cyanide after Distillation, Determine Cyanide Concentration Process: HACH 8027 (Pyridine - Pyrazalone Method)	mg/l	< 0.002	0.002
25	Ammonia	HACH Method 10205 (Silicylate TNT Plus Method)	mg/l	0.91	0.02
26	Hexavalent Chromium (Cr6+)	ISO 11083:1994 (Determination of chromium(VI) Spectrometric method using 1,5-diphenylcarbazide)	mg/l	< 0.05	0.05
27	Fluoride	APHA 4110 B (Ion Chromatography with Chemical Suppression of Eluent Conductivity)	mg/l	0.327	0.014
28	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	< 0.1	0.1
29	Total Residual Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	< 0.1	0.1
30	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.103	0.005
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.037	0.003
32	Phenols	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP With Distillation))	mg/l	0.009	0.002

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

LAB GEM

Analysed By :
Assistant Manager

Approved By :
Managing Director

MJTD

DOWA

Report No. : GEM-LAB-2020061122
Revision No. : 1
Report Date : 18 June, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tarmwe Township, Yangon, Myanmar
Project Name : Environmental Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-SW-2-0823
Sample No. : W-2006049
Waste Profile No. :
Sampling Date : 5 June, 2020
Sampling By : Customer
Sample Received Date : 5 June, 2020

No.	Parameter	Method	Unit	Result	LOQ
1	DO	APHA 2540C (Dry at 103-105°C Method)	mg/l	4	-
2	BOD (3)	APHA 5210 B (3 Days BOD Test)	mg/l	4.83	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	9.0	2.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	340	1.8
5	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 5.1	1.1
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	0.8	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.44	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	13.01	0.20
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	0
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	126	-
11	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
12	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.004	0.002
13	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
14	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
15	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
16	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.01	0.01
17	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
18	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
19	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.008	0.002
20	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
21	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
22	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	2.684	0.002
23	Cyanide	HACH 8027 (Pyridine - Pyrazolone Method	mg/l	< 0.002	0.002
24	Total Cyanide	Distillation Prepair APHA 4500 CN - C, Total Cyanide after Distillation, Determine Cyanide Concentration Process: HACH 8027 (Pyridine - Pyrazolone Method)	mg/l	< 0.002	0.002
25	Ammonia	HACH Method 10205 (Salicylate TNT Plus Method)	mg/l	0.25	0.02
26	Hexavalent Chromium, [Cr(6+)]	ISO 11083:1994 (Determination of chromium(VI) Spectrometric method using 1,5-diphenylcarbazide)	mg/l	< 0.05	0.05
27	Fluoride	APHA 4110 B (Ion Chromatography with Chemical Suppression of Eluent Conductivity)	mg/l	0.115	0.024
28	Free Chlorine	APHA 4500 Cl- G (DPD Colorimetric Method)	mg/l	< 0.1	0.1
29	Total Residual Chlorine	APHA 4500 Cl- G (DPD Colorimetric Method)	mg/l	< 0.1	0.1
30	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.003	0.003
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.003	0.003
32	Phenols	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP And Distillation))	mg/l	< 0.002	0.002

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

Prepared By :

Ni Ni Aye Lwin
Assistant Manager

LAB
18, JUN, 2020
GEM

Approved By :

Managing Director

MJTD

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

FOR DISCHARGED POINT

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No E1, Thilawa SEZ Zone A, Yangon Region, Myanmar
Phone No Fax No: (+95) 1 2309051

motivate our planet
Doc No: GEM-LB-R004E/00
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Report No. : GEM-LAB-202006112
Revision No. : 1
Report Date : 18 June, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)

Address : No. 39/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.

Project Name : Environment Monitoring report for Zone A & B

Sample Description

Sample Name : MKI-SW-7-0603
Sample No. : W-2006039
Waste Profile No. : -

Sampling Date : 3 June, 2020
Sampling By : Customer
Sample Received Date : 3 June, 2020

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

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

Analysed By :

Ni Ni Aye Lwin
Assistant Manager

LAB
Jn 18, 2020
GEM

Approved By :

Hideki Tomo Jn 18, 2020
Managing Director

MJTD

FOR REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGED POINTS AND BASELINE OF TUBE WELL

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No E1. Thilawa SEZ Zone A, Yangon Region, Myanmar.
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motivate our planet
Doc No: GEM-LB-R004E/00
Page1of1

Report No. : GEM-LAB-202006114
Revision No. : 1
Report Date : 18 June, 2020
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamwe Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description
Sample Name : MKI-GW-2-0603 Sampling Date : 3 June, 2020
Sample No. : W-2006041 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 3 June, 2020

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

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

Analysed By :
Ni Ni Aye Lwin
Assistant Manager

LAB
Jun 18 2020
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Approved By :
Hideki Yomo
Managing Director

MJTD MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

Thilawa Special Economic Zone

Zone B– Phase 1 & 2 (Operation phase)

Appendix

Air Quality Monitoring Report

June 2020

AIR QUALITY MONITORING
REPORT
FOR DEVELOPMENT OF INDUSTRIAL AREA
THILAWA SEZ ZONE B
(PHASE 1 & 2 OPERATION STAGE)

(BI-ANNUALLY MONITORING)

June 2020

Myanmar Koei International Ltd.

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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

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

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the operation of industrial area in and around Thilawa SEZ Zone B, air quality had been monitored from 8 June 2020 – 15 June 2020 as follows;

Table 1.2-1 Outlines of Air Quality Monitoring Plan

Monitoring Date	Monitoring Item	Parameters	Number of Point	Duration	Monitoring Methodology
From 8 June – 15 June, 2020	Air Quality	CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2	1	7 Days	On site measurement by Haz-Scanner Environmental Perimeter Air Station (EPAS)

Source: Myanmar Koei International Ltd.

CHAPTER 2: AIR QUALITY MONITORING

2.1 Monitoring Item

The parameters for air quality monitoring were CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2.

2.2 Monitoring Location

The air quality measurement equipment, "Haz-Scanner Environmental Perimeter Air Station (EPAS) was set up at the south of the Thilawa SEZ Zone B, N: 16°39'24.20", E: 96°17'15.80", inside the monastery compound of Phalan village, surrounded by the residential houses of Phalan village in the south and fields in west, Thilawa SEZ Zone A in north, local Thilawa Industrial Zone in northeast and operation of Thilawa SEZ Zone B in east, north, north-northwest, northwest and northeast respectively. The air quality monitoring is carried out above location where is near to the residential houses of Phalan village. Possible emission sources are dust emissions from construction activities and exhaust gas emissions from construction fuel-burning equipment and daily human activities in Phalan village. The location of air quality monitoring is shown in the Figure 2.2-1.

Source: Google Earth

Figure 2.2-1 Location of Air Quality Monitoring Point

2.3 Monitoring Period

Air quality monitoring was conducted seven consecutive days from 8 June, 2020 – 15 June, 2020.

2.4 Monitoring Method

Monitoring of CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2 were conducted by referring to the recommendation of the United States Environmental Protection Agency (U.S. EPA). The Haz-Scanner EPAS was used to collect ambient air pollutants. The EPAS measures automatically every one minute and directly reads and records onsite for CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2. The state of air quality monitoring is shown in Figure 2.4-1.

Source: Myanmar Koei International Ltd.

Figure 2.4-1 Status of Air Quality Monitoring Point

2.5 Monitoring Results

The daily average value of air quality monitoring results of CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2 are described in Table 2.5-1. Comparing with the target value of CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2 prescribed in EIA report for Thilawa SEZ development project Zone B, seven days average concentration of CO, NO_2, $PM_{2.5}$ and PM_{10} were lower than the target value and seven days average concentration of SO_2 was higher than the target value. Moreover, daily average concentration of SO_2 measured results for five days exceeded the target value.

Table 2.5-1 Air Quality Monitoring Result (Daily Average) During Construction and Non-Construction Period

Date	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2
	mg/m³	mg/m³	mg/m³	mg/m³	mg/m³
08~09 June, 2020	0.035	0.054	0.010	0.011	0.057
09~10 June, 2020	0.032	0.040	0.010	0.018	0.048
10~11 June, 2020	0.027	0.030	0.010	0.016	0.021
11~12 June, 2020	0.028	0.031	0.010	0.022	0.013
12~13 June, 2020	0.027	0.019	0.010	0.016	0.077
13~14 June, 2020	0.029	0.017	0.010	0.016	0.071
14~15 June, 2020	0.030	0.009	0.010	0.013	0.013
7 Days Average Value	0.030	0.029	0.010	0.016	0.043
Target Value	10.26	0.1	0.025	0.05	0.02

Note: Red color mentions the exceeded value for SO_2.
The target value of CO, NO_2 and SO_2 were converted from ppm units to mg/m³. The conversion equation are as follows.
1. (CO, mg/m³) = (CO, ppm) * (Molecular Weight of CO (28)) / 24.45 at 25℃ and 1 atm condition
2. (NO_2, mg/m³) = (NO_2, ppm) * (Molecular Weight of NO_2 (46)) / 24.45 at 25℃ and 1 atm condition
3. (SO_2, mg/m³) = (SO_2, ppm) * (Molecular Weight of SO_2 (64)) / 24.45 at 25℃ and 1 atm condition
Source: Myanmar Koei International Ltd.

Construction activities of Thilawa SEZ Zone B during the air quality monitoring period are described in Table 2.5-2. SO_2 results during construction period are described in Table 2.5-3. During construction period, Day 1, Day 2, Day 3, Day 5 and Day 6 daily average values for SO_2 exceeded the target value.

Table 2.5-2 Construction Activities of Thilawa SEZ Zone B

Date	Time	Construction Activities
8 June 2020	8:00-17:00	Buffer zone level dressing, Water spraying at cow grass planting work
9 June 2020	8:00-17:00	Buffer zone level dressing
10 June 2020	8:00-17:00	Buffer zone level dressing, Sand delivery for grass planting work, Water spraying at cow grass planting work
11 June 2020	8:00-17:00	Sand delivery for grass planting work, Water spraying at grass planting work
12 June 2020	8:00-17:00	Sand loading and dressing work, Sand delivery for grass planting work
13 June 2020	8:00-17:00	Sand loading work, R-19 road curb backfilling work, Sand delivery for grass planting work, Water spraying at grass planting work
14 June 2020	8:00-17:00	Sand delivery for grass planting work, Road cleaning work
15 June 2020	8:00-17:00	Sand delivery for grass planting work, Road cleaning work

Source: Myanmar Japan Thilawa Development Ltd

Table 2.5-3 SO_2 Results (During Construction Period)

Day	Operation Time for each day	SO_2
		mg/m³
Day 1	8:00-17:00	0.127
Day 2	8:00-17:00	0.106
Day 3	8:00-17:00	0.034
Day 4	8:00-17:00	0.014
Day 5	8:00-17:00	0.183
Day 6	8:00-17:00	0.156
Day 7	8:00-17:00	0.014
7 days Average value		0.090
Target Value	-	0.02

Note: Red color mentions the exceeded value than target value
Source: Myanmar Koei International Ltd

Wind direction and wind speed were measured at AQ-1. Hourly average values of measured wind direction and wind speed data are described in Appendix-1. Status of air quality monitoring point and wind direction are described in Figure 2.5-1. Depending on the wind direction, West-Northwest (WNW), Northwest (NW), North-Northwest (NNW), North (N), North-Northeast (NNE), Northeast (NE), East-Northeast (ENE) and East (E) directions are assumed to come from the operation site of Zone B.

Source: Google Earth

Figure 2.5-1 Status of Air Quality Monitoring Point and Wind Direction

Remark: **N** *North* **NNE** *North-Northeast* **NE** *Northeast* **ENE** *East-Northeast* **E** *East* **ESE** *East-Southeast* **SE** *Southeast* **SSE** *South-Southeast* **S** *South* **SSW** *South-Southwest* **SW** *Southwest* **WSW** *West-Southwest* **W** *West* **WNW** *West-Northwest* **NW** *Northwest* **NNW** *North-Northwest*

Overall summary of total exceeded hours for Day 1 to Day 7 during construction and non-construction time for SO_2 are shown in Table 2.5-4. The summary of wind direction at AQ-1 is shown in Table 2.5-5.

Based on the summary table of total exceeded hours for SO_2, the total exceeded hours for seven days during construction and non-construction were 36 hours but exceeded hours for construction time was 32 hours. After detailed analyzed the SO_2 exceeded time according to the wind direction during construction period, 30 hours exceeded are come from other sides of Zone B and 2 hours exceeded are come from construction site of Zone B.

According to the summary of wind direction at AQ-1, 68.3 % come from outside of Zone B and 31.7 % come from inside of Zone B.

Possible emission sources for SO_2 are affected from the combustion of fuel for vehicles from nearby roads, operation activities of Thilawa Port, operation activities of local industrial zone and operation activities of Zone B.

Table 2.5-4 Summary of Total Exceeded Hours for Day 1 to Day 7 During construction and non-Construction Period for SO_2

SO_2								
	Construction Time for each day	Total Exceeded hours	Construction Period exceeded hours	Non-construction period exceeded hours	Non-construction period (wind from Zone B)	Non-construction period (wind from other sides)	Construction period (wind from Zone B)	Construction period (wind from other sides)
Day-1	(8:00-17:00)	9	8	1	0	1	2	6
Day-2	(8:00-17:00)	6	6	0	0	0	0	6
Day-3	(8:00-17:00)	5	5	0	0	0	0	5
Day-4	(8:00-17:00)	0	0	0	0	0	0	0
Day-5	(8:00-17:00)	6	5	1	1	0	0	5
Day-6	(8:00-17:00)	10	8	2	0	2	0	8
Day-7	(8:00-17:00)	0	0	0	0	0	0	0
Total		36	32	4	1	3	2	30

Source: Myanmar Koei International Ltd.

Table 2.5-5 Summary of Wind Direction at AQ-1

Wind Direction	All Day	Day Time	Night Time	Inside/Outside Zone B	
N	1.2%	1.8%	0.6%	28.5%	Inside Zone B
NNE	2.2%	0.2%	4.2%		
NE	5.1%	2.0%	8.1%		
ENE	9.7%	3.6%	15.9%		
E	10.4%	4.8%	16.1%		
ESE	23.9%	25.6%	22.2%	68.3%	Outside Zone B
SE	5.2%	8.3%	2.0%		
SSE	4.9%	6.9%	2.8%		
S	4.0%	6.5%	1.4%		
SSW	3.0%	3.6%	2.4%		
SW	15.9%	19.0%	12.7%		
WSW	10.1%	12.5%	7.7%		
W	1.4%	1.6%	1.2%		
WNW	0.8%	1.0%	0.6%	3.2%	Inside Zone B
NW	1.4%	1.2%	1.6%		
NNW	1.0%	1.4%	0.6%		

Source: Myanmar Koei International Ltd.

CHAPTER 3: CONCLUSION AND RECOMMENDATION

The result of seven days average air quality of CO, NO_2, $PM_{2.5}$ and PM_{10} during seven days monitoring did not exceed the target value, thus there are no impacts on the surrounding environments. The result of seven days average air quality of SO_2 was higher than the target value. In addition, daily average concentration of SO_2 measured results for five days exceeded the target value. During construction period, Day 1, Day 2, Day 3, Day 5 and Day 6 daily average values for SO_2 exceeded the target value.

During the seven days monitoring period, 36 hours results were exceeded for SO_2. According to wind direction of Zone B, total 32 exceeded hours are during construction period and 30 exceeded hours are come from outside of Zone B and 2 exceeded hours are come from construction site Zone B. Possible emission sources for SO_2 are affected from the combustion of fuel for vehicles from nearby roads, operation activities of Thilawa Port, operation activities of local industrial zone and construction activities of Zone B. In the public health statement SO_2 reported by ATSDR (Agency for Toxic Substances and Disease Registry) in US, 100 ppm (261.8 mg/m^3) SO_2 is considered immediately dangerous to life and health (short term). Lung function changes observed when 0.4 to 3 ppm (1.05mg/m^3 to 7.85 mg/m^3) exposure for 20 years or more (long term). Therefore, although the target value of SO_2 was exceeded during monitoring period but it is considered that there is no significant impact on human health.

As for future subject for air quality monitoring in Zone B, the following action may be taken to achieve the target level:

1) To spray the water during construction period.
2) To control the speed limit of all machinery & vehicle (25km/hr) on site to avoid excessive dust creation and to minimize air pollution by the exhaust fumes.
3) To conduct the proper operation (stop idling while no operation).
4) To implement the regular maintenance of machine used for construction activities.
5) To give awareness training to workers on machinery.
6) To check and maintain the generator regularly.

The periodical monitoring will be necessary to grasp the environmental conditions in operation stage of Thilawa SEZ Zone B. The mitigation measures for environmental management will be considered in collected periodical environmental data and has to be reviewed in future.

APPENDIX-1 HOURLY AIR RESULTS

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
08 June, 2020	14:00 – 14:59	0.023	0.036	0.010	0.017	0.172	1.17	137.33	SE
08 June, 2020	15:00 – 15:59	0.023	0.050	0.010	0.003	0.066	0.78	161.50	SSE
08 June, 2020	16:00 – 16:59	0.045	0.035	0.010	0.003	0.073	0.95	141.33	SE
08 June, 2020	17:00 – 17:59	0.038	0.049	0.010	0.008	0.044	0.43	138.67	SE
08 June, 2020	18:00 – 18:59	0.027	0.047	0.010	0.002	0.013	0.52	178.50	S
08 June, 2020	19:00 – 19:59	0.028	0.063	0.010	0.028	0.013	0.83	244.50	WSW
08 June, 2020	20:00 – 20:59	0.029	0.080	0.010	0.005	0.013	0.35	213.83	SW
08 June, 2020	21:00 – 21:59	0.047	0.081	0.010	0.004	0.013	0.02	186.20	S
08 June, 2020	22:00 – 22:59	0.034	0.084	0.010	0.008	0.013	0.00	218.50	SW
08 June, 2020	23:00 – 23:59	0.036	0.084	0.010	0.011	0.013	0.05	139.33	SE
09 June, 2020	0:00 – 0:59	0.034	0.074	0.010	0.023	0.013	0.38	139.50	SE
09 June, 2020	1:00 – 1:59	0.023	0.074	0.010	0.036	0.013	0.45	183.50	S
09 June, 2020	2:00 – 2:59	0.031	0.081	0.010	0.002	0.013	0.12	93.50	E
09 June, 2020	3:00 – 3:59	0.048	0.081	0.010	0.009	0.013	0.28	75.67	ENE
09 June, 2020	4:00 – 4:59	0.039	0.081	0.010	0.019	0.013	0.50	56.17	NE
09 June, 2020	5:00 – 5:59	0.033	0.070	0.008	0.006	0.011	0.97	58.67	ENE
09 June, 2020	6:00 – 6:59	0.026	0.045	0.006	0.004	0.007	0.88	59.17	ENE
09 June, 2020	7:00 – 7:59	0.052	0.084	0.010	0.016	0.013	0.93	56.00	NE
09 June, 2020	8:00 – 8:59	0.048	0.032	0.010	0.006	0.013	1.13	89.17	E
09 June, 2020	9:00 – 9:59	0.039	0.018	0.010	0.005	0.053	1.60	100.67	E
09 June, 2020	10:00 – 10:59	0.033	0.009	0.010	0.016	0.221	1.75	104.67	ESE
09 June, 2020	11:00 – 11:59	0.025	0.009	0.010	0.022	0.176	1.82	100.67	E
09 June, 2020	12:00 – 12:59	0.035	0.009	0.010	0.002	0.123	1.50	110.00	ESE
09 June, 2020	13:00 – 13:59	0.036	0.009	0.010	0.004	0.249	1.88	115.80	ESE

Max	0.052	0.084	0.010	0.036	0.249
Avg	0.035	0.054	0.010	0.011	0.057
Min	0.023	0.009	0.006	0.002	0.007

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
09 June, 2020	14:00 ~ 14:59	0.056	0.009	0.010	0.004	0.363	1.75	118.67	ESE
09 June, 2020	15:00 ~ 15:59	0.023	0.009	0.010	0.016	0.320	1.67	129.50	SE
09 June, 2020	16:00 ~ 16:59	0.033	0.013	0.010	0.009	0.082	1.02	125.83	SE
09 June, 2020	17:00 ~ 17:59	0.023	0.030	0.010	0.002	0.013	1.30	109.67	ESE
09 June, 2020	18:00 ~ 18:59	0.027	0.023	0.010	0.005	0.013	1.13	110.33	ESE
09 June, 2020	19:00 ~ 19:59	0.023	0.025	0.010	0.004	0.013	1.20	194.00	SSW
09 June, 2020	20:00 ~ 20:59	0.037	0.041	0.010	0.014	0.013	0.63	217.50	SW
09 June, 2020	21:00 ~ 21:59	0.040	0.047	0.010	0.005	0.013	0.18	142.83	SE
09 June, 2020	22:00 ~ 22:59	0.063	0.053	0.010	0.009	0.013	0.08	204.17	SSW
09 June, 2020	23:00 ~ 23:59	0.033	0.059	0.010	0.007	0.013	0.42	79.00	E
10 June, 2020	0:00 ~ 0:59	0.023	0.070	0.010	0.022	0.013	0.85	162.50	SSE
10 June, 2020	1:00 ~ 1:59	0.043	0.079	0.010	0.006	0.013	0.08	213.17	SSW
10 June, 2020	2:00 ~ 2:59	0.027	0.072	0.010	0.029	0.013	0.32	75.67	ENE
10 June, 2020	3:00 ~ 3:59	0.023	0.074	0.010	0.028	0.013	0.40	89.50	E
10 June, 2020	4:00 ~ 4:59	0.023	0.065	0.010	0.017	0.013	1.12	185.33	S
10 June, 2020	5:00 ~ 5:59	0.025	0.052	0.010	0.055	0.013	0.68	206.17	SSW
10 June, 2020	6:00 ~ 6:59	0.023	0.018	0.010	0.057	0.013	0.30	126.50	SE
10 June, 2020	7:00 ~ 7:59	0.023	0.024	0.010	0.003	0.013	0.25	119.67	ESE
10 June, 2020	8:00 ~ 8:59	0.032	0.090	0.010	0.008	0.013	0.33	85.83	E
10 June, 2020	9:00 ~ 9:59	0.030	0.071	0.010	0.032	0.013	0.95	104.67	ESE
10 June, 2020	10:00 ~ 10:59	0.039	0.012	0.010	0.012	0.013	1.27	117.33	ESE
10 June, 2020	11:00 ~ 11:59	0.047	0.009	0.010	0.074	0.027	1.75	116.33	ESE
10 June, 2020	12:00 ~ 12:59	0.023	0.009	0.010	0.003	0.080	1.58	114.83	ESE
10 June, 2020	13:00 ~ 13:59	0.023	0.009	0.010	0.017	0.045	1.68	113.33	ESE

Max	0.063	0.090	0.010	0.074	0.363
Avg	0.032	0.040	0.010	0.018	0.048
Min	0.023	0.009	0.010	0.002	0.013

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
10 June, 2020	14:00 – 14:59	0.024	0.009	0.010	0.004	0.015	1.35	137.83	SE
10 June, 2020	15:00 – 15:59	0.023	0.009	0.010	0.004	0.026	1.37	135.83	SE
10 June, 2020	16:00 – 16:59	0.025	0.009	0.010	0.005	0.016	1.32	130.00	SE
10 June, 2020	17:00 – 17:59	0.028	0.009	0.010	0.014	0.013	1.17	144.67	SE
10 June, 2020	18:00 – 18:59	0.023	0.009	0.010	0.028	0.013	1.63	211.67	SSW
10 June, 2020	19:00 – 19:59	0.030	0.021	0.010	0.004	0.013	0.63	253.17	WSW
10 June, 2020	20:00 – 20:59	0.023	0.018	0.010	0.003	0.013	0.40	188.60	S
10 June, 2020	21:00 – 21:59	0.030	0.020	0.010	0.005	0.013	0.37	113.17	ESE
10 June, 2020	22:00 – 22:59	0.023	0.015	0.010	0.032	0.013	0.77	88.67	E
10 June, 2020	23:00 – 23:59	0.023	0.026	0.010	0.005	0.013	1.08	103.83	ESE
11 June, 2020	0:00 – 0:59	0.023	0.031	0.010	0.005	0.013	0.60	80.33	E
11 June, 2020	1:00 – 1:59	0.036	0.070	0.010	0.065	0.013	0.42	75.00	ENE
11 June, 2020	2:00 – 2:59	0.030	0.072	0.010	0.046	0.013	1.28	158.00	SSE
11 June, 2020	3:00 – 3:59	0.023	0.023	0.010	0.008	0.013	1.82	214.67	SW
11 June, 2020	4:00 – 4:59	0.023	0.022	0.010	0.003	0.013	2.27	237.83	WSW
11 June, 2020	5:00 – 5:59	0.027	0.053	0.010	0.004	0.013	1.57	234.67	SW
11 June, 2020	6:00 – 6:59	0.031	0.086	0.010	0.006	0.013	0.48	159.00	SSE
11 June, 2020	7:00 – 7:59	0.031	0.095	0.010	0.006	0.013	0.10	65.50	ENE
11 June, 2020	8:00 – 8:59	0.027	0.058	0.010	0.005	0.013	0.72	90.33	E
11 June, 2020	9:00 – 9:59	0.036	0.017	0.010	0.019	0.013	1.18	97.50	E
11 June, 2020	10:00 – 10:59	0.036	0.009	0.010	0.009	0.024	1.58	104.67	ESE
11 June, 2020	11:00 – 11:59	0.024	0.009	0.010	0.052	0.062	1.92	111.80	ESE
11 June, 2020	12:00 – 12:59	0.024	0.009	0.010	0.048	0.105	1.48	108.17	ESE
11 June, 2020	13:00 – 13:59	0.027	0.009	0.010	0.013	0.027	1.73	159.17	SSE

Max	0.036	0.095	0.010	0.065	0.105
Avg	0.027	0.030	0.010	0.016	0.021
Min	0.023	0.009	0.010	0.003	0.013

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
11 June, 2020	14:00 ~ 14:59	0.031	0.041	0.010	0.008	0.013	0.65	75.33	ENE
11 June, 2020	15:00 ~ 15:59	0.036	0.049	0.010	0.006	0.013	0.87	95.17	E
11 June, 2020	16:00 ~ 16:59	0.046	0.024	0.010	0.026	0.013	1.12	115.17	ESE
11 June, 2020	17:00 ~ 17:59	0.030	0.010	0.010	0.063	0.013	1.22	113.83	ESE
11 June, 2020	18:00 ~ 18:59	0.035	0.041	0.010	0.003	0.013	0.58	169.83	S
11 June, 2020	19:00 ~ 19:59	0.030	0.045	0.010	0.036	0.013	0.23	244.17	WSW
11 June, 2020	20:00 ~ 20:59	0.024	0.057	0.010	0.036	0.013	0.00	38.33	NE
11 June, 2020	21:00 ~ 21:59	0.023	0.038	0.010	0.024	0.013	0.40	123.17	ESE
11 June, 2020	22:00 ~ 22:59	0.023	0.042	0.010	0.022	0.013	0.70	123.67	ESE
11 June, 2020	23:00 ~ 23:59	0.023	0.045	0.010	0.037	0.013	0.92	103.33	ESE
12 June, 2020	0:00 ~ 0:59	0.023	0.034	0.010	0.051	0.013	1.77	167.83	SSE
12 June, 2020	1:00 ~ 1:59	0.024	0.009	0.010	0.002	0.013	0.58	196.33	SSW
12 June, 2020	2:00 ~ 2:59	0.024	0.022	0.010	0.009	0.013	0.10	62.00	ENE
12 June, 2020	3:00 ~ 3:59	0.023	0.033	0.010	0.032	0.013	0.46	94.80	E
12 June, 2020	4:00 ~ 4:59	0.023	0.033	0.010	0.041	0.013	0.27	117.33	ESE
12 June, 2020	5:00 ~ 5:59	0.023	0.020	0.010	0.039	0.013	0.42	59.00	ENE
12 June, 2020	6:00 ~ 6:59	0.026	0.027	0.010	0.017	0.013	0.43	79.00	E
12 June, 2020	7:00 ~ 7:59	0.034	0.043	0.010	0.008	0.013	0.82	87.17	E
12 June, 2020	8:00 ~ 8:59	0.024	0.010	0.010	0.022	0.013	0.92	122.00	ESE
12 June, 2020	9:00 ~ 9:59	0.024	0.009	0.010	0.004	0.013	1.25	100.33	E
12 June, 2020	10:00 ~ 10:59	0.026	0.010	0.010	0.017	0.018	1.12	140.83	SE
12 June, 2020	11:00 ~ 11:59	0.028	0.058	0.010	0.007	0.013	0.87	119.00	ESE
12 June, 2020	12:00 ~ 12:59	0.028	0.038	0.010	0.004	0.013	2.53	235.83	SW
12 June, 2020	13:00 ~ 13:59	0.052	0.017	0.010	0.008	0.013	1.15	185.17	S

Max	0.052	0.058	0.010	0.063	0.018
Avg	0.028	0.031	0.010	0.022	0.013
Min	0.023	0.009	0.010	0.002	0.013

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
12 June, 2020	14:00 ~ 14:59	0.041	0.009	0.010	0.008	0.013	0.58	167.33	SSE
12 June, 2020	15:00 ~ 15:59	0.034	0.009	0.010	0.042	0.013	0.75	213.17	SSW
12 June, 2020	16:00 ~ 16:59	0.027	0.009	0.010	0.023	0.013	0.60	122.83	ESE
12 June, 2020	17:00 ~ 17:59	0.023	0.012	0.010	0.017	0.013	0.27	178.50	S
12 June, 2020	18:00 ~ 18:59	0.025	0.012	0.010	0.016	0.013	0.93	239.50	WSW
12 June, 2020	19:00 ~ 19:59	0.033	0.014	0.010	0.022	0.013	1.24	195.80	SSW
12 June, 2020	20:00 ~ 20:59	0.031	0.048	0.010	0.003	0.013	0.12	68.00	ENE
12 June, 2020	21:00 ~ 21:59	0.026	0.045	0.010	0.004	0.013	0.00	68.00	ENE
12 June, 2020	22:00 ~ 22:59	0.024	0.009	0.010	0.005	0.013	0.00	53.17	NE
12 June, 2020	23:00 ~ 23:59	0.023	0.009	0.010	0.002	0.013	0.00	65.33	ENE
13 June, 2020	0:00 ~ 0:59	0.023	0.035	0.010	0.024	0.024	0.00	19.00	NNE
13 June, 2020	1:00 ~ 1:59	0.027	0.063	0.010	0.020	0.013	0.03	47.83	NE
13 June, 2020	2:00 ~ 2:59	0.024	0.009	0.010	0.046	0.013	0.00	57.00	ENE
13 June, 2020	3:00 ~ 3:59	0.024	0.009	0.010	0.011	0.013	0.00	57.00	ENE
13 June, 2020	4:00 ~ 4:59	0.047	0.012	0.010	0.027	0.013	0.00	57.00	ENE
13 June, 2020	5:00 ~ 5:59	0.026	0.050	0.010	0.012	0.013	0.02	83.67	E
13 June, 2020	6:00 ~ 6:59	0.025	0.021	0.010	0.035	0.013	0.12	129.67	SE
13 June, 2020	7:00 ~ 7:59	0.029	0.009	0.010	0.026	0.014	0.08	272.33	W
13 June, 2020	8:00 ~ 8:59	0.024	0.014	0.010	0.007	0.013	0.35	238.50	WSW
13 June, 2020	9:00 ~ 9:59	0.023	0.009	0.010	0.007	0.070	0.33	141.00	SE
13 June, 2020	10:00 ~ 10:59	0.024	0.009	0.010	0.009	0.227	0.62	245.50	WSW
13 June, 2020	11:00 ~ 11:59	0.023	0.009	0.010	0.002	0.320	0.47	198.33	SSW
13 June, 2020	12:00 ~ 12:59	0.023	0.009	0.010	0.013	0.459	0.57	196.83	SSW
13 June, 2020	13:00 ~ 13:59	0.023	0.009	0.010	0.008	0.514	0.93	206.50	SSW

Max	0.047	0.063	0.010	0.046	0.514
Avg	0.027	0.019	0.010	0.016	0.077
Min	0.023	0.009	0.010	0.002	0.013

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		mg/m³	mg/m³	mg/m³	mg/m³	ng/m³	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
13 June, 2020	14:00 ~ 14:59	0.023	0.009	0.010	0.037	0.496	0.90	198.67	SSW
13 June, 2020	15:00 ~ 15:59	0.023	0.015	0.010	0.011	0.338	0.60	201.83	SSW
13 June, 2020	16:00 ~ 16:59	0.023	0.009	0.010	0.013	0.145	0.47	159.17	SSE
13 June, 2020	17:00 ~ 17:59	0.023	0.009	0.010	0.028	0.107	0.82	232.33	SW
13 June, 2020	18:00 ~ 18:59	0.023	0.009	0.010	0.035	0.021	2.10	242.33	WSW
13 June, 2020	19:00 ~ 19:59	0.032	0.009	0.010	0.022	0.013	0.63	126.00	SE
13 June, 2020	20:00 ~ 20:59	0.024	0.009	0.010	0.002	0.013	0.68	137.00	SE
13 June, 2020	21:00 ~ 21:59	0.023	0.015	0.010	0.003	0.013	0.17	222.17	SW
13 June, 2020	22:00 ~ 22:59	0.029	0.027	0.010	0.007	0.013	0.08	194.83	SSW
13 June, 2020	23:00 ~ 23:59	0.036	0.017	0.010	0.040	0.013	0.00	58.83	ENE
14 June, 2020	0:00 ~ 0:59	0.030	0.022	0.010	0.037	0.013	0.22	248.83	WSW
14 June, 2020	1:00 ~ 1:59	0.023	0.025	0.010	0.031	0.013	0.42	241.50	WSW
14 June, 2020	2:00 ~ 2:59	0.030	0.055	0.010	0.030	0.013	0.60	220.33	SW
14 June, 2020	3:00 ~ 3:59	0.035	0.057	0.010	0.014	0.013	0.13	244.17	WSW
14 June, 2020	4:00 ~ 4:59	0.034	0.010	0.010	0.017	0.013	0.02	112.50	ESE
14 June, 2020	5:00 ~ 5:59	0.046	0.020	0.010	0.015	0.013	0.00	117.00	ESE
14 June, 2020	6:00 ~ 6:59	0.027	0.020	0.010	0.009	0.013	0.30	194.33	SSW
14 June, 2020	7:00 ~ 7:59	0.026	0.009	0.010	0.011	0.013	1.28	233.83	SW
14 June, 2020	8:00 ~ 8:59	0.036	0.009	0.010	0.004	0.013	1.53	231.17	SW
14 June, 2020	9:00 ~ 9:59	0.031	0.009	0.010	0.002	0.030	1.33	228.83	SW
14 June, 2020	10:00 ~ 10:59	0.023	0.009	0.010	0.003	0.084	1.50	233.67	SW
14 June, 2020	11:00 ~ 11:59	0.025	0.009	0.010	0.005	0.137	1.50	231.50	SW
14 June, 2020	12:00 ~ 12:59	0.026	0.013	0.010	0.006	0.126	1.70	224.83	SW
14 June, 2020	13:00 ~ 13:59	0.053	0.009	0.010	0.002	0.034	1.18	216.50	SW

Max	0.053	0.057	0.010	0.040	0.496
Avg	0.029	0.017	0.010	0.016	0.071
Min	0.023	0.009	0.010	0.002	0.013

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		mg/m³	mg/m³	mg/m³	mg/m³	mg/m³	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
14 June, 2020	14:00 – 14:59	0.030	0.009	0.010	0.019	0.020	1.25	225.00	SW
14 June, 2020	15:00 – 15:59	0.061	0.009	0.010	0.002	0.013	1.53	239.33	WSW
14 June, 2020	16:00 – 16:59	0.035	0.009	0.010	0.010	0.013	2.70	234.83	SW
14 June, 2020	17:00 – 17:59	0.024	0.009	0.010	0.026	0.013	0.88	257.67	WSW
14 June, 2020	18:00 – 18:59	0.024	0.009	0.010	0.022	0.013	0.97	236.83	WSW
14 June, 2020	19:00 – 19:59	0.024	0.009	0.010	0.002	0.013	0.22	260.17	W
14 June, 2020	20:00 – 20:59	0.039	0.009	0.010	0.003	0.013	0.28	278.00	W
14 June, 2020	21:00 – 21:59	0.023	0.009	0.010	0.003	0.013	0.05	237.00	WSW
14 June, 2020	22:00 – 22:59	0.023	0.009	0.010	0.002	0.013	0.00	53.67	NE
14 June, 2020	23:00 – 23:59	0.036	0.009	0.010	0.003	0.013	0.03	118.67	ESE
15 June, 2020	0:00 – 0:59	0.025	0.009	0.010	0.015	0.013	0.13	120.50	ESE
15 June, 2020	1:00 – 1:59	0.023	0.009	0.010	0.017	0.013	0.08	90.67	E
15 June, 2020	2:00 – 2:59	0.023	0.009	0.010	0.004	0.013	0.03	146.33	SSE
15 June, 2020	3:00 – 3:59	0.024	0.009	0.010	0.010	0.013	0.35	98.50	E
15 June, 2020	4:00 – 4:59	0.035	0.009	0.010	0.022	0.013	0.08	204.67	SSW
15 June, 2020	5:00 – 5:59	0.037	0.009	0.010	0.029	0.013	0.13	100.50	E
15 June, 2020	6:00 – 6:59	0.023	0.009	0.010	0.002	0.013	0.65	108.33	ESE
15 June, 2020	7:00 – 7:59	0.030	0.009	0.010	0.030	0.013	0.85	109.33	ESE
15 June, 2020	8:00 – 8:59	0.024	0.009	0.010	0.012	0.013	1.20	111.83	ESE
15 June, 2020	9:00 – 9:59	0.025	0.009	0.010	0.012	0.013	1.48	115.33	ESE
15 June, 2020	10:00 – 10:59	0.035	0.009	0.010	0.061	0.013	1.58	168.00	SSE
15 June, 2020	11:00 – 11:59	0.024	0.009	0.010	0.002	0.013	2.17	239.17	WSW
15 June, 2020	12:00 – 12:59	0.040	0.009	0.010	0.004	0.013	1.48	233.17	SW
15 June, 2020	13:00 – 13:59	0.029	0.009	0.010	0.011	0.013	1.27	223.33	SW

Max	0.061	0.009	0.010	0.061	0.020
Avg	0.030	0.009	0.010	0.013	0.013
Min	0.023	0.009	0.010	0.002	0.013

APPENDIX-2 CERTIFICATE OF CALIBRATION

Certificate of Calibration

Certificate Number: EDCQP200-4.11.5

Environmental Devices Corporation certifies the Haz-Scanner model EPAS is calibrated to published specifications and NIST traceable.

Calibration Dust Specifications are NIST traceable using Coulter Mutisizer II e. ISO12103 -1 A2 Fine Test Dust and is designed to agree with EPA Class I and Class III FRM and FEM particulate samplers and monitors and EN 12341 and EN 14907 standards.

Gas sensors are Calibrated against NIST/EPA traceable Calibration Gas using NIST primary Flow Standard: LFE774300 to ISO 17025 and EPA Instrumental Test Methods as defined by 40 CFR Part 60.

Quality system standard to meet the requirements of ANSI/ASQC standard Q9000-1994 (ISO 9001), MIL-STD 45662A, and customer's specification if required.

Temperature = 22°C
Relative Humidity = 30%
Atmospheric Pressure = 760 mmHg
Measurement Uncertainty Estimated @ 95% Confidence Level (k=2) using ISO 17025 guidelines.

Model	Serial Number	Calibration Date	Next Calibration Due
EPAS	918189	October 28, 2019	October 2020

Calibration Span Accessory if purchased	Sensor A	Sensor B	Model
	K- 4 [illegible]	K- 9 [illegible]	CS-105

Technician	Supervisor
Dan Okoniewicz	Mark Sullivan

Environmental Devices Corporation
4 Wilder Drive Building #15
Plaistow, NH 03865
ISO-9001 Certified

Thilawa Special Economic Zone

Zone B– Phase 1 & 2 (Operation phase)

Appendix

Noise and Vibration Monitoring Report

June 2020

NOISE AND VIBRATION

MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1 & 2 OPERATION STAGE)

(BI-ANNUALLY MONITORING)

June 2020

Myanmar Koei International Ltd.

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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

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

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the operation of industrial area in and around Thilawa SEZ Zone B, noise and vibration levels had been monitored from 8 June 2020 – 10 June 2020 as follows;

Table 1.2-1 Outlines of Noise and Vibration Level Monitoring

Monitoring Date	Monitoring Item	Parameters	Number of Points	Duration	Monitoring Methodology
From 9–10 June 2020	Noise Level	LA_{eq} (dB)	1 (NV-1)	24 hours	On-site measurement by "Rion NL-42 sound level meter"
From 8–9 June 2020	Noise Level	LA_{eq} (dB)	1 (NV-2)	24 hours	On-site measurement by "Rion NL-42 sound level meter"
From 9–10 June 2020	Vibration Level	L_{v10} (dB)	1 (NV-1)	24 hours	On-site measurement by "Vibration Level Meter- VM-53A"
From 8–9 June 2020	Vibration Level	L_{v10} (dB)	1 (NV-2)	24 hours	On-site measurement by "Vibration Level Meter- VM-53A"

Source: Myanmar Koei International Ltd.

CHAPTER 2: NOISE AND VIBRATION LEVEL MONITORING

2.1 Monitoring Item

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

Table 2.1-1 Monitoring Parameters for Noise and Vibration Level

No.	Item	Parameter
1	Noise	A-weighed loudness equivalent ($L_{A_{eq}}$)
2	Vibration	Vibration level, vertical, percentile (L_{V10})

Source: Myanmar Koei International Ltd.

2.2 Monitoring Location

Noise and vibration levels were measured in the northeast corner of the Thilawa SEZ Zone B, monitoring point (NV-1); N: 16°40'18.22", E: 96°17'18.18" for traffic noise concerned and in the south of the Thilawa SEZ Zone B, monitoring point (NV-2); N: 16°39'24.90", E: 96°17'16.70", inside the monastery compound of Phalan village. The location of the noise and vibration monitoring points are shown in Figure 2.2-1.

Source: Google Earth

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

NV-1

NV-1 is located in front of temporary gate of operation site of Thilawa SEZ Zone B and next to Thilawa Development road. The surrounding area are Zone A in the northwest, local industrial zone in the east respectively. Possible sources of noise and vibration is generated from construction activities and road traffic.

NV-2

NV-2 is located at the south of the Thilawa SEZ Zone B, inside the monastery compound of Phalan village, surrounded by the residential houses of Phalan village in the south and fields in west, Thilawa SEZ Zone A in north, local industrial zone in northeast respectively. Possible sources of noise and vibration is generated from construction activities from Zone B and daily human activities from nearby Phalan village.

2.3 Monitoring Method

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

Source: Myanmar Koei International Ltd.

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

2.4 Monitoring Results

Noise Monitoring Results

Noise monitoring results are separated as daytime (6:00 AM to 10:00 PM) and evening time (10:00 PM to 6:00 AM) time frames for NV-1 and daytime (7:00 AM to 7:00 PM), evening time (7:00 PM to 10:00 PM) and night time (10:00 PM to 7:00 AM) time frames respectively for NV-2. Noise measurement was carried out for one location on a 24-hour basis. The monitoring results are summarized in Table 2.4-1 and Table 2.4-2. Hourly noise level (LA_{eq}) monitoring results at NV-1 and NV-2 are shown in Table 2.4-3 and Table 2.4-4. Figure 2.4-1 and Figure 2.4-2 showed the results of noise level (LA_{eq}) at NV-1 and NV-2. Comparing with the target value of noise level in operation stage prescribed in EIA report for Thilawa SEZ development project Zone B, all results were under the target values except for NV-2 during night time. The results at NV-2 was higher than the target value for six hours during the night time and there were no construction activities at that time. According to the field surveyor record, it was due to the heavy rain, dog barking and passing of vehicles and motorcycles at that time. Therefore, it is considered that there is no impact from operation activities of Zone B to the surrounding environment.

Table 2.4-1 Results of Noise Levels (LA_{eq}) Monitoring at NV-1

Date	(Traffic Noise Level) Equivalent Noise Level (LA_{eq}, dB)	
	Day Time (6:00 AM – 10:00 PM)	Night Time (10:00 PM – 6:00 AM)
9 – 10 June 2020	65	54
Target Value	75	70

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

Table 2.4-2 Results of Noise Levels (LA_{eq}) Monitoring at NV-2

Date	(A side next to sensitive area such as monastery, hospital and school)) Equivalent Noise Level (LA_{eq}, dB)		
	Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
8 – 9 June 2020	53	51	52
Target Value	60	55	50

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

Table 2.4-3 Hourly Noise Level (LA_{eq}) Monitoring Results at NV-1

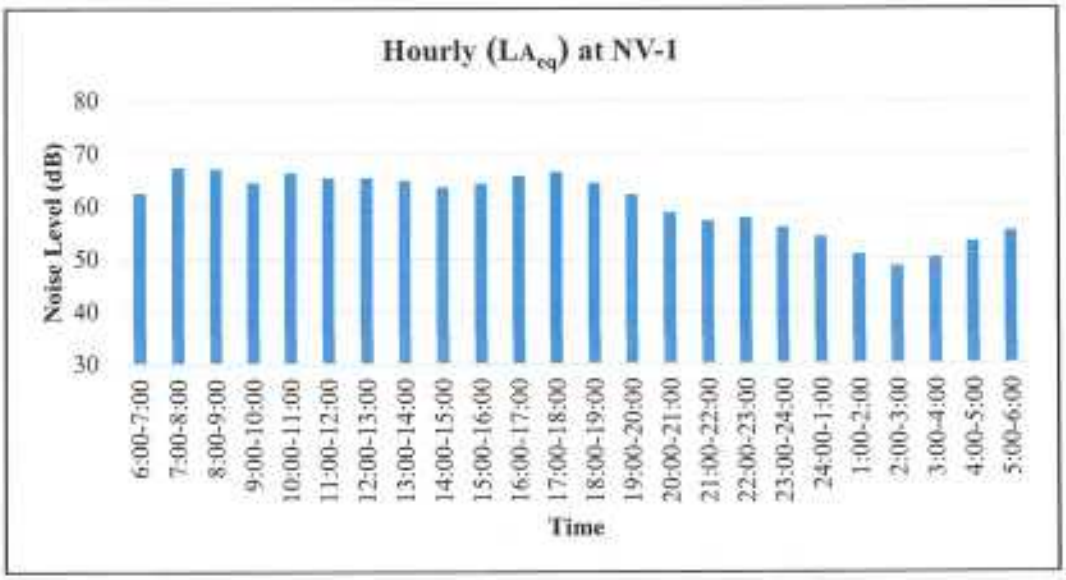
Date	Time	(LA_{eq}, dB)	(LA_{eq}, dB) Each Category	(LA_{eq}, dB) Target Value	Remark
9 - 10 June 2020	6:00-7:00	62	65	75	No construction Activities
	7:00-8:00	67			
	8:00-9:00	67			Construction activities of Zone B (Buffer Zone Level Dressing, Sand Delivery for Grass Planting Work, Water Spraying at Cow Grass Planting Work, etc.,)
	9:00-10:00	64			
	10:00-11:00	66			
	11:00-12:00	65			
	12:00-13:00	65			
	13:00-14:00	65			
	14:00-15:00	63			
	15:00-16:00	64			
	16:00-17:00	66			
	17:00-18:00	66			No construction Activities
	18:00-19:00	64			
	19:00-20:00	62			
	20:00-21:00	59			
	21:00-22:00	57			
	22:00-23:00	58	54	70	
	23:00-24:00	56			
	24:00-1:00	54			
	1:00-2:00	51			
	2:00-3:00	48			
	3:00-4:00	50			
	4:00-5:00	53			
	5:00-6:00	55			

Source: Myanmar Koei International Ltd.

Table 2.4-4 Hourly Noise Level (LA_{eq}) Monitoring Results at NV-2

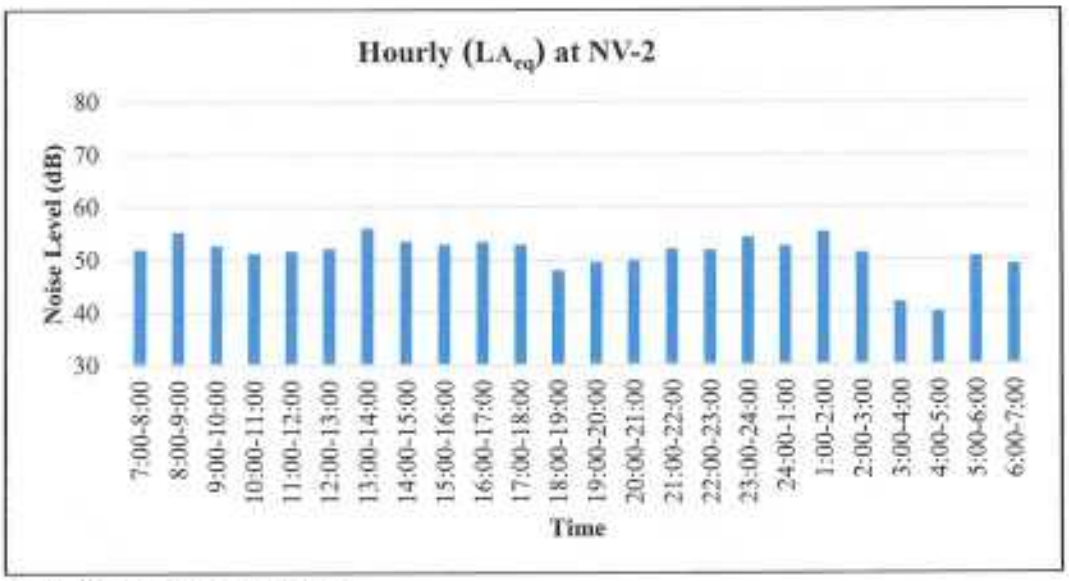
Date	Time	(LA_{eq}, dB)	(LA_{eq}, dB) Each Category	(LA_{eq}, dB) Target Value	Remark
8 - 9 June 2020	7:00-8:00	52	53	60	No construction Activities
	8:00-9:00	55			
	9:00-10:00	53			Construction activities of Zone B (Buffer Zone Level Dressing, Water Spraying at Cow Grass Planting Work, etc.,)
	10:00-11:00	51			
	11:00-12:00	52			
	12:00-13:00	52			
	13:00-14:00	56			
	14:00-15:00	53			
	15:00-16:00	53			
	16:00-17:00	53			
	17:00-18:00	53			No construction Activities
	18:00-19:00	48			
	19:00-20:00	49	51	55	
	20:00-21:00	50			
	21:00-22:00	52			
	22:00-23:00	52	52	50	
	23:00-24:00	54			
	24:00-1:00	53			
	1:00-2:00	55			
	2:00-3:00	51			
	3:00-4:00	42			
	4:00-5:00	40			
	5:00-6:00	51			
	6:00-7:00	49			

Source: Myanmar Koei International Ltd.



Source: Myanmar Koei International Ltd.

Figure 2.4-1 Results of Noise Levels (LA_{eq}) Monitoring at NV-1



Source: Myanmar Koei International Ltd.

Figure 2.4-2 Results of Noise Levels (LA_{eq}) Monitoring at NV-2

Vibration Monitoring Results

Vibration monitoring results are separated as daytime (7:00 AM to 7:00 PM), evening time (7:00 PM to 10:00 PM) and night time (10:00 PM to 7:00 AM) time frames respectively for both NV-1 and NV-2. Vibration measurement was carried out for one location on a 24-hour basis. The results of vibration level (L_{v10}) monitoring at NV-1 and NV-2 are shown in Table 2.4-5 and Table 2.4-6. Hourly vibration level (L_{v10}) monitoring results at NV-1 and NV-2 are shown in Table 2.4-7 and Table 2.4-8. Figure 2.4-3 and Figure 2.4-4 showed the graph of vibration level monitoring results at NV-1 and NV-2. By comparing with the target vibration level in operation stage in EIA report for Thilawa SEZ development project Zone B, all of results were under the target values.

Table 2.4-5 Results of Vibration Levels (L_{v10}) Monitoring at NV-1

Date	(Office, commercial facilities and factories) Equivalent Vibration Level (L_{v10}, dB)		
	Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
9 – 10 June 2020	41	33	27
Target Value	70	65	65

Note: Target value is applied to the vibration level during the operation stage in the EIA Report for Thilawa SEZ Development Project (Industrial Area of Zone B).
Source: Myanmar Koei International Ltd.

Table 2.4-6 Results of Vibration Levels (L_{v10}) Monitoring at NV-2

Date	(Residential houses and monastery) Equivalent Vibration Level (L_{v10}, dB)		
	Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
8 – 9 June 2020	25	18	14
Target Value	65	60	60

Note: Target value is applied to the vibration level during the operation stage in the EIA Report for Thilawa SEZ Development Project (Industrial Area of Zone B).
Source: Myanmar Koei International Ltd.

Table 2.4-7 Results of Hourly Vibration Levels (L_{V10}) Monitoring at NV-1

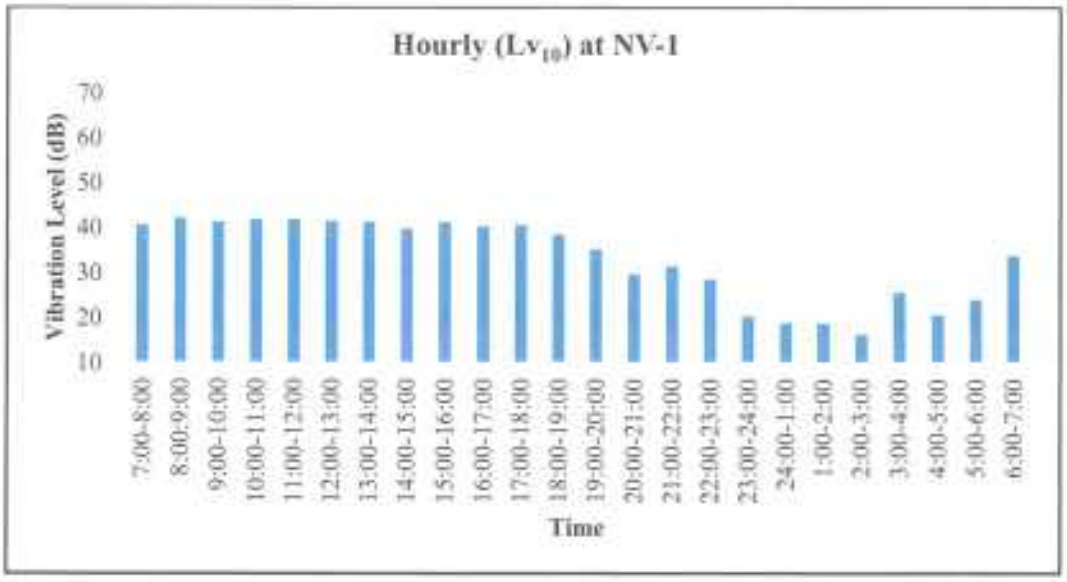
Date	Time	(L_{V10}, dB)	(L_{V10}, dB) Each Category	(L_{V10}, dB) Target Value	Remark
9 - 10 June 2020	7:00-8:00	41	41	70	No construction Activities
	8:00-9:00	42			Construction activities of Zone B (Buffer Zone Level Dressing, Sand Delivery for Grass Planting Work, Water Spraying at Cow Grass Planting Work, etc.,)
	9:00-10:00	41			
	10:00-11:00	42			
	11:00-12:00	42			
	12:00-13:00	42			
	13:00-14:00	41			
	14:00-15:00	40			
	15:00-16:00	41			
	16:00-17:00	40			
	17:00-18:00	41			No construction Activities
	18:00-19:00	38			
	19:00-20:00	35	33	65	
	20:00-21:00	30			
	21:00-22:00	31			
	22:00-23:00	29	27	65	
	23:00-24:00	20			
	24:00-1:00	19			
	1:00-2:00	19			
	2:00-3:00	16			
	3:00-4:00	26			
	4:00-5:00	20			
	5:00-6:00	24			
	6:00-7:00	34			

Source: Myanmar Koei International Ltd.

Table 2.4-8 Results of Hourly Vibration Levels (L_{V10}) Monitoring at NV-2

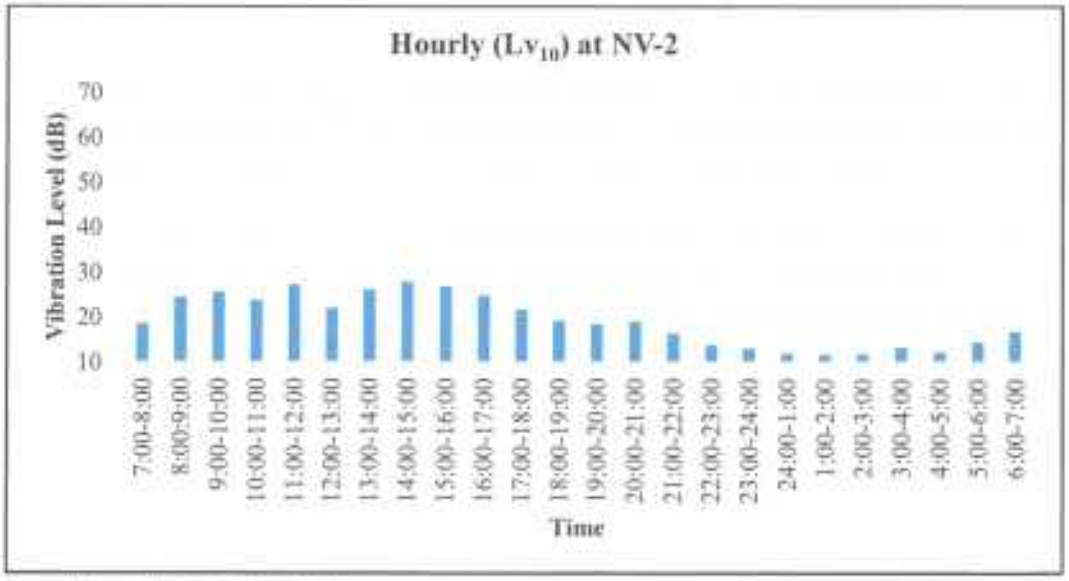
Date	Time	(L_{V10}, dB)	(L_{V10}, dB) Each Category	(L_{V10}, dB) Target Value	Remark
8 - 9 June 2020	7:00-8:00	19	25	65	No construction Activities
	8:00-9:00	24			Construction activities of Zone B (Buffer Zone Level Dressing, Water Spraying at Cow Grass Planting Work, etc.,)
	9:00-10:00	26			
	10:00-11:00	24			
	11:00-12:00	27			
	12:00-13:00	22			
	13:00-14:00	26			
	14:00-15:00	28			
	15:00-16:00	27			
	16:00-17:00	25			
	17:00-18:00	22			No construction Activities
	18:00-19:00	19			
	19:00-20:00	18	18	60	
	20:00-21:00	19			
	21:00-22:00	16			
	22:00-23:00	14	14	60	
	23:00-24:00	13			
	24:00-1:00	12			
	1:00-2:00	12			
	2:00-3:00	12			
	3:00-4:00	13			
	4:00-5:00	12			
	5:00-6:00	14			
	6:00-7:00	17			

Source: Myanmar Koei International Ltd.



Source: Myanmar Koei International Ltd.

Figure 2.4-3 Results of Vibration Levels (L_{v10}) Monitoring at NV-1



Source: Myanmar Koei International Ltd.

Figure 2.4-4 Results of Vibration Levels (L_{v10}) Monitoring at NV-2

CHAPTER 3: CONCLUSION AND RECOMMENDATION

Comparing with the target value of noise level in operation stage prescribed in EIA report for Thilawa SEZ development project Zone B, all results were under the target values except for NV-2 during night time. The results at NV-2 was higher than the target value for six hours during the night time and there were no construction activities at that time. According to the field surveyor record, it was due to the heavy rain, dog barking and passing by vehicles and motorcycles at that time. Therefore, it is considered that there is no impact from operation activities of Zone B to the surrounding environment. The results of vibration level for NV-1 and NV-2 were also lower than the target levels. Thus, there is no negative impact on noise and vibration from operation activities of Zone B to the surrounding environment.

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

Thilawa Special Economic Zone

Zone B– Phase 1 & 2(Operation phase)

Appendix

Traffic Volume Monitoring Report

June 2020

TRAFFIC VOLUME MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1 & 2 OPERATION STAGE)

(BI-ANNUALLY MONITORING)

June 2020

Myanmar Koei International Ltd.

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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

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

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the operation of industrial area in and around Thilawa SEZ Zone B, Traffic volume had been monitored from 9 June 2020 to 10 June 2020 as follows;

Table 1.2-1 Outlines of Traffic Volume Monitoring

Monitoring Date	Monitoring Item	Parameters	Number of Points	Duration	Monitoring Methodology
9 June 2020 - 10 June 2020	Traffic Volume	-	1 (TV-1)	24 hours	Manual Count

Source: Myanmar Koei International Ltd.

CHAPTER 2: TRAFFIC VOLUME MONITORING

2.1 Monitoring Item

The traffic volume monitoring item are shown in Table 2.1-1. All vehicles were classified into four types as detailed in Table 2.1-2.

Table 2.1-1 Monitoring Parameters for Traffic Volume

No.	Item	Parameter
1	Traffic volume	Number of Vehicle (4 Types)

Source: Myanmar Koei International Ltd.

Table 2.1-2 Classification of Vehicles Types

No.	Classification		Description
1	Two-wheeled vehicle		Motorbike, Motorcycle taxi
2	Four-wheeled light vehicle	  	Pick-up car, Jeep, Taxi, Saloon car, Light truck (under 2 tons)
3	Heavy vehicle	  	Medium bus, Express, Big bus, Medium truck, Heavy truck such as 2 axles, 3 axles and more than 4 axles and Trailer (over 4.5 tons)
4	Others		Tractor

Source: Myanmar Koei International Ltd.

2.2 Monitoring Location

Traffic volume was measured at the northeast corner of the Thilawa SEZ Zone B, monitoring point (TV-1); N; 16°40'17.90", E: 96°17'18.20". The location of the traffic volume monitoring point is shown in Figure 2.2-1.

Source: Myanmar Koei International Ltd.

Figure 2.2-1 Location of Traffic Volume Monitoring Point

TV-1

TV-1 is located in front of main gate of operation site of Thilawa SEZ Zone B and next to Thilawa Development road. The surrounding area are Zone A in the northwest and local industrial zone in the east respectively.

2.3 Monitoring Method

The traffic volume monitoring was conducted for 24 hours at the same time as the traffic noise and vibration level monitoring. Traffic volume monitoring was conducted to count the number of vehicles moving in each direction. Manual count method was used and data was recorded using tally sheets. The status of the traffic volume monitoring on TV-1 is shown in Figure 2.3-1.

Source: Myanmar Koei International Ltd

Figure 2.3-1 Status of Traffic Volume Monitoring at TV-1

2.4 Monitoring Results

The traffic volume monitoring results are summarized in Table 2.4-1. Hourly quantities of each type of vehicle were recorded. Table 2.4-1 shows that the number of 2-wheel vehicles are distinctly and highly utilized in weekdays. The number of Heavy vehicles are three and half times lower than the number of 4-wheel light vehicles (Phalan village to Dagon-Thilawa road) and the number of Heavy vehicles are four times lower than the number of 4-wheel light vehicles (Dagon-Thilawa road to Phalan village) for each direction.

Table 2.4-1 Summary of Traffic Volume Recorded at TV-1

Survey Point	Direction	Date	Weekday	2-wheel Vehicles	4-wheel Light Vehicles	Heavy Vehicles	Others	Total
TV-1	Phalan village to Dagon-Thilawa road	9 June 2020 - 10 June 2020	Tuesday & Wednesday	2,786	1,374	381	53	4,594
	Dagon-Thilawa road to Phalan village			2,929	1,493	361	52	4,835

Source: Myanmar Koei International Ltd

The summary monitoring results of hourly traffic volume at TV-1 is shown in Table 2.4-2 and Table 2.4-3 respectively. Compare the result of each direction in morning peak hours as 6:00 to 9:00 and in the evening peak hours as 16:00 to 18:00, traffic volume from Dagon Thilawa road to Phalan village is higher than another direction in the morning peak hours and in the evening peak hours. It may be possible that the commuting vehicles are passing from Dagon Thilawa road to Phalan village in the morning peak hours and in the evening peak hours in this monitoring period.

Table 2.4-2 Hourly Traffic Volume Results at TV-1 (From Phalan Village to Dagon-Thilawa Road)

From	To	Classification				Total
		Type of vehicles				
		Two-wheeled vehicle	Four-wheeled light vehicle	Heavy vehicle	Others	
13:00	14:00	86	93	32	4	215
14:00	15:00	95	86	30	2	213
15:00	16:00	92	91	21	4	208
16:00	17:00	144	96	23	3	266
17:00	18:00	375	235	21	3	614
18:00	19:00	310	128	15	5	458
19:00	20:00	146	39	3	4	192
20:00	21:00	32	24	6	0	62
21:00	22:00	5	3	1	0	9
22:00	23:00	32	19	6	1	58
23:00	0:00	14	6	0	0	20
0:00	1:00	0	2	0	0	2
1:00	2:00	4	2	0	0	6
2:00	3:00	0	0	1	0	1
3:00	4:00	0	1	3	0	4
4:00	5:00	12	3	3	0	18
5:00	6:00	15	5	2	0	22
6:00	7:00	192	55	12	1	260
7:00	8:00	500	88	26	6	620
8:00	9:00	217	87	35	4	343
9:00	10:00	137	81	32	2	252
10:00	11:00	121	75	41	7	244
11:00	12:00	125	98	41	3	267
12:00	13:00	132	77	27	4	240
Total		2,786	1,374	381	53	4,594

Source: Myanmar Koei International Ltd

Table 2.4-3 Hourly Traffic Volume Results at TV-1 (From Dagon-Thilawa Road to Phalan Village)

From	To	Classification				Total
		Type of vehicles				
		Two-wheeled vehicle	Four-wheeled light vehicle	Heavy vehicle	Others	
13:00	14:00	148	95	31	3	277
14:00	15:00	115	105	39	3	262
15:00	16:00	82	100	30	2	214
16:00	17:00	137	118	31	5	291
17:00	18:00	452	120	22	6	600
18:00	19:00	280	73	11	2	366
19:00	20:00	151	59	10	0	220
20:00	21:00	90	30	1	0	121
21:00	22:00	36	14	2	0	52
22:00	23:00	20	4	8	0	32
23:00	0:00	10	3	0	0	13
0:00	1:00	0	0	1	0	1
1:00	2:00	0	0	2	0	2
2:00	3:00	1	0	0	0	1
3:00	4:00	1	0	1	0	2
4:00	5:00	6	3	1	0	10
5:00	6:00	31	7	0	0	38
6:00	7:00	104	24	3	3	134
7:00	8:00	426	172	15	4	617
8:00	9:00	316	170	22	2	510
9:00	10:00	146	125	28	9	308
10:00	11:00	120	101	34	6	261
11:00	12:00	107	94	37	4	242
12:00	13:00	150	76	32	3	261
Total		2,929	1,493	361	52	4835

Source: Myanmar Koei International Ltd

CHAPTER 3: CONCLUSION AND RECOMMENDATION

The results of the traffic volume show that the number of 2-wheel vehicles are distinctly and highly utilized in this monitoring period. The number of 4-wheel Heavy vehicles are three and half times and four times significantly lower than the number of 4-wheel light vehicles for each direction. It seems that commuting vehicles are more utilized during this monitoring period as compared with construction related vehicles (Heavy vehicles).

The continuous monitoring will be necessary to grasp the traffic volume data in operation stage of Thilawa SEZ Zone B. Once enough traffic volume data is collected, the mitigation measures for traffic volume management will be considered in future.

Thilawa Special Economic Zone

Zone B– Phase 1 (Operation phase)

Appendix

General Waste Disposal Record

(February 2020 to August 2020)

Manifest C-Slip

*Transportation company to Waste Generator

Date of Issuance (Day Month, Year)	26 - Feb - 2020	Issuer (Name&Sign)	
Number of Issuance	9999 - 2002 - 0320		

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

Waste	Kind	Name	Style of packing
	☐Non-Hazardous	General waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	840 kg	0001

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) 3K - 8896	(Day Month, Year)
Waste service company	(Name&Sign)	

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD. GEM-SL-R-01E-10

Manifest C-Slip

*Transportation company to Waste Generator

Date of Issuance (Day Month, Year)	26 / Feb / 2020	Issuer (Name&Sign)	
Number of Issuance	9999 - 2002 - 0319		

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

Waste	Kind	Name	Style of packing
	☑Non-Hazardous	General waste	
	☐Hazardous	Quantity(Unit)	Remark
	☐Others	840 kg	0001

Customer code	0001	Waste Profile code	A001

Trace	PIC(Name&Sign)	Date of Completion
Transportation company	(Name&Sign) 3K - 8896	(Day Month, Year)
Waste service company	(Name&Sign)	

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

မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့

ကျောက်တန်းမြို့

ငွေလွှဲပြောင်း/လက်ခံပြေစာ

၁။ လွှဲပြောင်းပေးသည့်ငွေ(စာဖြင့်) ---------

၂။ လွှဲပြောင်းပေးသည့်ငွေ(ဂဏန်းဖြင့်) ---------

၃။ လွှဲပြောင်းပေးသည့်အကြောင်းအရာ ---------

၄။ လွှဲပြောင်းပေးသည့်ရက်စွဲ ---------

၅။ အထက်ဖော်ပြပါငွေကျပ်(---------) အား လက်ခံရရှိပါကြောင်းအောက်တွင်လက်မှတ်ရေးထိုးပါသည်.

လွှဲပြောင်းပေးသူ

အမည်၊

ရာထူး

လွှဲပြောင်းလက်ခံသူ

အမည်၊

လိပ်စာ

Manifest C-Slip

*Transportation company to Waste Generator

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

Contractors	Waste generator	Transportation company	Waste service company
Company Name			
Tel			

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

Customer code		Waste Profile code	

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

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO.,LTD. GEM-SL-R 010E/00

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Manifest	C-Slip	*Transportation company to Waste Generator

Date of issuance	(Day Month, Year) 20.9.2020	Issuer	(Name & Sign)
Number of issuance	0001-2004-0008		

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

	Kind	Name	Style of packing
Waste	☐ Non-Hazardous	General Waste	
	☐ Hazardous	Quantity (Unit)	Remark
	☐ Others	1,000 kg	B001

Customer code	0001	Waste Profile code	A001

Trace	PIC (Name & Sign)	Date of Completion
Transportation company	(Name & Sign) Zaw Htung Lin 5K-3346	(Day Month, Year)
Waste service company	(Name & Sign) Ko Myo Thet Maw	(Day Month, Year)

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO.,LTD. GEM-SL-R 010E/00

Manifest	C-Slip	*Transportation company to Waste Generator

Date of issuance	(Day Month, Year) 21.9.2020	Issuer	(Name & Sign) Thet Htet Htet Aung
Number of issuance	0001-2004-0008		

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

	Kind	Name	Style of packing
Waste	☐ Non-Hazardous	General waste	
	☐ Hazardous	Quantity (Unit)	Remark
	☐ Others	1,040 kg	B001

Customer code	T0001	Waste Profile code	A001

Trace	PIC (Name & Sign)	Date of Completion
Transportation company	(Name & Sign) Zaw Htung Lin 5K-3346	(Day Month, Year)
Waste service company	(Name & Sign) Ko Myo Thet Maw	(Day Month, Year)

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO.,LTD. GEM-SL-R 010E/00

MJTD MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

Manifest — A-Slip

*Waste generator Copy

Date of issuance	(Day Month, Year) 11.5.2020	Issuer	(Name & Sign) Thet Sein Khin
Number of issuance	0001-2005-0001		

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

	Kind	Name	Style of packing
Waste	☐ Non-Hazardous	General Waste	
	☐ Hazardous	Quantity (Unit)	Remark
	☐ Others	800 kg	B001

Customer code	0001	Waste Profile code	A001

Trace	PIC (Name & Sign)	Date of Completion
Transportation company	(Name & Sign) Myi Myi Htwe 3lc-8896	(Day Month, Year)
Waste service company	(Name & Sign) Phyo Phyu Aye	(Day Month, Year)

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO.,LTD. GEM-SL-R 010E/00

MJTD

Manifest — C-Slip

*Transportation company to Waste Generator

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

Contractors	Waste generator	Transportation company	Waste service company
mpany Name			
Tel			

	Kind	Name	Style of packing
Waste	☐ Non-Hazardous		
	☐ Hazardous	Quantity (Unit)	Remark
	☐ Others	740 kg	

istomer code		Waste Profile code	

Trace	PIC (Name & Sign)	Date of Completion
nsportation company	(Name & Sign) 3H-8896	(Day Month, Year)
ste service company	(Name & Sign)	(Day Month, Year)

Designed by GOLDEN TOWA ECO-SYSTEM MYANMAR CO.,LTD. GEM-SL-R 010E/00

: 3K_8896

: Golden Towa Eco-System Myanmar Co., LTD

To: GW

6000kg G
5340kg PI
740kg N

MJTD MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

Manifest	E-Slip	*Waste service company to Waste Generator

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

Contractors	Waste generator	Transportation company	Waste service company
Company Name			
Tel			

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

Customer code		Waste Profile code	

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

Manifest	E-Slip	*Waste service company to Waste Generator

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

Contractors	Waste generator	Transportation company	Waste service company
Company Name			
Tel			

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

Customer code		Waste Profile code	

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

Designed by GOLDEN DOWA ECO-SYSTEM MYANMAR CO.,LTD. GEM-SL-R 010E/00

MJTD DEVELOPMENT LIMITED

Thilawa Special Economic Zone

Zone B– Phase 1 (Operation phase)

Appendix

Sewage Treatment Plant Monitoring Record

March 2020 to August 2020

Daily Parameter Report - STP

Monthly	Date	Inlet				Outlet - 1				Outlet - 2			
		pH	TDS	Tem	COD	pH	TDS	Tem	COD	pH	TDS	Tem	COD
Standard		6 - 9	2000	≤38	400	6 - 9	2000	≤38	125	6 - 9	2000	≤38	125
Unit		-	mg/L	°C	mg/L	-	mg/L	°C	mg/L	-	mg/L	°C	mg/L
Mar	01-03-20	6.8	356	28.35	-	6.73	493	26.55	OFF	6.79	734	28.72	-
Mar	02-03-20	6.75	359	29.15	-	7.07	492	26.5	OFF	6.57	652	28.62	-
Mar	03-03-20	6.8	534	29.22	-	6.71	493	26.49	OFF	6.21	623	28.61	22.6
Mar	04-03-20	6.95	467	29.11	24.3	6.56	495	27.31	OFF	6.47	618	28.75	16.2
Mar	05-03-20	6.89	468	29.57	-	6.91	493	27.00	OFF	6.56	617	28.36	20.3
Mar	06-03-20	7.04	360.8	29.64	-	6.34	457	26.96	OFF	6.64	598	29.15	26.1
Mar	07-03-20	6.87	329	30.02	-	6.24	506	26.73	OFF	6	523	29.57	-
Mar	08-03-20	6.81	334	29.12	-	6.32	521	26.14	OFF	6.16	538	29.43	-
Mar	09-03-20	6.38	458	29.6	-	6.85	511	26.92	OFF	6.49	560	29.32	-
Mar	10-03-20	7.02	517.6	30.3	-	6.59	534.7	27.2	OFF	6.36	546.7	29.6	24.8
Mar	11-03-20	6.96	356.2	30.6	467	7.21	502.6	28.5	OFF	6.62	539.7	29	33.3
Mar	12-03-20	7.2	518.6	28.8	-	7.12	516.2	25.6	OFF	6.83	486	26	40
Mar	13-03-20	6.75	1639	27.04	-	6.84	516.2	27.2	OFF	6.22	511.3	25.6	31.9
Mar	14-03-20	7.01	470	26.8	-	6.78	502.2	26.7	OFF	6.49	502.4	26.7	-
Mar	15-03-20	6.98	520	25.7	-	6.91	490.2	26.1	OFF	6.91	536.1	25.6	-
Mar	16-03-20	7.28	466.1	27.26	-	6.77	530.1	30.14	OFF	6.87	562	30.33	49
Mar	17-03-20	7.88	461.8	25.4	-	6.66	540.5	25.3	42	6.77	470	25.9	OFF
Mar	18-03-20	6.87	1019	24.7	716	7.32	529.7	24.7	102	7.13	781.9	25.8	OFF
Mar	19-03-20	7.13	633.8	26	-	7.31	554.5	26.1	50	6.89	752.5	24.6	OFF
Mar	20-03-20	6.99	410.3	26.3	-	7.23	503.8	27.6	62	7.28	745.6	27.5	OFF
Mar	21-03-20	7.15	729	29.86	-	6.05	544	30.55	-	6.96	738	30.14	OFF
Mar	22-03-20	6.88	470	30.43	-	6.93	565	30.45	-	7.04	759	29.79	OFF
Mar	23-03-20	6.24	1234	29.62	-	6.6	532.4	29.16	57	7.27	799.6	29.59	OFF
Mar	24-03-20	6.22	1060	25.9	-	6.36	572.9	25.8	52	7.38	801.4	26.3	OFF
Mar	25-03-20	6.81	2080	27	788	6.97	646	28.5	78	7.36	778.2	26.2	OFF
Mar	26-03-20	7.06	549.6	28.8	-	6.73	626.1	27.4	104	7.37	799.9	28.1	OFF
Mar	27-03-20	6.85	642.4	27.2	-	6.77	556.7	28.1	-	7.13	798.7	27.2	OFF
Mar	28-03-20	7.28	471.3	26.4	-	7.75	648.3	25.8	-	7.89	782.2	26.4	OFF
Mar	29-03-20	6.9	384.8	27.9	-	7.17	604.3	26.4	-	7.5	784.4	26.8	OFF
Mar	30-03-20	7.14	525.8	28.2	-	7.05	594.9	28	60	7.77	795.2	28.1	OFF
Mar	31-03-20	7.14	392	28.6	-	7.07	663.7	28.7	33.6	7.8	794.2	25.8	OFF
Apr	01-04-20	7.18	764.8	23.9	-	7.09	647	24	47	7.69	782	24	OFF
Apr	02-04-20	7.25	755.3	28.8	108	7.02	932.6	27.1	88	7.42	800.7	28.6	OFF
Apr	03-04-20	7.15	500.5	29.8	-	7.11	727.4	28.1	16	7.19	803.5	28.6	OFF
Apr	04-04-20	7.03	360.1	22.9	-	7.3	784.3	22.6	-	7.68	805.2	22.6	OFF
Apr	05-04-20	7.25	504.5	22.7	-	7.34	698.9	22.8	-	-	780.6	22.7	OFF
Apr	06-04-20	7.19	375.7	22.1	-	7.29	506.2	22.4	56	7.69	780.9	22.2	OFF
Apr	07-04-20	7.17	537.7	28.6	134	7.13	548.5	27.1	39	7.81	791.7	27.3	OFF
Apr	08-04-20	7.2	571.4	28.1	-	7.16	804.5	28.1	101	7.72	788.8	28	OFF
Apr	09-04-20	6.92	193.7	27.6	-	7.22	708.8	28	49	7.71	803.7	28.2	OFF
Apr	10-04-20	6.94	702.8	23.5	-	7.21	599.4	23	-	7.59	783.9	23.1	-
Apr	11-04-20	6.6	316.8	23.2	-	7.09	594.1	23.3	-	8.02	773.4	23.3	-
Apr	12-04-20	6.49	271.2	22.8	-	6.89	580.5	23.8	-	7.1	781.4	23.5	-
Apr	13-04-20	6.42	239.2	22.7	-	6.83	567.6	23.3	-	7.27	692.8	23.5	-
Apr	14-04-20	6.83	288.8	23.5	-	6.86	571.6	23	-	7.26	599.9	23	-
Apr	15-04-20	6.88	354.5	22.5	-	7.31	598.4	23.1	-	7.41	612.9	22.6	-
Apr	16-04-20	6.7	304.9	22.5	-	6.89	421	22.7	-	7.09	589.6	22.6	-
Apr	17-04-20	7.01	314.6	22.8	-	6.67	376.2	22.7	-	7.22	609.4	22.9	-
Apr	18-04-20	7.11	316.6	22.6	-	6.77	321.2	22.8	-	7.39	607.2	22.9	-
Apr	19-04-20	7.12	347.6	22.9	-	6.8	302.3	23	-	7.25	609.9	23.1	-
Apr	20-04-20	7.21	356.2	28.8	13.8	6.79	353.5	27.9	OFF	6.75	614.4	28.1	13.8
Apr	21-04-20	7.22	444.7	28	-	6.89	399.7	27.7	OFF	7.25	562.3	28.1	37
Apr	22-04-20	7.26	381.1	28.4	-	6.76	407.1	27.5	OFF	7.29	561.6	28	12
Apr	23-04-20	7.11	363.1	24.9	-	6.66	432.6	27.5	OFF	7.24	561.5	27.1	16
Apr	24-04-20	7.22	294.8	28	-	6.83	446.3	28.3	OFF	7.2	537.8	27.8	14
Apr	25-04-20	6.96	304.4	24.1	-	6.7	435.2	24.5	-	7.03	472.7	24.2	-
Apr	26-04-20	6.97	296.7	24.3	-	6.75	405.4	24.2	-	7	450.2	24	-
Apr	27-04-20	7.06	366	25.6	-	6.79	439	25.1	OFF	7.14	433.3	25.1	16
Apr	28-04-20	7.03	321.7	27.5	46	6.96	420.7	27.9	OFF	6.92	513.9	28	34
Apr	29-04-20	7.09	479.8	26.7	-	6.66	440.2	27.4	OFF	6.8	531.6	26.4	19.7
Apr	30-04-20	7.11	570.8	27.7	-	6.63	439.2	27.7	OFF	6.6	601.1	27.9	18.4
May	01-05-20	6.9	618.3	25.1	-	6.83	491.1	25.2	OFF	6.78	686.3	25	-
May	02-05-20	6.48	272.3	25	-	6.58	439.2	25.4	OFF	6.66	610.7	25	-
May	03-05-20	6.68	493.8	25.3	-	6.82	468.1	24.8	OFF	6.47	683.8	25.1	-
May	04-05-20	6.06	510.4	27	88	6.72	440.7	26.9	OFF	6.63	685.1	26.7	640
May	05-05-20	6.83	589.6	29.1	-	6.75	441.4	27.6	OFF	6.67	683.8	27.5	32
May	06-05-20	7.3	381.1	24.4	-	6.15	594.2	24.7	OFF	7.85	612.3	25	OFF
May	07-05-20	6.93	327.3	26.5	-	6.66	654.1	28.3	30.6	6.66	600.1	28	OFF
May	08-05-20	6.11	178.5	25.7	-	6.61	540.5	26.3	30.7	6.69	583.7	25.9	OFF
May	09-05-20	6.92	142.6	25.4	-	6.64	577.9	25.3	-	6.81	586.5	25	OFF
May	10-05-20	7.22	441.2	25.8	-	6.7	628.3	25.3	-	8.04	594.8	25.6	OFF
May	11-05-20	7.1	694.3	29	-	6.56	632.9	29.9	19.6	6.44	699.4	28.7	OFF
May	12-05-20	7.21	638.7	28.2	-	6.59	650.1	28.7	22.7	7.3	698.2	28	OFF
May	13-05-20	6.93	398.1	27.3	113	6.37	604.7	27.3	OFF	6.41	611.1	27.1	31.1
May	14-05-20	7.1	701.4	29.1	-	6.4	633	28.8	OFF	6.88	704.9	29.2	32
May	15-05-20	6.96	665.8	29.4	-	6.39	613.3	28.1	OFF	6.49	705.8	28.2	31
May	16-05-20	6.84	664.7	24.4	-	6.4	615.7	24.5	OFF	6.38	767.7	24.5	-
May	17-05-20	6.88	641.1	24.7	-	6.57	615.2	24.3	OFF	6.69	702.8	24.4	-
May	18-05-20	7.01	566.8	26.8	-	6.61	617.4	26.7	OFF	6.01	670.4	26.9	39.1
May	19-05-20	7.12	332.5	26.6	426	6.59	592.1	26.6	OFF	6.56	677.3	25.9	37.7
May	20-05-20	7.05	482.3	26	-	6.49	593.5	26.3	OFF	6.57	628.3	26.9	36.3
May	21-05-20	6.78	523.5	24.6	-	6.56	600.6	24.3	OFF	6.19	637.1	23.9	28
May	22-05-20	6.98	274.3	28.1	-	6.41	472.5	27.9	28.8	6.53	624.2	27.1	30.8
May	23-05-20	6.84	1200	27.7	-	6.48	598.3	27.5	-	6.52	667.4	27.2	-
May	24-05-20	7.01	337	26.6	-	6.71	583	26.8	-	6.6	682.2	26.4	-
May	25-05-20	6.92	678.2	30.3	-	6.63	667.9	30.1	16.2	6.44	700.1	30.2	OFF
May	26-05-20	6.97	485.7	27.6	130	6.68	607.3	27.1	19.6	6.49	704.8	27.2	OFF
May	27-05-20	7.01	583.2	30.4	-	6.65	604.5	30.1	30	6.45	747.8	29.5	OFF
May	28-05-20	7.03	396.7	27.5	-	6.62	593.3	26.7	32.4	6.55	760.9	28	OFF

May	29-05-20	7.03	373.5	26.1	-	6.86	577.3	26.7	14.5	6.59	786.2	28.2	20.7
May	30-05-20	6.86	408.6	24.6	-	6.71	592.7	24.8	-	6.46	769.8	24.4	-
May	31-05-20	6.94	340.2	24.3	-	7.04	540.2	24.4	-	6.84	768.7	24.4	-
Jun	01-06-20	7.1	1308	26.8	-	6.86	523.5	25.8	22.4	6.49	688.9	25.5	20.6
Jun	02-06-20	6.88	399.5	25.6	-	6.99	484.9	26	12.1	6.79	624.7	26.3	15.6
Jun	03-06-20	6.86	405.8	25.7	127	7.13	467	25.1	27.7	6.48	619.3	25.3	28.5
Jun	04-06-20	6.89	326.9	29	-	6.97	506.1	29	13.1	6.61	747.6	26.9	16.7
Jun	05-06-20	7	348.0	27.1	-	6.93	524.8	27	16.3	6.69	724.2	26.9	12.4
Jun	06-06-20	6.85	420.2	24.4	-	6.74	472.1	24.4	-	6.6	636.7	24.6	-
Jun	07-06-20	6.83	357.7	24.5	-	6.72	434.9	24.3	-	6.66	621.3	24.8	-
Jun	08-06-20	6.9	442.2	24.6	-	6.99	446.6	25.3	5.9	6.67	617.7	25.2	9.6
Jun	09-06-20	6.88	353.4	26.1	-	6.75	417.3	26.5	6.7	6.62	535.9	26.9	26.7
Jun	10-06-20	7.04	237.9	27.5	209	7.03	465.9	27.7	30.8	6.94	530.3	27.5	24.2
Jun	11-06-20	6.91	319.7	24.9	-	6.7	469.3	24.8	16	6.62	618.4	25.1	22.7
Jun	12-06-20	6.93	323.3	26.2	-	6.84	351	25.4	12.9	7	636.9	25.9	26.4
Jun	13-06-20	6.76	247.5	21.1	-	6.94	284.6	21.5	-	7.18	485.1	20.9	-
Jun	14-06-20	6.77	324.5	22.6	-	6.88	300.7	22.4	-	7.21	387.8	22.6	-
Jun	15-06-20	7.01	309.7	24.9	-	6.93	279.9	23.8	25.5	6.97	386.1	24.4	12.2
Jun	16-06-20	6.91	290.9	25.4	-	7.01	313.2	26	13.7	7	339.4	25.7	10.6
Jun	17-06-20	7.21	1148	25.4	139	6.94	305.9	25	15.9	7.09	464.1	25.6	16.7
Jun	18-06-20	6.87	341.5	28.2	-	6.89	324.2	28	9.7	6.91	521.2	28.1	27.2
Jun	19-06-20	6.8	238.8	26.4	-	6.86	270.6	26.4	14.4	6.76	438	26.6	19
Jun	20-06-20	6.7	293.1	22	-	6.85	260.9	22	-	6.99	386.1	22	-
Jun	21-06-20	6.67	238.1	22.3	-	6.8	361.8	22.4	-	6.98	364	22.6	-
Jun	22-06-20	6.68	338.5	26.2	-	7.04	364	24.9	17.9	7	395.8	23.8	12.9
Jun	23-06-20	6.69	866.6	24.6	-	7.01	330.8	23.8	28.4	7.07	379.1	23.5	18.5
Jun	24-06-20	6.19	707.8	25	923	6.9	402.4	25.5	26.2	6.95	456.4	25.2	25.4
Jun	25-06-20	6.8	231.3	24.3	-	6.92	398.7	24.7	39.1	7.21	467.8	25.1	-
Jun	26-06-20	6.79	183.3	26.6	-	6.91	340.6	26.5	24.9	6.9	479.2	26.2	40
Jun	27-06-20	6.67	270	24.5	-	6.72	336.2	24.3	-	6.9	467.3	24.3	-
Jun	28-06-20	6.79	349.2	24.2	-	6.85	320.6	24.6	-	6.91	469.3	24.5	-
Jun	29-06-20	6.8	212.5	27.8	-	6.81	230.8	27.4	13.4	6.86	329.2	27.5	
Jun	30-06-20	6.94	504.1	21.8	-	7.1	316.9	21.5	33.7	7.1	364.8	20.9	31.1
Jul	01-07-20	7.04	313.7	27.4	316	6.99	468	27.6	20.2	7.06	395.9	27.2	31.1
Jul	02-07-20	6.93	695.2	25.4	-	6.93	458.7	25.7	19.8	6.97	378.2	25.3	22.8
Jul	03-07-20	6.89	249.2	26.9	-	6.81	348.5	26.8	18	6.96	461.1	26.8	13
Jul	04-07-20	6.81	700.7	24.3	-	6.7	436.3	24.3	-	7.19	534.7	24.1	-
Jul	05-07-20	6.72	203.8	24.8	-	6.91	271	24.8	-	7.02	409.2	24.8	-
Jul	06-07-20	6.84	302.7	25.4	-	6.88	230.7	25.6	11	6.95	384.3	25.5	16
Jul	07-07-20	6.88	469.2	27.7	238	6.14	285.4	27.6	16.2	6.89	544.4	27.7	17.8
Jul	08-07-20	6.71	238.6	24.1	-	6.77	329.4	23.9	20	6.89	416.7	25.2	5
Jul	09-07-20	6.72	436.1	27.9	-	6.74	429.5	27.5	39	6.9	428.1	27	-
Jul	10-07-20	6.84	502.6	26.5	-	6.67	424.8	26.1	54	6.89	414.3	26.3	-
Jul	11-07-20	6.71	234.9	22.2	-	6.78	310.1	22.6	-	6.96	399.4	22.6	-
Jul	12-07-20	6.66	269	23.6	-	6.9	276	23.7	-	6.76	420.9	23.6	-
Jul	13-07-20	6.85	269.5	23.7	-	6.88	376.5	24.7	16	7.02	265.6	23.8	22
Jul	14-07-20	6.89	416.9	23.5	-	6.95	279.3	23.1	4	7.03	317.7	23.4	21
Jul	15-07-20	6.99	273.4	26.7	230	6.96	291.5	25.6	7	7.16	432.2	25.7	33
Jul	16-07-20	6.94	342.2	25.9	-	6.8	294	25.6	6	7.2	495.1	25.7	39
Jul	17-07-20	6.94	221.4	24.9	-	7.28	286.9	26.2	18	9.38	490	25.9	29
Jul	18-07-20	6.79	365.3	24.2	-	6.89	297	24.2	-	7.27	421.6	24.1	-
Jul	19-07-20	6.77	284.6	23.7	-	6.96	340.6	23.7	-	7.44	434.7	23.8	-
Jul	20-07-20	6.83	278.6	23	-	6.95	327.4	23.9	-	7.26	431.5	23.8	-
Jul	21-07-20	6.92	242	24.5	-	6.97	304	24.1	5	7.23	467.1	24.4	10
Jul	22-07-20	7.03	316.5	25.6	54	6.94	312.4	25.6	21	7.14	386.4	25.4	8
Jul	23-07-20	6.91	349.4	27.2	-	6.9	376.9	26.8	9	7.05	434.6	27.1	11
Jul	24-07-20	6.75	303.1	26.6	-	6.86	373.8	27	16	6.74	370	26.5	36
Jul	25-07-20	6.71	310.1	22.9	-	6.75	386.4	21.9	-	6.67	396.8	22.7	-
Jul	26-07-20	6.81	388.3	23.3	-	6.75	364.4	23.3	-	7.25	474.7	22.7	-
Jul	27-07-20	6.85	272.7	29.4	-	6.86	380.5	29.3	-	7.19	405	29.3	-
Jul	27-07-20	7.07	415.8	29.3	48	6.77	393.2	29.7	19	6.85	462.3	30	33
Jul	28-07-20	6.88	256.0	26.6	-	6.76	362.9	24.8	12	6.96	474.5	26	30
Jul	29-07-20	6.97	959.4	24.7	186	6.92	379.1	25.1	23	6.6	486.6	24.9	25
Jul	30-07-20	6.83	301.9	26.9	-	6.91	353.1	26.9	13	6.79	529.6	26.6	14
Jul	31-07-20	6.9	293.9	22.5	-	6.92	398.9	23.6	-	6.65	614	22.3	-
Aug	01-08-20	6.67	178	23.6	-	6.46	382.4	23.9	-	6.63	383.1	23	-
Aug	02-08-20	6.76	196.6	23	-	6.58	257.3	23.3	-	6.69	330.9	23.2	-
Aug	03-08-20	6.77	177	23.8	-	6.83	285.2	23.4	-	6.79	302	23.3	-
Aug	04-08-20	6.77	265.3	27.3	386	6.98	291.1	26.4	16	6.99	334	26.3	18
Aug	05-08-20	6.34	362.8	25.1	436	6.81	269.2	26.9	54	6.83	393.9	27.4	29
Aug	06-08-20	6.77	237.1	25.9	-	6.74	265.2	26.2	76	6.97	299.7	26.2	45
Aug	07-08-20	6.71	177	25.7	-	6.78	301.2	26.7	14	6.74	299.7	26.6	261
Aug	08-08-20	6.63	318.4	25.8	-	6.51	286.5	25.9	-	6.95	294	25.9	-
Aug	09-08-20	6.79	382.2	27.2	-	6.8	311.5	26.8	-	6.93	386.4	27	-
Aug	10-08-20	6.54	432.4	25.5	47	6.66	315.3	25.9	3	6.89	409	25.2	8
Aug	11-08-20	6.9	320.1	28	81	6.21	450.7	27.8	16	7.27	429.9	27.6	7
Aug	12-08-20	6.46	540.7	28.6	-	6.81	364.8	26.2	9	7.04	464.5	29.6	10
Aug	13-08-20	6.69	226.3	28.8	-	6.92	379.9	28.5	25	7.12	466.3	28.7	8
Aug	14-08-20	6.74	207.6	26.2	-	6.78	408.1	26.9	63	6.91	447.9	26.6	200
Aug	15-08-20	6.36	233.8	20.9	-	7.06	327.2	21.2	-	6.78	330.7	20.9	-
Aug	16-08-20	6.74	312.2	21.1	-	6.91	272.9	21.4	-	6.97	359.8	21.6	-
Aug	17-08-20	6.95	294.5	22.1	1036	7.01	247	22.9	14	7.14	326.5	23.2	10
Aug	18-08-20	5.64	609.2	25.9	-	6.84	272.3	28.3	24	7.23	374.5	28.2	17
Aug	19-08-20	7	200.2	25.8	183	7.01	297.8	25.4	28	7.14	446.8	25.9	24
Aug	20-08-20	6.76	264.6	25.6	-	7	474.1	25.4	10	7.06	477.2	25.5	18
Aug	21-08-20	6.69	300.3	27.7	-	6.54	307	27.7	5	6.61	393.2	27.9	10
Aug	22-08-20	6.84	302.3	22.2	-	6.85	331.7	22.3	-	6.83	341	22	-
Aug	23-08-20	6.73	249.8	23.1	-	6.81	320.2	23.4	-	6.99	552.6	23.1	-
Aug	24-08-20	7.05	240.5	26.9	277	6.96	326.6	26.7	7	6.82	470.6	26.9	24
Aug	25-08-20	6.95	259.4	24.9	742	6.94	318.1	27	10	6.88	394.9	25.9	30
Aug	26-08-20	6.86	295.6	23.8	-	6.86	299.4	24.1	13	6.95	394.5	24.3	16
Aug	27-08-20	6.71	982	26.4	340	6.75	299.8	26.7	10	6.89	412.2	26.4	7
Aug	28-08-20	6.89	212.2	25.6	-	6.89	282.1	25.3	11	6.84	411	25.3	14
Aug	29-08-20	6.62	199.1	21.8	-	6.74	312.9	22.1	-	6.78	405	21.7	-
Aug	30-08-20	6.93	205.4	23.8	-	7.44	341	23.9	-	6.85	416	23.8	-
Aug	31-08-20	6.78	203.6	24	130	6.83	228.3	23.6	7	6.82	414.3	24	10

Weekly Parameter Report -STP

Month	Date	Inlet					Outlet - 1								Outlet - 2							
		SS	BOD	T-N	T-P	O&G	SS	BOD	T-N	T-P	O&G	T-Coli	E-Coli	Free Chlorine	SS	BOD	T-N	T-P	O&G	T-Coli	E-Coli	Free Chlorine
Standard		Max 200	Max 200	Max 80	Max 8	Max 40	Max 50	Max 30	Max 60	Max 2	Max 10	Max 400	Max 1000	Max 1	Max 50	Max 30	Max 60	Max 2	Max 10	Max 400	Max 1000	Max 1
Unit		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	MNP/100ml	MNP/100ml	mg/L	ppm	ppm	ppm	ppm	ppm	MNP/100ml	MNP/100ml	mg/L
Mar	04-03-20	24	3.3	9.8	1.06	< 3.1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	4	6.44	15.7	1.34	< 3.1	540	-	< 0.1
Mar	11-03-20	-	-	-	-	-	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	4	9.01	14.9	0.72	< 3.1	< 1.8	-	-
Mar	18-03-20	-	-	-	-	-	22	13.52	7.8	1.27	< 3.1	23	-	-	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Mar	25-03-20	-	-	-	-	-	8	2.02	13.6	0.34	< 3.1	< 1.8	-	-	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Apr	01-04-20	22	28.24	16	2.22	1.6	11	4.55	14	1.7	1.7	1	1	0.3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Apr	08-04-20	59	16.64	23	3.77	1.5	34	5.7	8	1.84	1.6	< 1	< 1	-	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Apr	22-04-20	17	10.09	17	3.04	1.3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	3	3.04	10	< 0.3	0.9	112	23	-
Apr	29-04-20	38	35.33	14	1.23	1.5	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	3	16.64	10	1.09	0.7	21	6	0.33
May	05-05-20	12	18.09	13.1	1.84	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	3	0.77	11.3	1.63	0	1	1	0.12
May	13-05-20	77	71.74	17.3	4.84	0.9	2	OFF	14.1	1.42	0.8	OFF	OFF	OFF	OFF	18.23	OFF	OFF	OFF	131	21	0.23
May	20-5-20	48	283.69	20	5.06	0.8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	9	7.85	14.2	1.95	0.6	5	1	0.27
May	27-5-20	68	86.24	17.1	2.64	0.8	5	1.49	12.3	1.36	0.5	1	< 1	0.2	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Jun	03-06-20	619	42.65	15.1	1.91	1.6	3	1.38	12.3	1.38	1.8	<1	<1	0.41	5	2.25	14	1.38	1.5	1	< 1	0.28
Jun	10-06-20	28	176.3	16	1.63	0.6	4	2.2	10.1	0.76	0.7	< 1	< 1	0.22	4	3.62	8.8	0.94	0.4	1	< 1	0.36
Jun	17-06-20	200	73.7	10.1	2.12	0.8	2	1.08	7.6	1.15	0.5	1	< 1	0.23	3	4.32	7.3	1.28	0.3	1	< 1	0.38
Jun	24-06-20	150	396.47	10.1	1.8	0.5	1	8.38	5.2	0.98	0.3	5	< 1	0.25	2	7.96	6	1.02	0.6	1	< 1	0.38
Jul	01-07-20	36	89.07	10.7	1.29	0.8	12	3.4	5.5	0.87	0.6	< 1	< 1	0.62	8	8.35	6	0.69	0.3	< 1	< 1	0.35
Jul	07-07-20	20	85.65	8	1.77	0.5	10	0.89	4	0.85	0.2	< 1	< 1	0.54	6	2.47	2	0.75	0.1	1	< 1	0.22
Jul	15-07-20	189	169.67	16	1.76	0.9	2	0.76	10	0.52	0.5	1	< 1	0.28	14	1.83	8	0.75	0.7	< 1	< 1	0.2
Jul	22-07-20	35	34.53	22	1.63	0.6	5	4.2	9	0.82	0.4	< 1	< 1	0.17	1	4.6	8	0.75	0.4	< 1	< 1	0.12
Jul	29-07-20	30	109.56	22	2.07	0	1	4.84	13	0.86	0	< 1	< 1	0.42	5	4.49	11	0.84	0	4568	838	0.2
Aug	05-08-20	45	455.89	12	1.61	0	6	2.14	11	0.536	0	< 1	< 1	0.39	24	0.49	9	0.798	0	< 1	< 1	0.22
Aug	12-08-20	30	19.54	13	0.733	2.2	7	1.83	9	0.728	1.9	< 1	< 1	0.39	6	3.39	7	0.762	1.8	1	< 1	0.27
Aug	19-08-20	45	57.24	13	1.01	2	4	3.05	10	0.73	1.7	< 1	< 1	0.85	8	1.89	7	0.452	1.2	< 1	< 1	0.68
Aug	26-08-20	150	232.54	15	2.02	0	1	6.66	11	0.833	0	< 1	< 1	1.21	15	6.36	7	1.05	0	< 1	< 1	1.69

Monthly Parameter Report - STP

Month	Date	Inlet						Outlet -1						Outlet -2					
		Cyanide	Formal-dehyde	Free Chlorine	Color	Iron	Ammonia	Cyanide	Formal-dehyde	Total Chlorine	Color	Iron	Ammonia	Cyanide	Formal-dehyde	Total Chlorine	Color	Iron	Ammonia
Standard		Max 0.1	Max 1	Max 1	150	Max3.5	Max10	Max 0.1	Max 1	Max 0.2	Max 150	Max3.5	Max10	Max 0.1	Max 1	Max 0.2	Max 150	Max3.5	Max10
Unit		ppm	ppm	ppm	Co-Pt	ppm	ppm	ppm	ppm	ppm	TCU	ppm	ppm	ppm	ppm	ppm	-	ppm	ppm
Mar	04-03-20	-	-	-	-	-	-	OFF	OFF	OFF	OFF	OFF	OFF	< 0.002	0.272	< 0.1	4.7	0.062	0.07
Apr	03-04-20	0.006	0.237	0	17.89	1.5	> 12.4	0.001	0.084	0.52	11.6	0.304	0.236	OFF	OFF	OFF	OFF	OFF	OFF
May	05-05-20	0.004	0.086	-	13.99	0.654	13.6	OFF	OFF	OFF	OFF	OFF	OFF	0.004	0.034	0.18	6.32	0.066	0.084
Jun	03-06-20	0.006	0.264	0	42.59	0.899	10.3	0.002	0.051	0.9	8.7	0.146	0.072	0.004	0.045	0.58	7.29	0.06	0.047
Jul	01-07-20	0.005	0.393	0	37.02	2.244	5.33	0.004	0.072	2.4	5.53	0.264	0.04	0.002	0.047	0.27	6.6	0.297	0.041
Aug	05-08-20	0.031	0.819	0	21.09	2.453	4.64	0	0.035	0.47	3.12	0.284	0.049	0	0.062	0.63	5.01	0.392	0.046