MJTD

Thilawa Special Economic Zone (Zone B) Development

Environmental Monitoring Report Phase-1,2 and 3 (Operation Phase)

Myanmar Japan Thilawa Development Limited.

September 2022

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 2022 to August 2022 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
4	Environmental Monitoring Report	Phase-1 & 2 Operation Phase	March, 2021
5	Environmental Monitoring Report	Phase-1,2 & 3 Operation Phase	September, 2021
6	Environmental Monitoring Report	Phase-1,2 & 3 Operation Phase	March, 2022
7	Environmental Monitoring Report	Phase-1,2 & 3 Operation Phase	September, 2022

Report (No.7 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 operation 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_2, SO_2, CO, $PM_{2.5}$, PM_{10}	Representative point inside the project area	1 week each in the dry and rainy seasons	June 2022, 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 2022, April 2022 Water and Wastewater Quality Monitoring Report (Bi-monthly report) June 2022 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
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)	Monitoring will be started when the whole Zone-B is in Operation Stage
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 2022 Traffic Count Monitoring Report June 2022
Bottom Sediment	-Water quality monitoring (as indicative 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	-
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 related 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	-

*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 & 3 (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 2022)

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	0.053	0.106	0.2 mg/m³ (1 Hour)	0.1 mg/m³ (24 Hour)	-	One time / 3 months	Haz-Scanner EPAS	Refer to air quality report
	SO_2	mg/m³	0.019	0.028	0.02 mg/m³ (24 Hours)	0.02 mg/m³ (24 Hours)	-			
	CO	mg/m³	0.110	1.755	-	10.26 mg/m³ (24 Hours)	-			
	PM2.5	mg/m³	0.015	0.030	0.025 mg/m³ (24 Hours)	0.025 mg/m³ (24 Hours)	-			
	PM10	mg/m³	0.026	0.038	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 2022)

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 2022

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	21	< 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*3	mg/L	114	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	5.48	-	-		Instrument Analysis Method	
	BOD_5*5	mg/L	52.60	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}*7	mg/L	144	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100 ml	35000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	4.3	10	10		APHA 5520 B (partition Gravimetric 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	Total Dissolved solids (TDS) *6,*3	mg/L	2368	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron*6,	mg/L	1.062	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	22	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.5	6-9	6.0 - 9.0		Instrument Analysis Method	
	SS*3	mg/L	180	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.97	-	-		Instrument Analysis Method	
	BOD_5	mg/L	4.42	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	14.8	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100 ml	110	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)	
	Total Dissolved solids (TDS) *6, *3	mg/L	6036	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron*6	mg/L	2.744	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-7 (Discharge d Point)	Temperature	°C	22	< 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*8	mg/L	104	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	5.47	-	-		Instrument Analysis Method	
	BOD_5*9	mg/L	38.44	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	61.2	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100 ml	49	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)	
	Total Dissolved solids (TDS) *6, *8	mg/L	3488	-	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)
	Iron*6	mg/L	1.108	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 (reference point)	Temperature	°C	27	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.0	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L	6	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	5.7	-	-		Instrument Analysis Method	
	BOD_5	mg/L	1.49	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	<1.8	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)	
	Total Dissolved solids (TDS) *5	mg/L	156	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180 C)	
	Iron*6	mg/L	2.362	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)	

*1Remark: Reference to the Water and Wastewater Quality Monitoring Report (February 2022)

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

*3Remark: SS and Total Dissolved Solid results exceeded in the monitoring point of SW-2 and SW-4 than the target value due to two expected reasons i) delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and ii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

*4Remark: For the monitoring point of SW2 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 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.

*5Remark: For the monitoring points of SW-2 the result of BOD_5 exceeded due to expected i) high levels of organic pollution in the water, ii) certain environmental stresses (hot summer temperatures), iii) high nitrate levels which causes high plant growth and lower DO in the water body.

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

*7 Remark: For the monitoring point of SW-2, the results of COD exceeded due to expected reason i) high levels of organic pollution in the water which deplete the DO level, ii) presence of inorganic compounds that can oxidize and high levels of decaying plant matter, human waste, or industrial effluent from local industrial zone outside of Thilawa SEZ.

*8 Remark: For the monitoring point of SW-7, the results of SS and TDS exceeded due to expected reason i) due to the surface water run-off from bare land in Zone B.

*9 Remark: For the monitoring point of SW-7, the results of BOD exceeded due to i) high levels of organic pollution in the water, ii) certain environmental stresses (hot summer temperatures), iii) high nitrate levels which causes high plant growth and lower DO in the water body. Even though the BOD_5 values exceeded the Thilawa SEZ target values, it is still under (50 mg/L) the National Environmental Quality (Emission) Guidelines (NEQG). For more effective identification of BOD_5, additional self-water quality monitoring was carried out at SW-7 on (8-March-2022) and results was 7.41mg/L. That result was complied and within standard.

2) (a) Water Quality – April 2022

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	℃	26	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.8	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	114	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.40	-	-		Instrument Analysis Method	
	BOD_5	mg/L	25.94	50	30		APHA 5210 B (5days BOD Test) APHA 5220 D (Close Reflux Colorimetric 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	COD_{Cr}	mg/L	43	250	125			
	Total Coliform*4	MPN/100 ml	35,000	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)	
	Total Dissolved solids (TDS) *5, *3	mg/L	8570	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180 C)	
	Iron*5	mg/L	0.494	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*5	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
SW-4 (Reference point)	Temperature	°C	27	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	8.3	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	80	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.52	-	-		Instrument Analysis Method	
	BOD_5	mg/L	6.91	50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	24.2	250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100 ml	92,000	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)	
	Total Dissolved solids (TDS) *5, *3	mg/L	7084	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180 C)	
	Iron*5	mg/L	0.380	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*5	mg/L	≤ 0.002	0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
SW-7 (Discharge d Point)	Temperature	°C	There is no water during sampling	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-		6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L		50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L		-	-		Instrument Analysis Method	
	BOD_5	mg/L		50	30		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L		250	125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100		400	400		APHA 9221 B (Standard Total Coliform Fermentation	

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)
		ml					Technique)	
	Oil and Grease	mg/L		10	10		APHA 5520 B (partition Gravimetric Method)	
	Total Dissolved solids (TDS*5	mg/L		-	2000		APHA 2540C (Total Dissolved Solids Dried at 180 C)	
	Iron*5	mg/L		3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*5	mg/L		0.01	0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
GW-2 (reference point)	Temperature	°C	27	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	6.5	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L	8	50	50		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	6.38	-	-		Instrument Analysis Method	
	BOD_5	mg/L	5.12	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	< 1.8	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)	
	Total Dissolved solids (TDS) *5	mg/L	150	-	2000		APHA 2540C (Total Dissolved Solids Dried at 180 C)	
	Iron*5	mg/L	0.970	3.5	3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury*5	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 2022)

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

*3Remark: SS, Total Dissolved Solids results exceeded in the monitoring point of SW-2 and SW-4 than the target value due to expected reasons i) delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and ii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

*4Remark: For the monitoring point of SW2, SW4 the result of total coliform exceeded than the target value due to 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 ii) wastewater from the local industrial zone

outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect.

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

2) (b) Water Quality – June 2022

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 (Referenc e point)	Temperature	°C	19	< 3 (increase)	≤ 35	Once per 6 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.2	6-9	6~9		Instrument Analysis Method	
	SS*3	mg/L	88	50	Max 50		APHA 2540 D Method	
	DO	mg/L	4.79	-	-		Instrument Analysis Method	
	BOD (5)	mg/L	4.10	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	112	250	Max 125		APHA 5220D Method	
	Total Coliform*4	MPN/100 ml	160000	400	Max 400		APHA 9221B Method	
	T-N	mg/L	2.1	-	Max 80		HACH Method 10072 Method	
	T-P	mg/L	0.26	2	Max 2		APHA 4500-P E Method	
	Color	TCU	25.56	-	Max 150		APHA 2120C Method	
	Odor	TON	2	-	-		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	0.094	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.010	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	≤ 0.005	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.005	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.005	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.005	0.1	Max 0.1		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)
SW-2 (Reference point)	Copper	mg/L	≤ 0.005	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	0.032	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	≤ 0.005	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	0.003	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	0.066	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.025	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	0.007	0.5	Max 0.5		USEPA Method 420.1	
	Iron	mg/L	2.407	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids	mg/L	248	-	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	1.96	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.028	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.005	0.5	Max 0.5		APHA 3120 B Method	
SW-4 (Reference point)	Temperature	℃	19	< 3 (increase)	≤ 35	Once per 6 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.4	6-9	6~9		Instrument Analysis Method	
	SS*3	mg/L	156	50	Max 50		APHA 2540 D Method	
	DO	mg/L	6.68	-	-		Instrument Analysis Method	
	BOD (5)	mg/L	4.45	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	36.8	250	Max 125		APHA 5220D Method	
	Total Coliform*4	MPN/100 ml	>160000	400	Max 400		APHA 9221B Method	
	T-N	mg/L	0.6	-	Max 80		HACH Method 10072 Method	
	T-P	mg/L	0.22	2	Max 2		APHA 4500-P E Method	
	Color	TCU	14.1	-	Max 150		APHA 2120C Method	
	Odor	TON	2	-	-		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	0.124	2	Max 2			

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-4 (Reference point)	Arsenic	mg/L	≤ 0.010	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	0.006	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.005	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.005	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.005	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	0.013	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	0.025	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	≤ 0.005	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	0.064	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.015	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	0.005	0.5	Max 0.5		USEPA Method 420.1	
	Iron*5	mg/L	3.618	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids	mg/L	308	-	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	0.58	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.377	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.005	0.5	Max 0.5		APHA 3120 B Method	
	Temperature	°C	19	< 3 (increase)	≤ 35		Instrument Analysis Method	
	pH	-	8	6-9	6-9		Instrument Analysis Method	
	SS*7	mg/L	80	50	Max 50		APHA 2540 D Method	
	DO	mg/L	9.01	-	-		Instrument Analysis Method	
	BOD (5)	mg/L	3.93	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	15.1	250	Max 125	Once per 6 months	APHA 5220D Method	Refer to water quality report
	Total Coliform*8	MPN/100 ml	> 160000	400	Max 400		APHA 9221B Method	
	T-N	mg/L	0.5	-	Max 80			
	T-P	mg/L	0.05	2	Max 2		HACH Method 10072 Method 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)
SW-7 (Discharged point)	Color	TCU	15.58	-	Max 150			
	Odor	TON	1	-	-		APHA 2120C Method	
	Oil and Grease	mg/L	< 3.1	10	Max 10		APHA 2150 B Method	
	Mercury	mg/L	≤ 0.002	0.01	Max 0.005		APHA 5520B Method	
	Zinc	mg/L	0.099	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.010	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	≤ 0.005	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.005	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.005	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	0.009	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	≤ 0.005	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	0.142	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	≤ 0.005	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	0.081	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.037	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	< 0.002	0.5	Max 0.5		USEPA Method 420.1	
	Iron	mg/L	1.590	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids	mg/L	136	-	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	0.09	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.087	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.005	0.5	Max 0.5		APHA 3120 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)
GW-2 (Reference point)	Temperature	℃	21	< 3 (increase)	≤ 35	Once per 6 months	Instrument Analysis Method	
	pH	-	7	6-9	6~9		Instrument Analysis Method	
	SS	mg/L	16	50	Max 50		APHA 2540 D Method	
	DO	mg/L	8.04	-	-		Instrument Analysis Method	
	BOD (5)	mg/L	4.20	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	< 0.7	250	Max 125		APHA 5220D Method	
	Total Coliform	MPN/100 ml	<1.8	400	Max 400		APHA 9221B Method	
	T-N	mg/L	< 0.5	-	Max 80		HACH Method 10072 Method	
	T-P	mg/L	0.66	2	Max 2		APHA 4500-P E Method	
	Color	TCU	13.66	-	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	0.100	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.010	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	0.007	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.005	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.005	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	0.032	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	≤ 0.005	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	0.018	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	< 0.005	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	0.026	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.019	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	< 0.002	0.5	Max 0.5		USEPA Method 420.1	
	Iron*3	mg/L	6.212	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids	mg/L	180	-	Max 2000		APHA 2540 C Method	
	Total Residual Chlorine	mg/L	< 0.1	0.2	Max 0.2		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)
GW-2 (Reference point)	Chromium (Hexavalent)	mg/L	< 0.05	0.1	Max 0.1		ISO 11083:1994 Method	
	Ammonia	mg/L	0.23	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	≤ 0.014	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	0.210	0.5	Max 0.5		APHA 3120 B Method	

*1Remark: Reference to the Water and Wastewater Quality Monitoring Report (June 2022)

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

*3Remark: SS result exceeded in the monitoring point of SW-2, SW-4 than the target value due to expected reasons i) delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and ii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

*4Remark: For the monitoring point of SW2, SW4 the result of total coliform exceeded than the target value due to 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 ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect.

*5Remark: For the monitoring point of SW-4, 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. As the comparison with the living environment standard value in Japan, iron result in SW-4 is lower than the standard value. Therefore, it can be considered that there is no significant impact on the living environment.

*6 Remark: The result of Iron at the monitoring point of reference tube well (GW-2) exceeded the target value. Comparison with previous monitoring results of reference tube well (GW-2), the iron concentration results ranged from 3.076 mg/l (August, 2019) - 8.310 mg/l (October, 2021) and most of the iron concentration measured results (from April

2019 to June, 2022) exceeded the target value except the iron concentration result of August, 2019 and April, 2022. Therefore, the possible reasons may due to the influence of natural origin (iron can reach out from soil by run-off). In Yangon, soil is naturally rich in iron.

*7 Remark: For the monitoring point of SW-7, the results of SS exceeded due to expected reason i) the surface water run-off from bare land in Zone B.

*8 Remark: For the monitoring point of SW-7, the results of Total Coliform exceeded due to i) natural bacteria existed in all area of Zone B because there are various kinds of vegetation and creature such as birds, and small animals in and along the retention pond. 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 12. It is considered that there is no significant impact to human health.

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 2022)

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)	52	54	Refer to NEQG Article 1.3	75	Refer the section 2.4 in EIA main report	One time / 3 months		
	Leq (evening)	dB(A)	-	-		60				
	Leq(night)	dB(A)	-	-		55				
Along the road (NV-1)	Leq (day)	dB(A)	57	59		75				
	Leq(night)	dB(A)	-	-		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 2022)

Remark: Due to has Curfew and we could monitor only day time only.

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: 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	March -2022	General Waste	Kg	350	Waste disposing to YCDC
Amount of Sludge	April-2022	General Waste	Kg	350	Waste disposing to YCDC
Amount of Sludge	May-2022	General Waste	Kg	350	Waste disposing to YCDC
Amount of Sludge	June-2022	General Waste	Kg	350	Waste disposing to YCDC
Amount of Sludge	July-2022	General Waste	Kg	350	Waste disposing to YCDC
Amount of Sludge	August-2022	General Waste	Kg	350	Waste disposing to YCDC

Remarks: Waste amount is not only in TSEZ-B but also combine with TSEZ-A General Waste. Generate wastes are dried waste and weight value are estimated base on trash bin specification.

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

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
March -2022		m^3/ week	+6.303	m	

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

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
April -2022		m^3/ week	+6.303	m	

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

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
May -2022		m^3/ week	+6.302	m	

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

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
June -2022		m^3/ week	+6.302	m	

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

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
July -2022		m^3/ week	+6.302	m	

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

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
August -2022		m^3/ week	+6.302	m	

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
There is no accident and incident during monitoring period.	

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.

Resentment Works		Progress in Narrative	Remarkable Issues
Projected Affected Persons	Land Acquisition and Relocation	From March 2022 to August 2022; - 1 landowner PAH from Zone B (Phase 1) agreed and received compensation. - 1 landowner PAH from Zone B (Phase 4) agreed and received compensation. - No relocation.	
	Income Restoration Program	1) Supporting rice and cooking oil to PAPs for Valuable People Program in Zone B (Phase 3 and 4) for every month. 14 HHs from Zone B (Phase 3) and 5 HHs from Zone B (Phase 4) are received for rice and cooking oil in every month. 2) Providing electricity charges for streetlight and trash cleaning charges for Zone B PAPs from relocation site in every month 3) Social Welfare Support (200,000 Ks) to two Valuable people from Zone B Phase 3&4 who were passed away in August 2022.	
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 is no grievance from March to August 2022.	

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 2022	TSEZ Covid-19 Vaccination Program	Booster Dose Vaccination (Covishield) for employees above 50 years and Complete Dose (Covishield) for unvaccinated employees in TSEZ at TPD compound.
April 2022	TSEZ Covid-19 Vaccination Program	Booster Dose Vaccination (Covishield) for employees above 40 years and Complete Dose (Covishield) for unvaccinated employees in TSEZ at TPD compound.
April 2022	Homage Paying Ceremony (Cash Assistance Program)	Provide Cash (100,000 MMK each) to Elders who are 80 years and above from Aye Mya Thida Ward and Alun Sut Village
May 2022	TSEZ Covid-19 Vaccination Program	Booster Dose Vaccination to employees in TSEZ (Covishield)
May 2022	Homage Paying Ceremony (Cash Assistance Program)	Provide Cash (100,000 MMK each) to Elders who are 80 years and above from Shwe Pyi Thar Yar Ward, Shwe Pyouk Village and Thida Myaing Ward
June 2022	TSEZ Covid-19 Vaccination Program	Booster Dose Vaccination to employees in TSEZ (Covishield)
July/August/September 2022	Stationary Donation Program	BEHS Aye Mya Thida Ward, BEMS Aduttaw Village, BEPS Thilawa Kone Tan (Shwe Pyi Tar Yar village), BEPS Aye Mya Thida Ward, BEPS Alun Sut Village and St. Marry Orphanage School/ Pan Taw Ba Ka School, BEHS Myaing Tar Yar School and students from Yay Kyaung Village
July/August/September 2022	Scholarship/Student Grant Program for University Student	Mg Zaw Htet, Foundation Year, University of Medicine (1), Yangon from Shwe Pyauk Village

August 2022	Thilawa SEZ's CSR Engagement Meeting	Locators at TSEZ
March/April/May/June/July/August 2022	Electricity Utility Support Program	Support the Electricity Utility Charges of Moe Kyo Swan Monastery
March/April/May/June/July/ August 2022	Job assistance to local community	Relaying information of Job Vacancy from Okamura Trading Myanmar Company Limited, Guston Amava Company Limited, LS Gaon Cable Myanmar Company Limited, Alidac Health Care Myanmar Company Limited, Myanmar Wacoal Company Limited, TCCC Myanmar Company Limited, A&N foods Myanmar Company Limited and Indorama Ventures Packaing (Myanmar) Limited.

End of Document

Thilawa Special Economic Zone

Zone B– Phase 1,2 & 3 (Operation phase)

Appendix-A

Water and Waste Water Monitoring Report

February 2022

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1, 2 & 3 OPERATION STAGE)

(Bi-Monthly Monitoring)

February 2022

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone 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 two locations (SW-2 and 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 (T-N)	○	○	○	○	Laboratory analysis
7	Suspended Solids	○	○	○	○	Laboratory analysis
8	Total Coliform	○	○	○	○	Laboratory analysis
9	Total Phosphorous (T-P)	-	-	-	-	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

Note: Total Phosphorous (T-P) cannot be analyzed at the laboratory during the monitoring period.
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' 13.25", 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 in 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 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)	-
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)

Note: Total Phosphorous (T-P) cannot be analyzed at the laboratory during the monitoring period.
Source: Myanmar Koei International Ltd.

2.4 Monitoring Period

Water quality and water flow rate monitoring were conducted on 15 February 2022 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar on 15 February 2022 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	15/02/2022 08:43
2	SW-4	15/02/2022 07:42
3	SW-7	15/02/2022 09:09
4	GW-2	15/02/2022 12:27

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
15/02/2022	04:10	5.04	High Tide
	11:59	0.38	Low Tide
	16:43	4.91	High Tide
	23:49	0.74	Low Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2022.

2.5 Monitoring Results

Results of water quality monitoring at discharged point, discharged creek and reference tube well are summarized in Table 2.5-1 and Table 2.5-2. Analytical results of the laboratory are described in Appendix-2. The results were compared with the target value of effluent water quality 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), $BOD_{(5)}$, $COD_{(Cr)}$ and total coliform exceeded the target values.

Result of Discharged point

At the main discharged point of Zone B (SW-7) before discharging to the creek, the results of suspended solids (SS), $BOD_{(5)}$ and total dissolved solids (TDS) exceeded the target values.

The possible reason for exceeding the value of SS and TDS maybe due to the surface water run-off from bare land in Zone B.

The possible reason for exceeded $BOD_{(5)}$ values maybe due to i) high levels of organic pollution in the water, ii) certain environmental stresses (hot summer temperatures), iii) high nitrate levels which causes high plant growth and lower DO in the water body. Even though the $BOD_{(5)}$ values exceeded the Thilawa SEZ target values, it is still under (50 mg/L) the National Environmental Quality (Emission) Guidelines (NEQG).

Result of Reference Monitoring points (Discharged Creek)

At the reference monitoring points (SW-2 and SW-4), the results of suspended solids (SS), $BOD_{(5)}$, $COD_{(Cr)}$, total coliform and total dissolved solids (TDS) exceeded the target values.

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

As for the result of $BOD_{(5)}$, results at the surface water monitoring point (SW-2) exceeded the target value. The possible reason for exceeded $BOD_{(5)}$ values maybe due to i) high levels of organic pollution in the water, ii) certain environmental stresses (hot summer temperatures), iii) high nitrate levels which causes high plant growth and lower DO in the water body.

As for the result of $COD_{(Cr)}$, results at the surface water monitoring point (SW-2) exceeded the target value. The possible reason for exceeded $COD_{(Cr)}$ values maybe due to i) high levels of organic pollution in the water which deplete the DO level, ii) presence of inorganic compounds that can oxidize and high levels of decaying plant matter, human waste, or industrial effluent from local industrial zone outside of Thilawa SEZ.

As for the result of total coliform, results at surface water monitoring points (SW-2) 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.

Additional Information by MJTD

Regular water quality monitoring was carried out in accordance with EMP of EIA report. As of the regular water quality monitoring results on 15-February-2022, the $BOD_{(5)}$ results exceeded at (SW-7). Therefore, for more effective identification of $BOD_{(5)}$, additional self-water quality monitoring was carried out at the same location on 8-March-2022 by MJTD. When results of regular monitoring (15-February-2022 are compared with results of additional monitoring (8-March-2022), it can be clearly seen that the result of $BOD_{(5)}$ is lower in additional monitoring and comply with the target value. As for the result of $BOD_{(5)}$ on regular monitoring (15-February-2022), the exceed values maybe due to high levels of organic pollution in the water. However, the $BOD_{(5)}$ results in previous monitoring month and additional monitoring results complied with the target value at (SW-7). Therefore, this $BOD_{(5)}$ exceedance is an unprecedented occurrence and it might be due to the extremely hot weather.

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

Sampling Date			15.2.2022	15.2.2022	15.2.2022	8.3.2022	Target Value (Reference Value for Self-Monitoring)
No.	Parameters	Unit	Regular monitoring*1	Regular monitoring*1	Regular monitoring*1	Additional Monitoring*1	
			SW-2	SW-4	SW-7	SW-7	
1	Water Temperature	℃	21	22	22	-	≤ 35
2	pH	-	7.9	7.5	8.6	-	6~9
3	Suspended Solid (SS)	mg/L	114	180	104	-	50
4	Dissolved Oxygen (DO)	mg/L	5.48	4.97	5.47	-	-
5	$BOD_{(5)}$	mg/L	52.60	4.42	38.44	7.41	30
6	$COD_{(Cr)}$	mg/L	144.0	14.8	61.2	-	125
7	Total Nitrogen (T-N)	mg/L	13.0	< 0.5	1.1	-	80
8	Total Phosphorous (T-P)	mg/L	-	-	-	-	2
9	Color	TCU (True Color Unit)	78.52	2.43	3.61	-	150
10	Odor	TON (Threshold Odor Number)	1.4	1	1.4	-	-
11	Total Coliform	MPN/100ml	35000.0	110.0	49.0	-	400
12	Oil and Grease	mg/L	4.3	< 3.1	< 3.1	-	10
13	Total Dissolved solids (TDS)	mg/L	2368	6036	3488	-	2000
14	Iron	mg/L	1.062	2.744	1.108	-	3.5
15	Mercury	mg/L	≤ 0.002	≤ 0.002	≤ 0.002	-	0.005
16	Escherichia Coli	MPN/100ml	-	-	< 1.8	-	(1000)* (CFU/100ml)
17	Flow Rate	m^3/s	0.001	0.28	-	-	-

Note: Red color means exceeded value than target value.

Total Phosphorous (T-P) cannot be analyzed at the laboratory during the monitoring period.

Note: *1 Regular water quality monitoring was carried out in accordance with EIA report. In addition to EIA report, additional self-water quality monitoring was also carried out on 8-March-2022. As of the water quality monitoring results on 15-February-2022, $BOD_{(5)}$ level exceeded at SW-7. Therefore, results (15-February-2022) is compared with results (8-March-2022). It can be clearly seen that the result of $BOD_{(5)}$ is lower on 8-March-2022.

*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, all the results are under the target value.

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	-	7.0	6~9
3	Suspended Solid (SS)	mg/L	6	50
4	Dissolved Oxygen (DO)	mg/L	5.70	-
5	$BOD_{(5)}$	mg/L	1.49	30
6	$COD_{(Cr)}$	mg/L	< 0.7	125
7	Total Nitrogen (T-N)	mg/L	< 0.5	80
8	Total Phosphorous (T-P)	mg/L	-	2
9	Color	TCU (True Color Unit)	47.82	150
10	Odor	TON (Threshold Odor Number)	1.4	-
11	Total Coliform	MPN/100ml	< 1.8	400
12	Oil and Grease	mg/L	< 3.1	10
13	Total Dissolved solids (TDS)	mg/L	156	2000
14	Iron	mg/L	2.362	3.5
15	Mercury	mg/L	≤ 0.002	0.005
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.
Total Phosphorous (T-P) cannot be analyzed at the laboratory during the monitoring period.
*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 dissolved solids (TDS) at (SW-2, SW-4 and SW-7), $BOD_{(5)}$ at (SW-2 and SW-7), $COD_{(Cr)}$ and total coliform at (SW-2), in the surface water exceeded the target values, whereas, the ground water monitoring results at the reference tube well (GW-2) are under the target values in this monitoring period for operation stage of Thilawa SEZ Zone B.

The possible reason for exceeding the value of SS and TDS at the main discharging point of Zone B (SW-7) maybe due to the surface water run-off from bare land in Zone B.

The possible reason for exceeded $BOD_{(5)}$ values at the main discharging point of Zone B (SW-7) maybe due to i) high levels of organic pollution in the water, ii) certain environmental stresses (hot summer temperatures), iii) high nitrate levels which causes high plant growth and lower DO in the water body. Even though the $BOD_{(5)}$ values exceeded the Thilawa SEZ target values, it is still under the National Environmental Quality (Emission) Guidelines (NEQG). For more effective identification of $BOD_{(5)}$, additional self-water quality monitoring was carried out at SW-7 on (8-March-2022) by MJTD. When results of regular monitoring (15-February-2022) is compared with results of additional monitoring (8-March-2022), it can be clearly seen that the result of $BOD_{(5)}$ is lower on 8-March-2022 and comply with the target value. Therefore, the exceeded $BOD_{(5)}$ values on the regular monitoring period is unprecedented and caused by high levels of organic pollution and hot summer temperatures. As the $BOD_{(5)}$ results in previous monitoring months and additional monitoring period complied with the target value at (SW-7), it can be considered that there is no significant impact on human health.

The possible reason for exceeding the value of SS and TDS at the reference monitoring points of surface water (SW-2 and SW-4) maybe due to delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and influenced by water from the downstream of monitoring points due to flow back by tidal fluctuation.

The possible reason for exceeded $BOD_{(5)}$ values at the reference monitoring point of surface water (SW-2) maybe due to i) high levels of organic pollution in the water, ii) certain environmental stresses (hot summer temperatures), iii) high nitrate levels which causes high plant growth and lower DO in the water body.

The possible reason for exceeded $COD_{(Cr)}$ values at the reference monitoring point of surface water (SW-2) maybe due to i) high levels of organic pollution in the water which deplete the DO level, ii) presence of inorganic compounds that can oxidize and high levels of decaying plant matter, human waste, or industrial effluent from local industrial zone outside of Thilawa SEZ.

The possible reason for exceeded total coliform values at the reference monitoring point of surface water (SW-2) may be due to 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, ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect.

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, $BOD_{(5)}$ 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

DOWA

(GLOBAL DOWA ECO-SYSTEM (MYANMAR) CO., LTD.
Lot No.(1), Thilawa SEZ Zone A, Yangon Region, Myanmar
Phone No. Fax No. (+95) (1) 398811)

Report No. : GEM-LAB-202203007
Revision No. : 1
Report Date : 1 March, 2022
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-7-0215
Sample No. : W-2202075
Waste Profile No. : -
Sampling Date : 15 February, 2022
Sampling By : Customer
Sample Received Date : 15 February, 2022

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	38.44	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	61.2	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	49.0	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	1.1	0.5
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	3.61	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1.4	0
9	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	3488	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
11	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
12	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	1.108	0.002
13	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
Mar 1, 2022
GEM

Approved By
Hideki Yoda
Managing Director
Mar 1, 2022

MYANMAR THILAWA DEVELOPMENT LIMITED
MJTD

Surface Water Sampling at SW-7 by MJTD

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
Page1of1

Report No. : GEM-LAB-202203087
Revision No. : 1
Report Date : 18 March,2022
Application No. : 0001-C001

Analysis Report

Client Name : MJTD Co.Ltd
Address : Corer of Thilwa Development Road and Dagon Thilawa Road, Thilawa SEZ,Thanlyin,Yangon.
Project Name : -
Sample Description
Sample Name : SW-7 (Environment)
Sample No. : W-2203052
Waste Profile No. : -
Sampling Date : 8 March, 2022
Sampling By : Customer
Sample Received Date : 8 March, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	BOD (5)	HACH Method 10099 (Respirometric Method)	mg/l	7.41	0.00

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 :
18.3.22
Cherry Myint Thein
Supervisor

LAB
March 18, 2022
GEM

Approved By :
Hideki Tomo March 18, 2022
Managing Director

MYANMAR THILAWA DEVELOPMENT LIMITED
MJTD

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

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No.12, Thilawa SEZ Zone A, Kyangin Region, Myanmar
Phone No. / Fax No. (+951) 2 [illegible]

Head office copy of
Doc No. GDM-LIS-R004(00)
Page 1 of 1

Report No. : GEM-LAB-202203004
Revision No. : 1
Report Date : 1 March, 2022
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Kowi 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-2-0215
Sample No. : W-2202072
Waste Profile No. : -
Sampling Date : 15 February, 2022
Sampling By : Customer
Sample Received Date : 15 February, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	114	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	52.60	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	144.0	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	35000.0	1.8
5	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	4.3	3.1
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	13.0	0.5
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	78.52	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1.4	0
9	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	2368	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
11	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
12	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	1.082	0.002

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

Analysed By

Ni Ni Aye Lwin
Assistant Manager

LAB
Mar 1, 2022
GEM

Approved By

Hideki Yorio
Managing Director
Mar 1, 2022

MJTD
MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

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

Report No. : GEM-LAB-202203005
Revision No. : 1
Report Date : 1 March, 2022
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-4-0215 Sampling Date : 15 February, 2022
Sample No. : W-2202073 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 15 February, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	180	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.42	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	14.8	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	110.0	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	<0.5	0.5
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	2.43	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	0
9	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	6035	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
11	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
12	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	2.744	0.002

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

Analysed By :
Ni Ni Aye Lwin
Assistant Manager

LAB
Mar 1, 2022
GEM

Approved By :
Hideki Yogo
Managing Director
Mar 1, 2022

MJTD

DOWA

Report No. : GEM-LAB-202203008
Revision No. : 1
Report Date : 1 March, 2022
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-2-0215
Sample No. : W-2202076
Waste Profile No. : -

Sampling Date : 15 February, 2022
Sampling By : Customer
Sample Received Date : 15 February, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	6	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	1.49	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	<1.8	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	<0.5	0.5
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	47.82	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1.4	0
9	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	156	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
11	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
12	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	2.362	0.002
13	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
Mar 1, 2022
GEM

Approved By
Hideki [illegible]
Managing Director
Mar 1, 2022

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD


MJTD
MITSUBISHI JAPAN TSUKUBA DEVELOPMENT LIMITED

Thilawa Special Economic Zone

Zone B– Phase 1,2 & 3 (Operation phase)

Appendix-B

Water and Waste Water Monitoring Report

April 2022

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1, 2 & 3 OPERATION STAGE)

(Bi-Monthly Monitoring)

April 2022

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone 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 two locations (SW-2 and 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 (T-N)	○	○	○	○	Laboratory analysis
7	Suspended Solids	○	○	○	○	Laboratory analysis
8	Total Coliform	○	○	○	○	Laboratory analysis
9	Total Phosphorus (T-P)	○	○	○	○	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 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' 13.25", 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 in 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 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 26 April 2022 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar on 26 April 2022 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	26/04/2022 08:20
2	SW-4	26/04/2022 07:36
3	SW-7	26/04/2022 08:30
4	GW-2	26/04/2022 15:18

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
26/04/2022	01:25	4.54	High Tide
	08:35	0.87	Low Tide
	14:16	4.81	High Tide
	21:10	1.24	Low Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2022.

2.5 Monitoring Results

Results of water quality monitoring at discharged point, discharged creek and reference tube well are summarized in Table 2.5-1 and Table 2.5-2. Analytical results of the laboratory are described in Appendix-2. The results were compared with the target value of effluent water quality 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) and total coliform exceeded the target values.

Result of Discharged point

Discharged monitoring point (SW-7) has no water for sampling during the monitoring period.

Result of Reference Monitoring points (Discharged Creek)

As for the result of SS and TDS, results at the surface water monitoring points (SW-2 and SW-4) exceeded the target values. The exceeded results for SS and TDS maybe due to two expected reasons; i) delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and ii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

As for the result of total coliform, results at surface water monitoring points (SW-2 and SW-4) 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.

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	26	27	-	≤ 35
2	pH	-	7.8	8.3	-	6~9
3	Suspended Solid (SS)	mg/L	114	80	-	50
4	Dissolved Oxygen (DO)	mg/L	4.40	4.52	-	-
5	BOD_{25}	mg/L	25.94	6.91	-	30
6	COD_{Cr}	mg/L	43.0	24.2	-	125
7	Total Nitrogen (T-N)	mg/L	1.2	3.0	-	80
8	Total Phosphorus (T-P)	mg/L	< 0.05	0.05	-	2
9	Color	TCU (True Color Unit)	18.12	7.59	-	150
10	Odor	TON (Threshold Odor Number)	6	4	-	-
11	Total Coliform	MPN/100ml	35,000.0	92,000.0	-	400
12	Oil and Grease	mg/L	< 3.1	< 3.1	-	10
13	Total Dissolved solids (TDS)	mg/L	8,570	7,084	-	2000
14	Iron	mg/L	0.494	0.380	-	3.5
15	Mercury	mg/L	≤ 0.002	≤ 0.002	-	0.005
16	Escherichia Coli	MPN/100ml	-	-	-	(1000)* (CFU/100ml)
17	Flow Rate	m^3/s	0.003	0.047	-	-

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, all the results are under the target value.

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	℃	27	≤ 35
2	pH	-	6.5	6~9
3	Suspended Solid (SS)	mg/L	8	50
4	Dissolved Oxygen (DO)	mg/L	6.38	-
5	$BOD_{(5)}$	mg/L	5.12	30
6	$COD_{(Cr)}$	mg/L	< 0.7	125
7	Total Nitrogen (T-N)	mg/L	< 0.5	80
8	Total Phosphorous (T-P)	mg/L	0.67	2
9	Color	TCU (True Color Unit)	15.88	150
10	Odor	TON (Threshold Odor Number)	1	-
11	Total Coliform	MPN/100ml	< 1.8	400
12	Oil and Grease	mg/L	< 3.1	10
13	Total Dissolved solids (TDS)	mg/L	150	2000
14	Iron	mg/L	0.970	3.5
15	Mercury	mg/L	≤ 0.002	0.005
16	Escherichia Coli	MPN/100ml	< 1.8	(100)* (MPN/100ml)
17	Flow Rate	m^3/s	-	-

*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), discharged monitoring point (SW-7) has no water for sampling during the monitoring period. The results of suspended solid (SS), total dissolved solids (TDS) and total coliform at (SW-2 and SW-4) in the surface water exceeded the target value in this monitoring period for operation stage of Thilawa SEZ Zone B.

The possible reason for exceeding the value of SS and TDS at the reference monitoring points of surface water (SW-2 and SW-4) maybe due to delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and influenced by water from the downstream of monitoring points due to flow back by tidal fluctuation.

The possible reason for exceeded total coliform values at the reference monitoring point of surface water (SW-2 and SW-4) may be due to 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, ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect.

End of the Document

APPENDIX-1 FIELD SURVEY PHOTOS

FOR DISCHARGED POINT OF THILAWA SEZ ZONE B

There was no water at discharged point (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 REFERENCE MONITORING POINTS FOR COMPARISON WITH DISCHARGED POINTS AND BASELINE OF DISCHARGED CREEK

DOWA

Report No. : GEM-LAB-202205016
Revision No. : 1
Report Date : 9 May, 2022
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-2-0426 Sampling Date : 26 April, 2022
Sample No. : W-2204085 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 28 April, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	114	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	25.94	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	43.0	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	35000.0	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	1.2	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	<0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	18.12	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	6	0
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	8570	-
11	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
12	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
13	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.494	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
9-5-22
Cherry Myint Thein
Supervisor

LAB
May 9, 2022
GEM

Aproved By
Ni Ni Aye Lwin May 9, 2022
Manager

MYANMA JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

DOWA

Report No. : GEM-LAB-2022050017
Revision No. : 1
Report Date : 9 May, 2022
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-4-0426
Sample No. : W-2204086
Waste Profile No. : -
Sampling Date : 26 April, 2022
Sampling By : Customer
Sample Received Date : 26 April, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	80	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	6.91	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	24.2	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	92000.0	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	3.0	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	7.59	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	4	0
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180 C Method)	mg/l	7084	-
11	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
12	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
13	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.380	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 :
9-5-22
Cherry Myint Thein
Supervisor

LAB
May 9, 2022
GEM

Approved By :
Ni Ni Aye Lwin May 9, 2022
Manager

DOWA

Report No. : GEM-LAB-202205019
Revision No. : 1
Report Date : 9 May, 2022
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-GW-2-0426 Sampling Date : 26 April, 2022
Sample No. : W-2204088 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 26 April, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	8	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.12	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	<1.8	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	<0.5	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.67	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	15.88	0.00
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	150	-
11	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
12	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
13	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.970	0.002
13	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 :
9.5.22
Cherry Myint Than
Supervisor

LAB
May 9, 2022
GEM

Approved By :
Ni Ni Aye Lwin May 9, 2022
Manager

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

Thilawa Special Economic Zone

Zone B– Phase 1, 2,3 (Operation phase)

Appendix-C

Water and Waste Water Monitoring Report

June 2022

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1, 2 & 3 OPERATION STAGE)

(Bi-Annually Monitoring)

June 2022

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone 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 two locations (SW-2 and 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	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-I.

Table 2.2-1 Outline of Sampling Points

No.	Station	Detailed Information
1	SW-2	**Coordinate**- N - 16° 40' 20.69", E - 96° 27' 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' 13.25", 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 in 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 7 June 2022 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar on 7 June 2022 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	07/06/2022 08:07
2	SW-4	07/06/2022 08:46
3	SW-7	07/06/2022 09:19
4	GW-2	07/06/2022 10:36

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
07/06/2022	04:06	1.26	Low Tide
	09:41	4.86	High Tide
	16:11	1.75	Low Tide
	21:43	4.86	High Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2022.

2.5 Monitoring Results

Results of water quality monitoring at discharged point, discharged creek are summarized in Table 2.5-1. Analytical results of the laboratory are described in Appendix-2. The results were compared with the target value of effluent water quality 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 coliform and iron exceeded the target values.

Result of Discharged point

As for the result of SS, result at the main discharging point of Zone B (SW-7) before discharging to the creek, exceeded the target value due to the surface water run-off from bare land in Zone B.

As for the result of total coliform of surface water, result at the main discharging point of Zone B (SW-7) before discharging to the creek, exceeded the target value due to the expected reason; the potential expected reason might be natural bacteria existed in all area of Zone B because there are various kinds of vegetation and creature such as birds, and small animals in and along the retention pond.

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 the main discharging point of Zone B (SW-7), the result was under the reference value. Therefore, although the target value of total coliform was exceeded at the main discharging point of Zone B (SW-7) but it is considered that there is no significant impact on human health.

Result of Reference Monitoring points (Discharged Creek)

As for the result of SS, results at the surface water monitoring point (SW-2) and (SW-4) exceeded the target values. The exceeded results for SS maybe due to two expected reasons; i) delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and ii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

As for the result of total coliform, results at surface water monitoring points (SW-2) and (SW-4) 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, ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect.

As for the result of iron, the result at the monitoring point of surface water monitoring point (SW-4) 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 result in SW-4 is 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	19	19	19	≤35
2	pH	-	7.2	7.4	8.0	6~9
3	Suspended Solid (SS)	mg/l	88	156	80	50
4	Dissolved Oxygen (DO)	mg/l	4.79	6.68	9.01	-
5	$BOD_{(5)}$	mg/l	4.10	4.45	3.93	30
6	$COD_{(Cr)}$	mg/l	112.0	36.8	15.1	125
7	Total Coliform	MPN/100ml	160000.0	> 160000	> 160000	400
8	Total Nitrogen (T-N)	mg/l	2.1	0.6	0.5	80
9	Total Phosphorous (T-P)	mg/l	0.26	0.22	0.05	2
10	Color	TCU (True Color Unit)	25.56	14.10	15.58	150
11	Odor	TON (Threshold Odor Number)	2	2	1	-
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	Zinc	mg/l	0.094	0.124	0.099	2
15	Arsenic	mg/l	≤ 0.010	≤ 0.010	≤ 0.010	0.1
16	Chromium	mg/l	≤ 0.005	0.006	≤ 0.005	0.5
17	Cadmium	mg/l	≤ 0.005	≤ 0.005	≤ 0.005	0.03
18	Selenium	mg/l	≤ 0.005	≤ 0.005	≤ 0.005	0.02
19	Lead	mg/l	≤ 0.005	≤ 0.005	0.009	0.1
20	Copper	mg/l	≤ 0.005	0.013	≤ 0.005	0.5
21	Barium	mg/l	0.032	0.025	0.142	1
22	Nickel	mg/l	≤ 0.005	≤ 0.005	≤ 0.005	0.2
23	Cyanide	mg/l	< 0.002	< 0.002	< 0.002	0.1
24	Total Cyanide	mg/l	0.003	< 0.002	< 0.002	1
25	Free Chlorine	mg/l	< 0.1	< 0.1	< 0.1	1
26	Sulphide	mg/l	0.066	0.064	0.081	1
27	Formaldehyde	mg/l	0.025	0.015	0.037	1
28	Phenols	mg/l	0.007	0.005	< 0.002	0.5
29	Iron	mg/l	2.407	3.618	1.590	3.5
30	Total Dissolved Solids	mg/l	248	308	136	2000
31	Total Residual Chlorine	mg/l	< 0.1	< 0.1	< 0.1	0.2
32	Chromium (Hexavalent)	mg/l	< 0.05	< 0.05	< 0.05	0.1
33	Ammonia	mg/l	1.96	0.58	0.09	10
34	Fluoride	mg/l	0.028	0.377	0.087	20
35	Silver	mg/l	≤ 0.005	≤ 0.005	≤ 0.005	0.5
36	Escherichia Coli	MPN/100ml	-	-	12.0	(1000)* (CFU/100ml)
37	Flow Rate	m^3/s	0.09	0.59	-	-

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. Comparison with previous monitoring results of reference tube well (GW-2), the iron concentration results ranged from 3.076 mg/l (August, 2019) – 8.310 mg/l (October, 2021) and most of the iron concentration measured results (from April, 2019 to June, 2022) exceeded the target value except the iron concentration result of August, 2019 and April, 2022. Therefore, the possible reasons may due to the influence of natural origin (iron can reach out from soil by run-off). In Yangon, soil is naturally rich in iron.

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	21	≤ 35
2	pH	-	7.0	6~9
3	Suspended Solid (SS)	mg/l	16	50
4	Dissolved Oxygen (DO)	mg/l	8.04	-
5	$BOD_{(5)}$	mg/l	4.20	30
6	$COD_{(Cr)}$	mg/l	< 0.7	125
7	Total Coliform	MPN/100ml	< 1.8	400
8	Total Nitrogen (T-N)	mg/l	< 0.5	80
9	Total Phosphorous (T-P)	mg/l	0.66	2
10	Color	TCU (True Color Unit)	13.66	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	0.100	2
15	Arsenic	mg/l	≤ 0.010	0.1
16	Chromium	mg/l	0.007	0.5
17	Cadmium	mg/l	≤ 0.005	0.03
18	Selenium	mg/l	≤ 0.005	0.02
19	Lead	mg/l	0.032	0.1
20	Copper	mg/l	≤ 0.005	0.5
21	Barium	mg/l	0.018	1
22	Nickel	mg/l	< 0.005	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	0.026	1
27	Formaldehyde	mg/l	0.019	1
28	Phenols	mg/l	< 0.002	0.5
29	Iron	mg/l	6.212	3.5
30	Total Dissolved Solids	mg/l	180	2000
31	Total Residual Chlorine	mg/l	< 0.1	0.2
32	Chromium (Hexavalent)	mg/l	< 0.05	0.1
33	Ammonia	mg/l	0.23	10
34	Fluoride	mg/l	≤ 0.014	20
35	Silver	mg/l	0.210	0.5
36	Escherichia Coli	MPN/100ml	< 1.8	(100)* (MPN/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) 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.

As for the result of SS, result at the main discharging point of Zone B (SW-7) before discharging to the creek, exceeded the target value due to the surface water run-off from bare land in Zone B.

As for the result of total coliform of surface water, result at the main discharging point of Zone B (SW-7) before discharging to the creek, exceeded the target value due to the expected reason; the potential expected reason might be natural bacteria existed in all area of Zone B because there are various kinds of vegetation and creature such as birds, and small animals in and along the retention pond. 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 the main discharging point of Zone B (SW-7) but it is considered that there is no significant impact on human health.

As for parameters of SS, toal coliform, and iron in surface water exceeded the target values at reference monitoring points (SW-2 and SW-4). The expected reasons for exceeding the target value of SS at (SW-2 and SW-4) is delivered from upstream area such as natural origin and wastewater from local industrial zone which outside of Thilawa SEZ, and influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

The expected reasons for exceeding the target value of total coliform at (SW-2 and SW-4) are by 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.

As for the result of iron, the result at the monitoring point of surface water monitoring point (SW-4) 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) is lower than the standard value. Therefore, it can be considered that there is no significant impact on the living environment.

As for the result of the iron, the result at the monitoring point of reference tube well (GW-2) exceeded the target value. Comparison with previous monitoring results of reference tube well (GW-2), the iron concentration results ranged from 3.076 mg/l (August, 2019) – 8.310 mg/l (October, 2021) and most of the iron concentration measured results (from April, 2019 to June, 2022) exceeded the target value except the iron concentration result of August, 2019 and April, 2022. Therefore, the possible reasons may 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 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 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

DOWA

Report No. : GEM-LAB-20220603
Revision No. : 1
Report Date : 21 June, 2022
Application No. : 0001-C(E)

Analysis Report

Client Name : Hydrither Kogo (International) LTD (HKI)
Address : No. 36/A, 1st Floor, Golden Pine Seri Condominium, Pine Gaw Road, Tarmwe Township, Yangon, Myanmar
Project Name : Environment Monitoring Report for Zone A & B
Sample Description :
Sample Name : HKI SW-T-0607
Sample No. : W-2206034
Waste Profile no. :
Sampling Date : 7 June, 2022
Sampling By : Customer
Sample Received Date : 7 June, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	80	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.93	0.30
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	15.1	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	>160000	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	0.3
7	Total Phosphorus	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.65	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	15.58	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	1
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	138	-
11	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.001	0.001
12	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.099	0.005
13	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.010	0.010
14	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
15	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.003	0.003
16	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
17	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.019	0.001
18	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
19	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.142	0.003
20	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
21	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
22	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	1.590	0.003
23	Cyanide	HACH 8027 (Pyridine- Pyrazolone 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- Pyrazolone Method)	mg/l	<0.002	0.002
25	Ammonia	HACH Method 10205 (Salicylate TNT Plus Method)	mg/l	0.09	0.02
26	Hexavalent Chromium (Cr6+)	ISO 11083:1994 (Determination of Chromium(VI)- Spectrometric Method using 1,5-diphenylcarbazide)	mg/l	<0.03	0.03
27	Fluoride	APHA 4110 B (Ion Chromatography with Chemical Suppression of Eluent Conductivity)	mg/l	0.087	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	0.081	0.003
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.137	0.003
32	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	12.0	1.8
33	Phenols	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP With Distillation))	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

Analyzed By
Cherry Myint (Tan)
Supervisor

LAB
June 21, 2022
GEM

Approved By
Naing Yone
Managing Director

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

DOWA

Report No. : DPM-LAB-2022060301
Revision No. : 1
Report Date : 21 June, 2022
Quotation No. : 2021-C061

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 96/A, 1st Floor, Sigma Pha Sein Condominium, Pha Sein Road, Tamwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI Stn. 2 (MC)
Sample No. : W-2206031
Waste Profile no. : -
Sampling Date : 1 June, 2022
Sampling By : Customer
Sample Received Date : 2 June, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	68	-
2	BOD (3)	APHA 5210 B (5 Days BOD Test)	mg/l	4.10	1.00
3	COD (Cr)	APHA 5220D (Close reflux, Colorimetric Method)	mg/l	112.2	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	160000.0	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	2.1	0.5
7	Total Phosphorus	APHA 4500-P E (Ascorbic Acid Method)	mg/l	3.26	0.05
8	Odor	APHA 2150C (Spectrophotometric Method)	TCU	23.56	2.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	3	1
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	248	-
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	0.284	0.005
13	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.010	0.010
14	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
15	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
16	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
17	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
18	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
19	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.132	0.005
20	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
21	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
22	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	2.467	0.005
23	Cyanide	HACH 8027 (Pyridine - Pyrazolone Method)	mg/l	<0.002	0.002
24	Total Cyanide	Distillation Process (APHA 4500-CN C Total Cyanide and Chlorination - Amenable Cyanide Determination Process (HACH 8027 Pyridine - Pyrazolone Method))	mg/l	0.003	0.002
25	Ammonia	HACH Method 10205 (Salicylate TNT Plus Method)	mg/l	1.96	0.02
26	Residual Chlorine (Cl2)	(DPD Method (Use Powder or Ampoule/DC Spectrophotometer) Iodometric Method (Cl2 & Hypochlorite)	mg/l	<2.0	0.01
27	Fluoride	APHA 4110 B (Ion Chromatography with Chemical Suppression of Eluent Conductivity)	mg/l	0.628	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	0.064	0.060
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.073	0.060
32	Phenols	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP with Distillation))	mg/l	0.067	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

Prepared By
01-6-22
Cherry Myint Thein
Supervisor

LAB
June 23, 2022
GEM

Approved By
June 23, 2022
Managing Director

DOWA

Report No : GEM-LAB-2022060[illegible]
Revision No : 1
Report Date : 21 June, 2022
Application No : 0063-C(E)

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 38/A, 1st Floor, Grand Phe Seit Condominium, Phe Seit Road, Tarkwa Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-EM-A-0607
Sample No. : W-2206022
Waste Profile No. :
Sampling Date : 7 June, 2022
Sampling By : Customer
Sample Received Date : 7 June, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	156	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.44	3.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	36.8	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	>160000	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	0.6	0.5
7	Total Phosphorus	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.22	0.05
8	Color	APHA 2120C (Electrophotometric Method)	TCU	14.10	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	0
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	308	-
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	0.124	0.005
13	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.010	0.010
14	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.006	0.002
15	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
16	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
17	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
18	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.013	0.001
19	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.025	0.005
20	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
21	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
22	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	3.618	0.005
23	Cyanide	HACH 8027 (Pyridine -Pyrazolone 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 -Pyrazolone Method)	mg/l	<0.002	0.002
25	Ammonia	HACH Method 10205 (Salicylate TNT Plus Method)	mg/l	0.58	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	0.177	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	0.064	0.003
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.015	0.003
32	Phenols	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP With Distillation))	mg/l	0.001	0.002

Remark : LOQ - Limit of Quantization
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 :
21-6-22
Chaw Myat Thazin
Supervisor

LAB
June 23,2022
GEM

Approved By :
June 23, 2022
Managing Director

DOWA

Report No. : SEM-LAB-20220xx04
Revision No. : 1
Report Date : 21 June, 2022
Application No. : 2021-0061

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 38/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 Dec-2-2021
Sample No. : A-2206025
Waste Profile No. : -
Sampling Date : 7 June, 2022
Sampling By : Customer
Sample Received Date : 9 June, 2022

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	16	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	< 2.0	2.00
3	COD (Cr)	APHA 5220C (Open Reflux Colorimetric Method)	mg/l	< 0.7	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	< 1.8	1.8
5	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
6	Total Nitrogen	HACH Method 10072 (N Persulfate Digestion Method)	mg/l	< 0.5	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.96	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	19.66	5.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	1
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	180	-
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	0.008	0.005
13	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.010	0.010
14	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.007	0.001
15	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.001	0.001
16	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
17	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.032	0.005
18	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.018	0.005
20	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.005	0.005
21	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.210	0.005
22	Tin	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.212	0.005
23	Cyanide	HACH 8027 (Pyridine - Pyrazolone Method)	mg/l	<0.002	0.002
24	Total Cyanide	(Sample Preparation Method: APHA 4500-CN- C Total Cyanide after Distillation, Determination Method: HACH 8027 (Pyridine - Pyrazolone Method))	mg/l	<0.002	0.002
25	Ammonia	HACH Method 10205 (Salicylate TNT Plus Method)	mg/l	0.23	0.03
26	Hexavalent Chromium (Cr6+)	(Sample Preparation Method: APHA 3500-Cr- B Preparation of Stock Solution Method, Determination Method: APHA 3500-Cr- C Determination by Spectrophotometric Method)	mg/l	<0.01	0.01
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 Residue Chlorine	APHA 4500 Cl- G (DPD Colorimetric Method)	mg/l	<0.1	0.1
30	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.026	0.005
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.016	0.002
32	Escherichia Coli	APHA 9221 F Membrane Cell Proliferation Using Fluorogenic Substrate	MPN/100ml	< 1.8	1.8
33	Phenols	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP with Distillation))	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

Analyzed By :
21-6-22
Chemist, Public Water
Supervisor

LAB
June 21, 2022
GEM

Approved By :
June 23, 2022
Manager, Director

Thilawa Special Economic Zone

Zone B– Phase 1,2 & 3 (Operation phase)

Appendix-D

Air Quality Monitoring Report

June 2022

AIR QUALITY MONITORING
REPORT
FOR DEVELOPMENT OF INDUSTRIAL AREA
THILAWA SEZ ZONE B
(PHASE 1, 2 & 3 OPERATION STAGE)

(BI-ANNUALLY MONITORING)

June 2022

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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 1 June 2022 – 8 June 2022 as follows;

Table 1.2-1 Outlines of Air Quality Monitoring Plan

Monitoring Date	Monitoring Item	Parameters	Number of Point	Duration	Monitoring Methodology
From 1 June – 8 June, 2022	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 1 June, 2022 – 8 June, 2022.

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 status 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, $PM_{2.5}$, PM_{10} and SO_2 were lower than the target value.

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

Date	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2
	mg/m³	mg/m³	mg/m³	mg/m³	mg/m³
01–02 June, 2022	0.127	0.062	0.013	0.023	0.019
02–03 June, 2022	0.096	0.050	0.015	0.026	0.018
03–04 June, 2022	0.105	0.046	0.017	0.028	0.020
04–05 June, 2022	0.094	0.053	0.014	0.026	0.019
05–06 June, 2022	0.192	0.057	0.015	0.025	0.017
06–07 June, 2022	0.103	0.056	0.016	0.027	0.020
07–08 June, 2022	0.054	0.047	0.015	0.024	0.018
7 Days Average Value	0.110	0.053	0.015	0.026	0.019
Target Value	10.26	0.1	0.025	0.05	0.02

Note: 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°C and 1 atm condition
2. (NO_2, mg/m³) = (NO_2, ppm) * (Molecular Weight of NO_2 (46)) / 24.45 at 25°C and 1 atm condition
3. (SO_2, mg/m³) = (SO_2, ppm) * (Molecular Weight of SO_2 (64)) / 24.45 at 25°C and 1 atm condition

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.

There were no construction activities during this monitoring period.

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*

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

CHAPTER 3: CONCLUSION AND RECOMMENDATION

The result of air quality at AQ-1, concentration of CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2 during seven days monitoring did not exceed the target value, thus there are no impacts on the surrounding environments.

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	m/s	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
01 June, 2022	12:00 – 12:59	0.028	0.011	0.012	0.027	0.020	1.30	118	ESE
01 June, 2022	13:00 – 13:59	0.033	0.014	0.014	0.025	0.019	1.40	121	ESE
01 June, 2022	14:00 – 14:59	0.046	0.016	0.013	0.022	0.020	1.40	123	ESE
01 June, 2022	15:00 – 15:59	0.041	0.011	0.013	0.030	0.019	1.12	123	ESE
01 June, 2022	16:00 – 16:59	0.027	0.012	0.013	0.028	0.019	1.00	142	SE
01 June, 2022	17:00 – 17:59	0.063	0.033	0.014	0.021	0.016	0.77	121	ESE
01 June, 2022	18:00 – 18:59	0.132	0.053	0.016	0.024	0.021	0.62	135	SE
01 June, 2022	19:00 – 19:59	0.114	0.073	0.013	0.021	0.026	0.72	137	SE
01 June, 2022	20:00 – 20:59	0.143	0.081	0.013	0.022	0.022	0.48	126	SE
01 June, 2022	21:00 – 21:59	0.153	0.087	0.013	0.025	0.020	0.52	116	ESE
01 June, 2022	22:00 – 22:59	0.142	0.092	0.014	0.018	0.019	0.48	130	SE
01 June, 2022	23:00 – 23:59	0.137	0.095	0.013	0.018	0.017	0.25	151	SSE
02 June, 2022	00:00 – 00:59	0.159	0.099	0.014	0.019	0.018	0.04	186	S
02 June, 2022	01:00 – 01:59	0.149	0.100	0.014	0.018	0.017	0.20	143	SE
02 June, 2022	02:00 – 02:59	0.156	0.102	0.014	0.019	0.019	0.05	186	S
02 June, 2022	03:00 – 03:59	0.168	0.104	0.013	0.034	0.019	0.00	213	SSW
02 June, 2022	04:00 – 04:59	0.178	0.105	0.013	0.037	0.019	0.00	165	SSE
02 June, 2022	05:00 – 05:59	0.322	0.106	0.012	0.038	0.018	0.00	24	NNE
02 June, 2022	06:00 – 06:59	0.392	0.106	0.013	0.022	0.019	0.07	52	NE
02 June, 2022	07:00 – 07:59	0.103	0.088	0.012	0.019	0.019	0.35	135	SE
02 June, 2022	08:00 – 08:59	0.120	0.043	0.012	0.017	0.018	0.65	140	SE
02 June, 2022	09:00 – 09:59	0.098	0.022	0.014	0.019	0.016	0.58	184	S
02 June, 2022	10:00 – 10:59	0.046	0.026	0.013	0.018	0.016	0.75	146	SE
02 June, 2022	11:00 – 11:59	0.104	0.009	0.013	0.018	0.016	0.82	151	SSE
Max		0.392	0.106	0.016	0.038	0.026			
Avg		0.127	0.062	0.013	0.023	0.019			
Min		0.027	0.009	0.012	0.017	0.016			

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	m/s	Deg.	Direction
			Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
02 June, 2022	12:00	12:59	0.026	0.009	0.013	0.023	0.018	0.90	140.00	SE
02 June, 2022	13:00	13:59	0.023	0.009	0.013	0.030	0.018	1.00	137.50	SE
02 June, 2022	14:00	14:59	0.023	0.009	0.012	0.030	0.018	0.95	142.67	SE
02 June, 2022	15:00	15:59	0.023	0.009	0.015	0.022	0.018	0.78	130.00	SE
02 June, 2022	16:00	16:59	0.023	0.009	0.014	0.024	0.016	0.60	136.83	SE
02 June, 2022	17:00	17:59	0.034	0.009	0.014	0.025	0.018	0.72	124.17	SE
02 June, 2022	18:00	18:59	0.071	0.033	0.016	0.031	0.027	0.43	112.67	ESE
02 June, 2022	19:00	19:59	0.141	0.058	0.017	0.032	0.027	0.22	97.67	E
02 June, 2022	20:00	20:59	0.078	0.070	0.012	0.021	0.018	0.18	107.50	ESE
02 June, 2022	21:00	21:59	0.110	0.077	0.013	0.021	0.014	0.23	122.83	ESE
02 June, 2022	22:00	22:59	0.131	0.083	0.013	0.021	0.013	0.28	107.17	ESE
02 June, 2022	23:00	23:59	0.132	0.085	0.014	0.023	0.014	0.27	114.50	ESE
03 June, 2022	00:00	00:59	0.136	0.088	0.020	0.028	0.013	0.20	99.40	E
03 June, 2022	01:00	01:59	0.135	0.090	0.013	0.021	0.014	0.02	199.50	SSW
03 June, 2022	02:00	02:59	0.120	0.091	0.011	0.019	0.014	0.03	156.67	SSE
03 June, 2022	03:00	03:59	0.118	0.089	0.012	0.020	0.013	0.00	199.33	SSW
03 June, 2022	04:00	04:59	0.105	0.083	0.014	0.029	0.015	0.03	171.83	S
03 June, 2022	05:00	05:59	0.205	0.083	0.017	0.030	0.013	0.12	94.50	E
03 June, 2022	06:00	06:59	0.229	0.087	0.016	0.029	0.014	0.02	93.67	E
03 June, 2022	07:00	07:59	0.178	0.073	0.018	0.031	0.014	0.18	196.17	SSW
03 June, 2022	08:00	08:59	0.152	0.030	0.017	0.033	0.025	0.48	217.83	SW
03 June, 2022	09:00	09:59	0.038	0.010	0.016	0.034	0.027	0.90	227.50	SW
03 June, 2022	10:00	10:59	0.033	0.015	0.014	0.026	0.026	0.42	136.00	SE
03 June, 2022	11:00	11:59	0.031	0.010	0.016	0.028	0.024	0.78	145.67	SE

Max	0.229	0.091	0.020	0.034	0.027
Avg	0.096	0.050	0.015	0.026	0.018
Min	0.023	0.009	0.011	0.019	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	m/s	Deg.	Direction
			Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
03 June, 2022	12:00	12:59	0.027	0.009	0.012	0.025	0.026	0.83	180.17	S
03 June, 2022	13:00	13:59	0.023	0.009	0.014	0.024	0.028	0.85	139.67	SE
03 June, 2022	14:00	14:59	0.023	0.009	0.016	0.020	0.027	0.65	141.50	SE
03 June, 2022	15:00	15:59	0.023	0.009	0.014	0.026	0.023	0.67	130.50	SE
03 June, 2022	16:00	16:59	0.043	0.009	0.016	0.030	0.027	0.35	138.00	SE
03 June, 2022	17:00	17:59	0.199	0.018	0.014	0.024	0.028	0.27	97.50	E
03 June, 2022	18:00	18:59	0.055	0.032	0.013	0.030	0.022	0.40	112.50	ESE
03 June, 2022	19:00	19:59	0.063	0.048	0.030	0.036	0.022	0.30	109.83	ESE
03 June, 2022	20:00	20:59	0.074	0.058	0.021	0.028	0.022	0.18	119.33	ESE
03 June, 2022	21:00	21:59	0.108	0.066	0.013	0.025	0.013	0.03	76.33	ENE
03 June, 2022	22:00	22:59	0.116	0.074	0.014	0.023	0.022	0.00	171.00	S
03 June, 2022	23:00	23:59	0.110	0.073	0.013	0.024	0.022	0.02	69.17	ENE
04 June, 2022	00:00	00:59	0.111	0.075	0.013	0.025	0.022	0.04	91.40	E
04 June, 2022	01:00	01:59	0.123	0.074	0.013	0.023	0.014	0.00	23.33	NNE
04 June, 2022	02:00	02:59	0.117	0.079	0.018	0.028	0.023	0.00	49.83	NE
04 June, 2022	03:00	03:59	0.115	0.080	0.014	0.024	0.017	0.00	93.50	E
04 June, 2022	04:00	04:59	0.160	0.084	0.016	0.030	0.016	0.00	92.83	E
04 June, 2022	05:00	05:59	0.167	0.082	0.016	0.032	0.015	0.00	99.33	E
04 June, 2022	06:00	06:59	0.467	0.083	0.014	0.026	0.015	0.00	197.67	SSW
04 June, 2022	07:00	07:59	0.193	0.064	0.014	0.023	0.013	0.20	165.50	SSE
04 June, 2022	08:00	08:59	0.035	0.036	0.028	0.037	0.013	0.40	176.67	S
04 June, 2022	09:00	09:59	0.096	0.017	0.029	0.037	0.015	0.38	223.67	SW
04 June, 2022	10:00	10:59	0.036	0.010	0.026	0.034	0.016	0.57	167.33	SSE
04 June, 2022	11:00	11:59	0.023	0.010	0.016	0.026	0.018	0.63	114.67	ESE

Max	0.467	0.084	0.030	0.037	0.028
Avg	0.105	0.046	0.017	0.028	0.020
Min	0.023	0.009	0.012	0.020	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	m/s	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
04 June, 2022	12:00 ~ 12:59	0.024	0.012	0.012	0.017	0.019	0.40	118.17	ESE
04 June, 2022	13:00 ~ 13:59	0.043	0.029	0.012	0.028	0.014	0.57	112.67	ESE
04 June, 2022	14:00 ~ 14:59	0.050	0.029	0.012	0.036	0.013	0.52	119.00	ESE
04 June, 2022	15:00 ~ 15:59	0.129	0.028	0.013	0.025	0.013	0.18	227.83	SW
04 June, 2022	16:00 ~ 16:59	0.047	0.036	0.013	0.022	0.013	0.32	255.83	WSW
04 June, 2022	17:00 ~ 17:59	0.185	0.046	0.013	0.032	0.013	0.13	261.33	W
04 June, 2022	18:00 ~ 18:59	0.054	0.050	0.015	0.027	0.013	0.12	198.67	SSW
04 June, 2022	19:00 ~ 19:59	0.134	0.060	0.013	0.028	0.015	0.02	146.33	SSE
04 June, 2022	20:00 ~ 20:59	0.280	0.077	0.019	0.028	0.017	0.00	33.17	NNE
04 June, 2022	21:00 ~ 21:59	0.166	0.080	0.013	0.030	0.014	0.10	64.50	ENE
04 June, 2022	22:00 ~ 22:59	0.037	0.076	0.013	0.034	0.020	0.03	101.83	ESE
04 June, 2022	23:00 ~ 23:59	0.038	0.076	0.012	0.028	0.024	0.03	158.50	SSE
05 June, 2022	00:00 ~ 00:59	0.074	0.076	0.013	0.020	0.026	0.30	109.60	ESE
05 June, 2022	01:00 ~ 01:59	0.084	0.075	0.012	0.018	0.027	0.45	108.00	ESE
05 June, 2022	02:00 ~ 02:59	0.099	0.078	0.012	0.019	0.027	0.33	112.83	ESE
05 June, 2022	03:00 ~ 03:59	0.102	0.077	0.012	0.019	0.028	0.02	107.00	ESE
05 June, 2022	04:00 ~ 04:59	0.092	0.072	0.012	0.027	0.025	0.02	134.67	SE
05 June, 2022	05:00 ~ 05:59	0.155	0.074	0.012	0.022	0.026	0.05	204.50	SSW
05 June, 2022	06:00 ~ 06:59	0.166	0.072	0.016	0.020	0.026	0.02	272.50	W
05 June, 2022	07:00 ~ 07:59	0.144	0.059	0.019	0.027	0.017	0.22	249.33	WSW
05 June, 2022	08:00 ~ 08:59	0.036	0.023	0.020	0.033	0.013	0.25	207.33	SSW
05 June, 2022	09:00 ~ 09:59	0.041	0.020	0.018	0.034	0.013	0.08	224.67	SW
05 June, 2022	10:00 ~ 10:59	0.039	0.011	0.016	0.023	0.017	0.50	216.00	SW
05 June, 2022	11:00 ~ 11:59	0.048	0.037	0.013	0.021	0.020	0.48	170.83	S

Max	0.280	0.080	0.020	0.036	0.028
Avg	0.094	0.053	0.014	0.026	0.019
Min	0.024	0.011	0.012	0.017	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	m/s	Deg.	Direction
			Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
05 June, 2022	12:00	12:59	0.144	0.060	0.016	0.030	0.014	0.33	110.00	ESE
05 June, 2022	13:00	13:59	0.141	0.069	0.017	0.025	0.014	0.42	108.17	ESE
05 June, 2022	14:00	14:59	0.074	0.058	0.018	0.025	0.013	0.27	105.67	ESE
05 June, 2022	15:00	15:59	0.089	0.028	0.017	0.027	0.013	0.43	124.17	SE
05 June, 2022	16:00	16:59	0.041	0.028	0.014	0.026	0.013	0.43	164.17	SSE
05 June, 2022	17:00	17:59	0.230	0.059	0.018	0.024	0.015	0.10	179.67	S
05 June, 2022	18:00	18:59	0.135	0.059	0.015	0.029	0.015	0.03	117.50	ESE
05 June, 2022	19:00	19:59	0.143	0.064	0.014	0.032	0.018	0.10	148.50	SSE
05 June, 2022	20:00	20:59	0.067	0.059	0.016	0.032	0.022	0.17	164.00	SSE
05 June, 2022	21:00	21:59	0.077	0.065	0.016	0.027	0.018	0.03	108.67	ESE
05 June, 2022	22:00	22:59	0.126	0.072	0.015	0.029	0.021	0.00	29.83	NNE
05 June, 2022	23:00	23:59	0.100	0.070	0.014	0.028	0.018	0.13	152.00	SSE
06 June, 2022	00:00	00:59	0.078	0.069	0.015	0.024	0.020	0.06	78.60	ENE
06 June, 2022	01:00	01:59	0.072	0.066	0.014	0.023	0.017	0.07	75.33	ENE
06 June, 2022	02:00	02:59	0.086	0.067	0.015	0.024	0.020	0.03	65.33	ENE
06 June, 2022	03:00	03:59	0.071	0.069	0.013	0.022	0.015	0.03	99.50	E
06 June, 2022	04:00	04:59	0.094	0.070	0.014	0.024	0.023	0.00	183.00	S
06 June, 2022	05:00	05:59	0.120	0.069	0.013	0.022	0.022	0.15	85.83	E
06 June, 2022	06:00	06:59	0.091	0.055	0.013	0.020	0.015	0.32	117.83	ESE
06 June, 2022	07:00	07:59	0.057	0.056	0.015	0.024	0.013	0.62	200.00	SSW
06 June, 2022	08:00	08:59	0.031	0.045	0.015	0.026	0.025	0.45	250.00	WSW
06 June, 2022	09:00	09:59	0.144	0.079	0.014	0.023	0.016	0.37	149.00	SSE
06 June, 2022	10:00	10:59	0.642	0.009	0.014	0.021	0.021	0.22	185.83	S
06 June, 2022	11:00	11:59	1.755	0.013	0.014	0.026	0.014	0.63	127.00	SE

Max	1.755	0.079	0.018	0.032	0.025
Avg	0.192	0.057	0.015	0.025	0.017
Min	0.031	0.009	0.013	0.020	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	m/s	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
06 June, 2022	12:00 ~ 12:59	0.279	0.069	0.015	0.023	0.013	0.48	113.33	ESE
06 June, 2022	13:00 ~ 13:59	0.216	0.051	0.015	0.025	0.013	0.57	115.83	ESE
06 June, 2022	14:00 ~ 14:59	0.273	0.054	0.014	0.031	0.023	0.50	110.00	ESE
06 June, 2022	15:00 ~ 15:59	0.189	0.049	0.015	0.023	0.020	0.87	113.50	ESE
06 June, 2022	16:00 ~ 16:59	0.138	0.047	0.014	0.022	0.022	0.58	200.33	SSW
06 June, 2022	17:00 ~ 17:59	0.191	0.060	0.015	0.022	0.024	0.12	196.33	SSW
06 June, 2022	18:00 ~ 18:59	0.086	0.063	0.015	0.025	0.025	0.07	170.00	S
06 June, 2022	19:00 ~ 19:59	0.036	0.058	0.014	0.034	0.024	0.28	90.67	E
06 June, 2022	20:00 ~ 20:59	0.051	0.051	0.014	0.029	0.023	0.70	144.67	SE
06 June, 2022	21:00 ~ 21:59	0.023	0.036	0.015	0.024	0.028	0.25	157.50	SSE
06 June, 2022	22:00 ~ 22:59	0.086	0.062	0.014	0.023	0.018	0.02	40.00	NE
06 June, 2022	23:00 ~ 23:59	0.102	0.068	0.015	0.035	0.013	0.00	37.83	NE
07 June, 2022	00:00 ~ 00:59	0.076	0.069	0.014	0.024	0.013	0.00	82.20	E
07 June, 2022	01:00 ~ 01:59	0.051	0.068	0.015	0.025	0.013	0.08	91.50	E
07 June, 2022	02:00 ~ 02:59	0.025	0.045	0.015	0.026	0.018	0.90	219.67	SW
07 June, 2022	03:00 ~ 03:59	0.027	0.017	0.023	0.027	0.023	0.18	108.83	ESE
07 June, 2022	04:00 ~ 04:59	0.087	0.062	0.018	0.022	0.020	0.23	106.67	ESE
07 June, 2022	05:00 ~ 05:59	0.127	0.070	0.019	0.032	0.016	0.18	102.00	ESE
07 June, 2022	06:00 ~ 06:59	0.102	0.075	0.019	0.033	0.013	0.10	59.50	ENE
07 June, 2022	07:00 ~ 07:59	0.061	0.077	0.018	0.024	0.018	0.70	103.17	ESE
07 June, 2022	08:00 ~ 08:59	0.040	0.069	0.014	0.022	0.024	0.30	105.67	ESE
07 June, 2022	09:00 ~ 09:59	0.073	0.058	0.017	0.032	0.026	0.55	142.17	SE
07 June, 2022	10:00 ~ 10:59	0.084	0.043	0.017	0.032	0.025	0.63	205.00	SSW
07 June, 2022	11:00 ~ 11:59	0.043	0.032	0.016	0.032	0.014	0.58	143.50	SE

Max	0.279	0.077	0.023	0.035	0.028
Avg	0.103	0.056	0.016	0.027	0.020
Min	0.023	0.017	0.014	0.022	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	m/s	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
07 June, 2022	12:00 ~ 12:59	0.038	0.045	0.017	0.032	0.022	0.60	115.33	ESE
07 June, 2022	13:00 ~ 13:59	0.103	0.047	0.013	0.021	0.021	0.57	123.83	SE
07 June, 2022	14:00 ~ 14:59	0.077	0.042	0.015	0.024	0.021	0.48	125.17	SE
07 June, 2022	15:00 ~ 15:59	0.052	0.039	0.016	0.033	0.023	0.75	131.67	SE
07 June, 2022	16:00 ~ 16:59	0.039	0.045	0.013	0.037	0.016	0.77	226.17	SW
07 June, 2022	17:00 ~ 17:59	0.025	0.025	0.014	0.025	0.020	0.85	237.50	WSW
07 June, 2022	18:00 ~ 18:59	0.027	0.038	0.017	0.024	0.019	0.45	246.00	WSW
07 June, 2022	19:00 ~ 19:59	0.025	0.030	0.015	0.020	0.017	1.08	255.50	WSW
07 June, 2022	20:00 ~ 20:59	0.046	0.053	0.017	0.026	0.016	1.40	247.83	WSW
07 June, 2022	21:00 ~ 21:59	0.045	0.063	0.016	0.021	0.015	1.27	242.00	WSW
07 June, 2022	22:00 ~ 22:59	0.057	0.066	0.015	0.025	0.017	0.17	261.33	W
07 June, 2022	23:00 ~ 23:59	0.058	0.063	0.014	0.021	0.015	0.18	215.17	SW
08 June, 2022	00:00 ~ 00:59	0.046	0.058	0.013	0.017	0.017	0.06	201.03	SSW
08 June, 2022	01:00 ~ 01:59	0.044	0.058	0.014	0.021	0.021	0.00	130.98	SE
08 June, 2022	02:00 ~ 02:59	0.062	0.058	0.014	0.032	0.018	0.00	98.00	E
08 June, 2022	03:00 ~ 03:59	0.030	0.059	0.015	0.022	0.017	0.00	98.00	E
08 June, 2022	04:00 ~ 04:59	0.087	0.063	0.016	0.020	0.018	0.05	97.77	E
08 June, 2022	05:00 ~ 05:59	0.052	0.057	0.014	0.020	0.017	0.63	137.13	SE
08 June, 2022	06:00 ~ 06:59	0.122	0.064	0.016	0.021	0.017	0.09	132.65	SE
08 June, 2022	07:00 ~ 07:59	0.109	0.068	0.013	0.024	0.018	0.00	108.25	ESE
08 June, 2022	08:00 ~ 08:59	0.033	0.047	0.012	0.027	0.015	0.31	201.95	SSW
08 June, 2022	09:00 ~ 09:59	0.051	0.031	0.014	0.022	0.020	0.58	220.00	SW
08 June, 2022	10:00 ~ 10:59	0.048	0.011	0.016	0.025	0.017	1.29	167.80	SSE
08 June, 2022	11:00 ~ 11:59	0.030	0.009	0.013	0.018	0.015	2.46	140.37	SE

Max	0.122	0.068	0.017	0.037	0.023
Avg	0.054	0.047	0.015	0.024	0.018
Min	0.025	0.009	0.012	0.017	0.015

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: 1.FE774300 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-6000	SN 9181185	December 21, 2021	December 2022

Calibration Span Accessory if purchased	Sensor A K= 9.11	Sensor B K= 9.21	Model S-101

Technician	Supervisor
Dan Okuniewicz	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 & 3 (Operation phase)

Appendix-E

Noise and Vibration Monitoring Report

June 2022

NOISE AND VIBRATION

MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1, 2 & 3 OPERATION STAGE)

(BI-ANNUALLY MONITORING)

June 2022

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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 1 June 2022 – 2 June 2022 as follows;

Table 1.2-1 Outlines of Noise and Vibration Level Monitoring

Monitoring Date	Monitoring Item	Parameters	Number of Points	Duration	Monitoring Methodology
2 June 2022	Noise Level	L_{Aeq} (dB)	1 (NV-1)	8 hours	On-site measurement by "Rion NL-42 sound level meter"
1 June 2022	Noise Level	L_{Aeq} (dB)	1 (NV-2)	8 hours	On-site measurement by "Rion NL-42 sound level meter"
2 June 2022	Vibration Level	L_{v10} (dB)	1 (NV-1)	8 hours	On-site measurement by "Vibration Level Meter- VM-53A"
1 June 2022	Vibration Level	L_{v10} (dB)	1 (NV-2)	8 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-weighted loudness equivalent (L_{Aeq})
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 8 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 on an 8-hour as working time (8:00 AM to 4:00 PM) at the designated one location instead of 24-hours due to the safety reason and risk avoidance. 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.

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)
2 June, 2022	57	-
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)
1 June, 2022	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

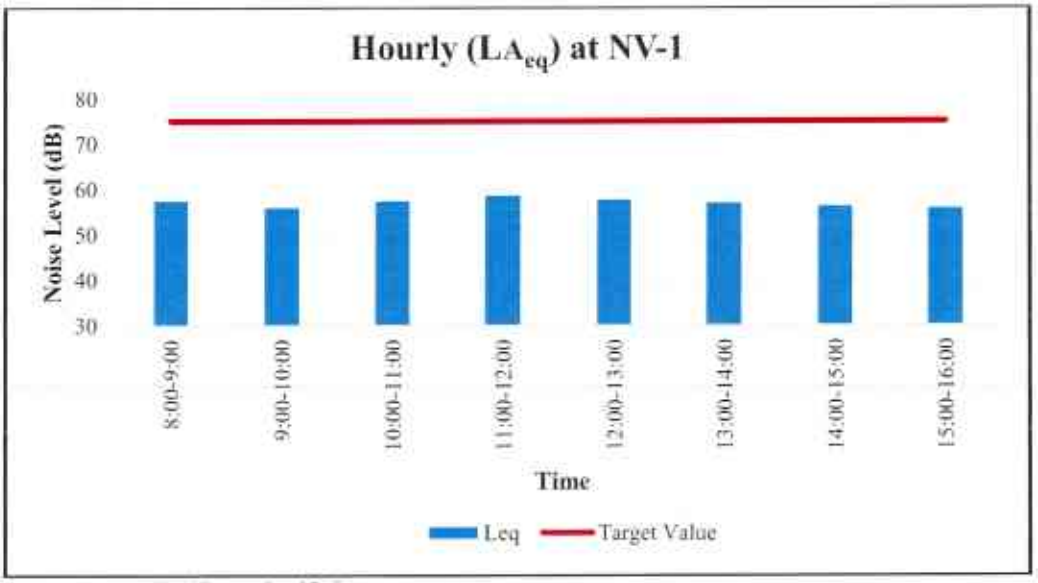
Date	Time	(L_{Aeq}, dB)	(L_{Aeq}, dB) Each Category	(L_{Aeq}, dB) Target Value	Remark
2 June, 2022	6:00-7:00	-	57	75	No construction Activities
	7:00-8:00	-			
	8:00-9:00	57			
	9:00-10:00	56			
	10:00-11:00	57			
	11:00-12:00	59			
	12:00-13:00	58			
	13:00-14:00	57			
	14:00-15:00	56			
	15:00-16:00	56			
	16:00-17:00	-			
	17:00-18:00	-			
	18:00-19:00	-			
	19:00-20:00	-			
	20:00-21:00	-			
	21:00-22:00	-			
	22:00-23:00	-	-	70	
	23:00-24:00	-			
	24:00-1:00	-			
	1:00-2:00	-			
	2:00-3:00	-			
	3:00-4:00	-			
	4:00-5:00	-			
	5:00-6:00	-			

Source: Myanmar Koei International Ltd.

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

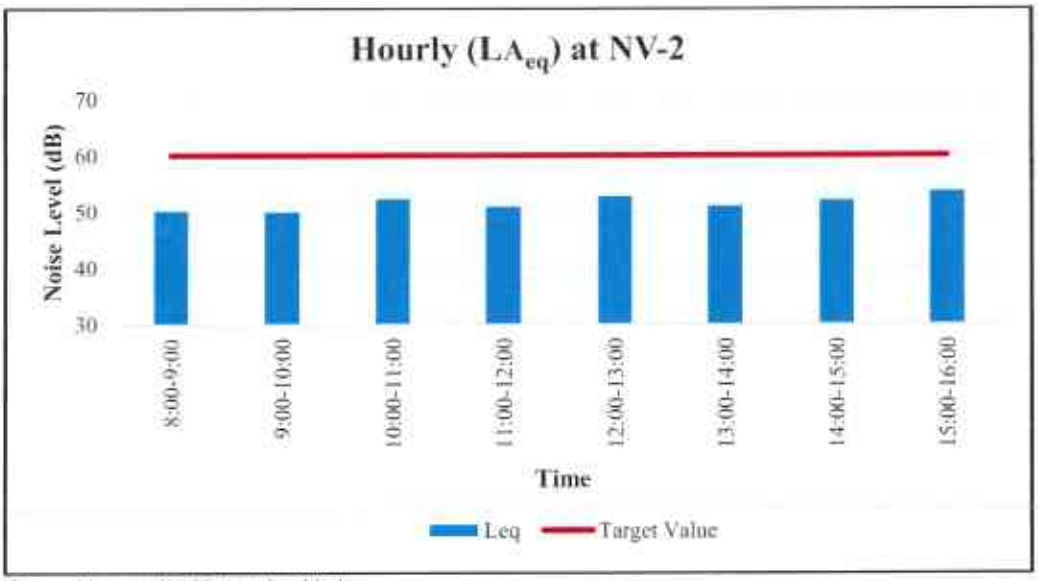
Date	Time	(L_{Aeq}, dB)	(L_{Aeq}, dB) Each Category	(L_{Aeq}, dB) Target Value	Remark
1 June, 2022	7:00-8:00	-	52	60	No construction Activities
	8:00-9:00	50			
	9:00-10:00	50			
	10:00-11:00	52			
	11:00-12:00	51			
	12:00-13:00	53			
	13:00-14:00	51			
	14:00-15:00	52			
	15:00-16:00	54			
	16:00-17:00	-			
	17:00-18:00	-			
	18:00-19:00	-			
	19:00-20:00	-	-	55	
	20:00-21:00	-			
	21:00-22:00	-			
	22:00-23:00	-	-	50	
	23:00-24:00	-			
	24:00-1:00	-			
	1:00-2:00	-			
	2:00-3:00	-			
	3:00-4:00	-			
	4:00-5:00	-			
	5:00-6:00	-			
	6:00-7:00	-			

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 on an 8-hour as working time (8:00 AM to 4:00 PM) at the designated one location instead of 24-hours due to the safety reason and risk avoidance. 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)
2 June, 2022	37	-	-
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)
1 June, 2022	24	-	-
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

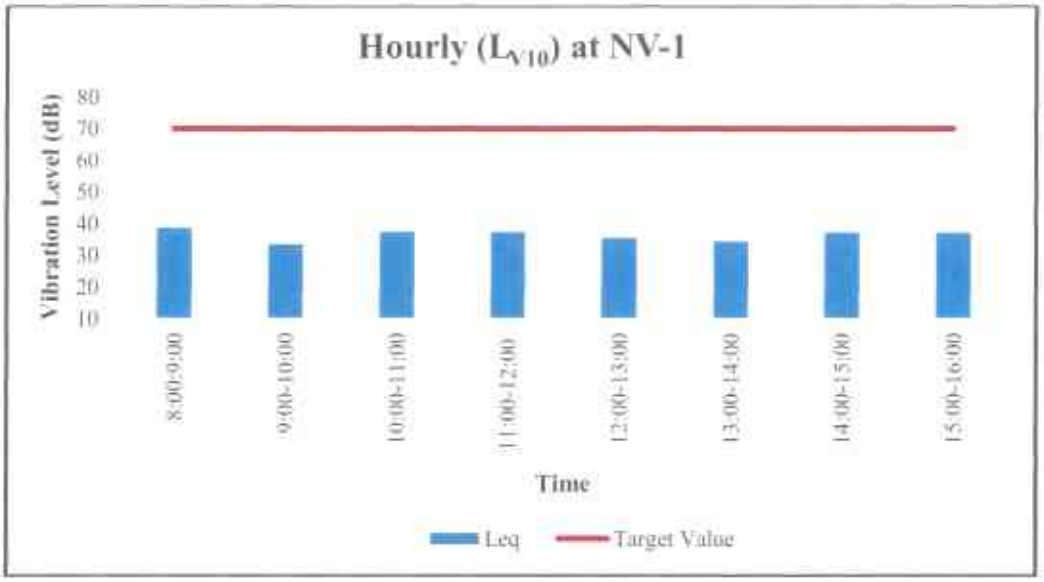
Date	Time	(L_{v10}, dB)	(L_{v10}, dB) Each Category	(L_{v10}, dB) Target Value	Remark
2 June, 2022	7:00-8:00	-	37	70	No construction Activities
	8:00-9:00	39			
	9:00-10:00	33			
	10:00-11:00	37			
	11:00-12:00	37			
	12:00-13:00	35			
	13:00-14:00	34			
	14:00-15:00	37			
	15:00-16:00	37			
	16:00-17:00	-			
	17:00-18:00	-			
	18:00-19:00	-			
	19:00-20:00	-	-	65	
	20:00-21:00	-			
	21:00-22:00	-			
	22:00-23:00	-	-	65	
	23:00-24:00	-			
	24:00-1:00	-			
	1:00-2:00	-			
	2:00-3:00	-			
	3:00-4:00	-			
	4:00-5:00	-			
	5:00-6:00	-			
	6:00-7:00	-			

Source: Myanmar Koei International Ltd.

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

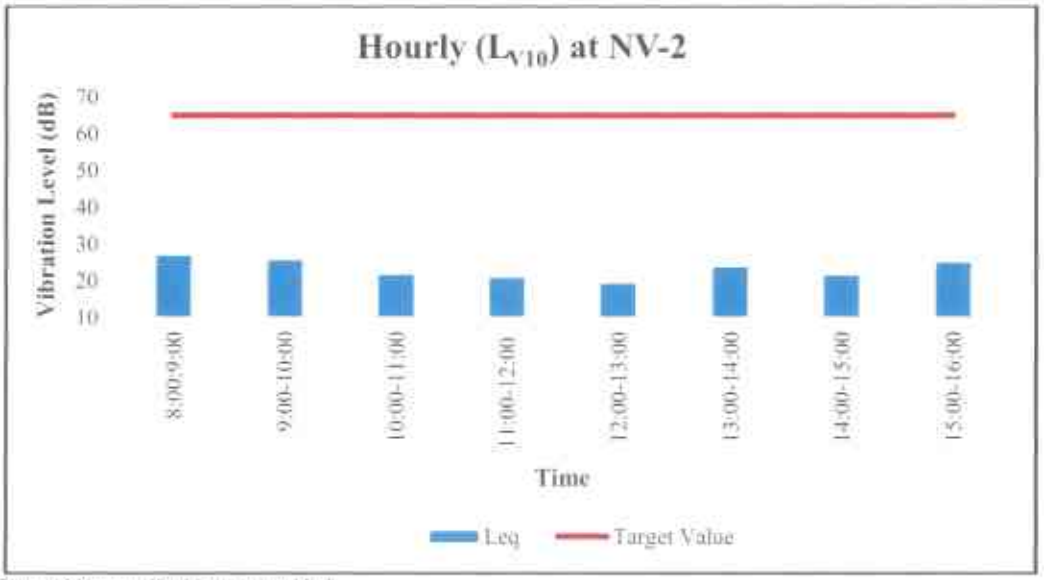
Date	Time	(L_{v10}, dB)	(L_{v10}, dB) Each Category	(L_{v10}, dB) Target Value	Remark
1 June, 2022	7:00-8:00	-	24	65	No construction Activities
	8:00-9:00	27			
	9:00-10:00	26			
	10:00-11:00	22			
	11:00-12:00	21			
	12:00-13:00	19			
	13:00-14:00	24			
	14:00-15:00	21			
	15:00-16:00	25			
	16:00-17:00	-			
	17:00-18:00	-			
	18:00-19:00	-			
	19:00-20:00	-	-	60	
	20:00-21:00	-			
	21:00-22:00	-			
	22:00-23:00	-	-	60	
	23:00-24:00	-			
	24:00-1:00	-			
	1:00-2:00	-			
	2:00-3:00	-			
	3:00-4:00	-			
	4:00-5:00	-			
	5:00-6:00	-			
	6:00-7:00	-			

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

By Comparing with the target value of noise and vibration level in operation stage prescribed in EIA report for Thilawa SEZ development project Zone B, all results were under the target values at NV-1 and NV-2. 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 & 3 (Operation phase)

Appendix-F

Traffic Volume Monitoring Report

June 2022

TRAFFIC VOLUME MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1, 2 & 3 OPERATION STAGE)

(BI-ANNUALLY MONITORING)

June 2022

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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 monitoring was carried out on an 8-hours as working time (8:00 to 16:00) at the designated one location instead of 24 hours due to the safety reason and risk avoidance. Traffic volume had been monitored from 2 June 2022 as follows;

Table 1.2-1 Outlines of Traffic Volume Monitoring

Monitoring Date	Monitoring Item	Parameters	Number of Points	Duration	Monitoring Methodology
2 June 2022	Traffic Volume		1 (TV-1)	8 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 8 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 4-wheel light vehicles are distinctly and highly utilized in weekdays. The number of Heavy vehicles are four times lower than the number of 4-wheel light vehicles (Phalan village to Dagon-Thilawa road) and the number of Heavy vehicles are five 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	2 June 2022	Thursday	195	632	147	26	1,000
	Dagon-Thilawa road to Phalan village			174	710	134	33	1,051

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 hours as 8:00 to 9:00 and in the afternoon hours as 15:00 to 16:00, traffic volume from Dagon Thilawa road to Phalan village is higher than another direction in the morning hours. However, in the afternoon hours, traffic volume from Phalan village to Dagon Thilawa road is higher than another direction. It may be possible commuting vehicles are passing from Dagon Thilawa road to Phalan village in the morning hours and returning from Phalan village to Dagon Thilawa road in the afternoon during this monitoring period.

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

From	To	Classification: Type of vehicles				Total
		Two-wheeled vehicle	Four-wheeled light vehicle	Heavy vehicle	Others	
7:00	8:00	-	-	-	-	-
8:00	9:00	35	87	20	5	147
9:00	10:00	28	79	15	0	122
10:00	11:00	20	62	24	3	109
11:00	12:00	16	85	21	4	126
12:00	13:00	37	91	18	3	149
13:00	14:00	18	72	12	2	104
14:00	15:00	16	80	18	3	117
15:00	16:00	25	76	19	6	126
16:00	17:00	-	-	-	-	-
17:00	18:00	-	-	-	-	-
18:00	19:00	-	-	-	-	-
19:00	20:00	-	-	-	-	-
20:00	21:00	-	-	-	-	-
21:00	22:00	-	-	-	-	-
22:00	23:00	-	-	-	-	-
23:00	0:00	-	-	-	-	-
0:00	1:00	-	-	-	-	-
1:00	2:00	-	-	-	-	-
2:00	3:00	-	-	-	-	-
3:00	4:00	-	-	-	-	-
4:00	5:00	-	-	-	-	-
5:00	6:00	-	-	-	-	-
6:00	7:00	-	-	-	-	-
Total		195	632	147	26	1,000

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: Type of vehicles				Total
		Two-wheeled vehicle	Four-wheeled light vehicle	Heavy vehicle	Others	
7:00	8:00	-	-	-	-	-
8:00	9:00	18	130	22	5	175
9:00	10:00	18	89	16	6	129
10:00	11:00	30	97	20	2	149
11:00	12:00	20	93	21	7	141
12:00	13:00	30	93	16	3	142
13:00	14:00	22	84	12	1	119
14:00	15:00	13	59	15	4	91
15:00	16:00	23	65	12	5	105
16:00	17:00	-	-	-	-	-
17:00	18:00	-	-	-	-	-
18:00	19:00	-	-	-	-	-
19:00	20:00	-	-	-	-	-
20:00	21:00	-	-	-	-	-
21:00	22:00	-	-	-	-	-
22:00	23:00	-	-	-	-	-
23:00	0:00	-	-	-	-	-
0:00	1:00	-	-	-	-	-
1:00	2:00	-	-	-	-	-
2:00	3:00	-	-	-	-	-
3:00	4:00	-	-	-	-	-
4:00	5:00	-	-	-	-	-
5:00	6:00	-	-	-	-	-
6:00	7:00	-	-	-	-	-
Total		174	710	134	33	1,051

Source: Myanmar Koei International Ltd

CHAPTER 3: CONCLUSION AND RECOMMENDATION

The results of the traffic volume show that the number of 4-wheel light vehicles are distinctly and highly utilized in this monitoring period. The number of heavy vehicles are four times and five 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 1,2 & 3(Operation phase)

Appendix-G

General Waste Disposal Record

(March 2022 to August 2022)

ငွေသွင်းပြေစာ/လက်ခံပြေစာ

အကြောင်းအရာ ။ Fee ... For ... Pumping ... Service ... Charge ... water ... treatment ... Plant.

ပမာဏ(ကျပ်) ။ 55000/-

ဖြစ်ငါး(ကျပ်ဖြင့်) ။ Fifty ... Five ... Thousand ... Kyats

15.07.2022

(ငွေသွင်းသူလက်မှတ်)

အမည် ... Myint Kyaw Thu ...

နှာမူ ... Accounts ...

ရက်စွဲ ... 15 July 2022 ...

(လက်ခံသူ)

အမည် ...

ရာထူး ... Assistant Engineer ...

ရက်စွဲ ...

ရသည့်ပမာဏ/ပမာဏစကား

ကျွန်တော်/ကျွန်မမှ For Dumping service charge

water treatment Plant

ကျပ်(ဂဏန်း) 55006/

ကျပ်(စကား) Fifty Five Thousand Kyats

21.05.2022

(လက်မှတ်ထိုးသူ)

အမည် Kyaw Kaing Phyo

ရာထူး Executive

ဌာန IT

ရက်စွဲ 21 June 2022

ဝန်ထမ်းကတ်ပြား အမှတ်

ဆဝလွှဲပြောင်း/လက်ခံပြေစာ

ခ။ အကြောင်းအရာ ။ Paying ... for ... Dumping Service charge ...
... Water ... treatment ... plant ...

ဂ။ ငွေပေါင်း(ဂဏန်း) ။ ..... 55000/- .....

ဃ။ ငွေပေါင်း(စာလုံး) ။ Fifty ... Five ... Thousand Kyats.

..... 24.03.2022 .....

(လွှဲပြောင်းသူ)

အမည် ... Kyaw Wine Oo ...

ရာထူး ... Chairperson ...

နေရာ ... TGEZ ...

ရက်စွဲ ... 24. March. 2022 ...

(လက်ခံသူ)

အမည် .....

ရာထူး .....

နေရာ .....

ရက်စွဲ .....

D:\Tag\Page Maker\Form-3

ရည်ညွှန်းစာ/ကိုးကားချက်

။ အကြောင်းအရာ။ Paying ... for ... Dumping ... service ... charge
... for ... water ... treatment ... Plant ...

။ ရည်ညွှန်းစာ။ ... 550081 ...

။ ပူးတွဲပါဝင်သည်။ Fifty ... Five ... Thousand ... Kyats
... 27.05.2022 ...

(ဗိုလ်ချုပ်ကြီးမှူး)
ဒုတိယဗိုလ်မှူးကြီး ... ဗိုလ်မှူးကြီး ...
ဒုတိယဗိုလ်မှူးကြီး ... ဗိုလ်မှူးကြီး ...
ဒုတိယဗိုလ်မှူးကြီး ... ဗိုလ်မှူးကြီး ...
ဒုတိယဗိုလ်မှူးကြီး ... ဗိုလ်မှူးကြီး ...

ကြိုးဝိုင်းဆေးရုံ

ငွေလွှဲပြောင်း/လက်ခံပြေစာ

၁။ အကြောင်းအရာ ။ ဒိုးမှာ ..... for ..... ဝန်ဆောင်မှု ..... Service charge

..... for ..... treatment ..... Plant .....

.....

၂။ ငွေပေါင်း(ဂဏန်း) ။ ..... ၅၅၀၀၀၀၀ .....

.....

၃။ ငွေပေါင်း(စာဖြင့်) ။ Fifty ..... five ..... thousand ..... Kyats

..... ၂၀၂၁.၀၁.၂၆ .....

(လွှဲပြောင်းပေးသူ)

အမည် ..... Khaing Wynn Phyo .....

နာမည် .....

နှာခေါင်း .....

နှုတ်ခမ်း .....

ကိုယ်ခန္ဓာ .....

ဆံပင် .....

DMCorp Page Maker/ Form-3

Thilawa Special Economic Zone

Zone B– Phase 1,2 & 3 (Operation phase)

Appendix-H

Sewage Treatment Plant Monitoring Record

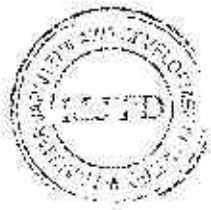
March 2022 to August 2022

Daily Self Monitoring of STP Inlet, Outlet and Aeration

Monthly	Date	Inlet (Zone B)				Inlet - 1				Inlet -2				Outlet - 1				Outlet - 2			
		pH	TDS	Tem	COD	pH	TDS	Tem	COD	pH	TDS	Tem	COD	pH	TDS	Tem	COD	pH	TDS	Tem	COD
Standard		6 - 9	2000	≤35	400	6 - 9	2000	≤35	400	6 - 9	2000	≤35	400	6 - 9	2000	≤35	125	6 - 9	2000	≤35	125
Unit		-	mg/L	°C	mg/L	-	mg/L	°C	mg/L	-	mg/L	°C	mg/L	-	mg/L	°C	mg/L	-	mg/L	°C	mg/L
Mar	01-03-22	6.94	273	25.9	480	7.05	368.9	25.7	-	7.08	398.4	26	348	6.72	326.5	25.5	-	8.17	392.5	26.8	-
Mar	02-03-22	7.1	315.9	22.9	-	7.06	359.8	23.7	-	6.95	429.9	23.2	-	6.94	332.9	24	27	8.7	380.7	24.1	36
Mar	03-03-22	7.23	319.2	24.5	326	7.01	427.6	25.4	-	7.29	418.9	24.8	184	8.58	390.9	25.9	49	8.58	358.9	25.9	20
Mar	04-03-22	7.11	296.8	22.8	529	7.12	355.7	21.8	-	7.17	414.6	21.5	541	8.46	389.4	23.4	24	8.56	360.4	23	36
Mar	05-03-22	6.87	314	22	-	6.88	563.9	22	-	6.82	57.9	22.1	-	8.35	389.4	22	-	8.67	393.4	22	-
Mar	06-03-22	7.01	388.1	23.1	-	7.12	626.4	23.1	-	6.8	415.4	23.1	-	8.28	463.4	23	-	8.83	409.7	23.1	-
Mar	07-03-22	7.4	371.3	24.2	-	7.03	360.8	24.9	279	7.09	301.7	25	-	8.41	492.3	25.1	41	8.82	412.3	25.2	111
Mar	08-03-22	7.29	384.9	26.3	898	7.04	336.6	26.3	-	7.05	336.8	26.8	866	8.17	463.4	26.4	49	8.24	473	26.4	58
Mar	09-03-22	7.27	382.6	23.7	-	7.08	412.1	22.3	164	7.11	416.7	23.3	-	8.33	436.7	23.9	49	8.66	382.7	27.9	100
Mar	10-03-22	7.13	342.2	28.5	475	7.01	368.8	29.7	-	6.98	342.5	29	341	8.48	446.4	29.5	53	8.4	376.8	29.3	57
Mar	11-03-22	6.95	307.1	30.5	443	6.87	361.4	30.2	-	6.96	250.1	30.4	134	8.39	469.9	30.5	97	8.63	428.9	30.5	72
Mar	12-03-22	7	286.9	22	-	7.08	470.9	22.8	-	7.13	467.8	22.4	-	8.51	415.5	22.1	-	8.79	408.5	22.5	-
Mar	13-03-22	6.87	301	21.8	-	6.62	452.6	22.5	-	6.65	457	22.5	-	8.34	420.7	22.8	-	8.93	428.5	22.8	-
Mar	14-03-22	7.21	339.8	29.5	-	6.95	364.4	29.4	146	7.14	375.6	29.2	-	8.35	436	28.9	74	8.71	475.6	28.8	18
Mar	15-03-22	7.08	304.5	27.3	263	7.03	396.1	27.2	-	7.11	425.9	27	341	8.21	365.3	27.3	39	8.72	435.2	28	103
Mar	16-03-22	6.89	384	21.1	-	6.76	496.2	20.9	-	6.74	478.5	22.1	-	8.25	358.9	20.8	-	8.7	396.5	20.7	-
Mar	17-03-22	6.89	305.6	23.4	151	6.85	277.4	24.5	-	7.05	343.5	25.1	269	8.06	392.9	24.9	60	8.48	389.6	24.8	11
Mar	18-03-22	6.84	274.3	23.9	230	6.98	322.1	24	-	6.95	343.7	24.8	86	8.01	393.8	24.1	53	8.48	375.4	23.9	46
Mar	19-03-22	6.56	194.1	19.4	-	6.63	362.6	20.1	-	6.64	350.1	19.1	-	5.75	350.8	20	-	8.02	373.1	19.5	-
Mar	20-03-22	6.96	228.1	20.2	-	5.57	453.4	19.9	-	6.99	448.6	20.3	-	6.93	368.4	20.3	-	8.44	351	20.2	-
Mar	21-03-22	5.94	218.5	24.4	-	6.81	315.9	23.9	145	5.48	176.7	23.4	-	6.21	375.4	24.2	95	5.88	396.7	23.5	63
Mar	22-03-22	7.25	231.6	26.3	502	6.86	330.4	26.2	-	6.89	314.8	26	56	5.91	399.7	26.5	46	8.6	360.3	26.6	48
Mar	23-03-22	6.94	263.1	27.9	-	7.09	491.3	28.8	67	6.88	484.4	28.9	-	6.03	404.1	28.3	47	8.24	329.5	28.1	135
Mar	24-03-22	7	220.5	28.6	375	6.87	368.3	26.4	-	6.98	343.4	28.5	265	6.09	391	28.4	22	8.36	411.5	28.3	31
Mar	25-03-22	6.9	276.6	25.4	189	6.8	645.7	25.3	-	6.89	434	24.4	504	5.92	390.5	23.9	66	8.34	406	24.3	50
Mar	26-03-22	6.88	282.9	21.9	-	6.74	408.1	21.9	-	6.65	407.4	21.9	-	6.29	392.7	22	-	8.57	404.7	21.9	-
Mar	27-03-22	6.91	305.2	21.5	-	6.84	381.1	21.9	-	7.03	419	21.8	-	5.93	402.3	21.9	-	8.52	407.8	22	-
Mar	28-03-22	7.16	186.2	26.5	-	7.12	496.2	27.5	207	6.97	503.9	26.9	-	8.26	447.9	27.1	41	8.47	429.3	27.4	29
Mar	29-03-22	6.87	273.7	21.7	158	6.78	402.7	21.4	-	6.81	371.3	20.9	266	6.05	431.1	21.3	26	8.19	406	21	27
Mar	30-03-22	6.88	275.8	29.5	-	6.86	426	29.1	279	6.86	403.8	28.8	-	8.22	423.9	29.3	49	8.21	429.8	29	18
Mar	31-03-22	6.89	289.9	22.8	520	7.19	497.8	22.7	-	7.21	469.6	23.1	287	6.09	423.9	23.1	66	8.68	421.5	22.8	92
Apr	01-04-22	6.96	239	30.5	206	7.01	357.2	30.1	-	7.02	329.8	29.7	219	6.36	430.9	29.7	44	8.21	409.9	29.5	80
Apr	02-04-22	6.93	256.5	22.4	-	6.73	449.5	22.1	-	6.7	426.1	22	-	6.34	374	21.8	-	8.45	382.1	6.45	-
Apr	03-04-22	7.14	276.3	21.6	-	7.08	348.2	21.5	-	7.06	345.2	21.5	-	7.68	70.16	21.9	-	7.67	70.93	21.8	-
Apr	04-04-22	6.93	287	23.6	-	6.87	536.2	22.9	300	6.88	532.5	23.6	-	6.35	364.1	23	51	8.51	419.6	22.9	42
Apr	05-04-22	6.73	365	29.8	1872	7.35	473.5	28.7	-	7.04	468.5	28.3	551	7.33	351.2	28.2	55	8.72	433.8	28.3	16
Apr	06-04-22	6.98	362.1	23.1	-	7.19	441.9	21.9	356	7.13	437.1	22.8	-	6.55	417.7	22.6	12	8.51	424.2	22.9	19
Apr	07-04-22	7.15	311.4	28.6	132	7.11	285.8	31.9	-	7.18	419.5	29.5	384	6.34	433.2	29.8	44	8.63	421.7	29.9	37
Apr	08-04-22	6.91	300.5	24.7	254	6.93	388.8	24.5	-	6.95	376.8	24.5	374	8.32	388.3	24.4	61	8.8	402.6	25.4	34
Apr	09-04-22	-	-	-	-	-	-	-	-	-	-	-	-	8.31	424.8	21.2	-	8.54	442.8	21.3	-
Apr	10-04-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	-	-	-	58
Apr	11-04-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apr	12-04-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apr	13-04-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	67	-	-	-	23
Apr	14-04-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apr	15-04-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apr	16-04-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70	-	-	-	7
Apr	17-04-22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apr	18-04-22	7.2	256.8	26.3	-	6.51	205.1	28.3	837	6.57	216.6	27.7	-	6.71	362.1	27.3	35	8.31	299.8	26.3	11
Apr	19-04-22	7.05	250.7	29.1	226	7.21	233.7	28.7	-	7.21	216.2	28.4	239	6.17	269.1	29.3	38	8.74	386.2	27.8	34
Apr	20-04-22	6.91	518.3	26.9	-	6.91	358.1	27.7	104	6.98	338	28	-	6.04	325.6	28.2	70	8.67	405.8	27.9	29
Apr	21-04-22	6.96	475.2	26.6	348	7.15	409.5	24.5	-	7.13	411.6	24.2	78	6.12	352.4	25.5	33	8.74	386.3	24.9	29
Apr	22-04-22	6.9	490.5	30.2	442	6.88	690.7	31.4	-	6.94	436.6	30.8	950	5.91	371.8	30.7	41	8.32	387	30.6	39
Apr	23-04-22	6.86	335.6	22.4	-	7.08	356.9	21.7	-	7.1	381.8	22.3	-	6.01	381.1	21.2	-	8.46	396.9	21.3	-
Apr	24-04-22	6.9	282.6	21.5	-	7.03	400	22	-	7.11	377.8	21.8	-	5.98	431.1	22.1	-	8.38	428.4	21.5	-
Apr	25-04-22	6.41	390	28.5	-	7.1	411.2	26.9	254	7.09	421	27.4	-	5.78	477.3	27.1	23	8.17	471.1	27.8	36
Apr	26-04-22	6.91	338.8	27.2	148	7.05	333.8	27.8	-	7.05	331	27.1	206	6.76	470.1	27.5	27	8.15	435.7	28.9	30
Apr	27-04-22	7.23	375.5	28.5	-	7.23	364.3	25.3	288	7.26	367.6	24.7	-	7.06	418.9	25	30	8.22	407.5	25.6	27
Apr	28-04-22	7.47	506.6	28.5	253	7.22	503.8	28.3	-	7.24	457.5	28	273	6.3	411	27.7	48	8.45	428.6	28	30
Apr	29-04-22	7.5	535	24.8	342	7.12	438.3	23.1	-	7.08	390.3	23.4	274	6.32	420.4	23.9	49	8.42	419.5	23.5	24
Apr	30-04-22	7.73	525.1	22.7	-	6.98	480.2	23.2	-	7.04	366.2	22.9	-	6.54	419.5	22.7	-	8.51	422.2	23	-

May	01-05-22	7.41	566.2	22.5	-	6.65	420	22.7	-	7	429.7	22.4	-	6.65	425.3	22.5	-	6.65	424.1	22.5	-
May	02-05-22	7.67	354.6	20.3	-	7.06	313.9	23.6	174	7.08	359.3	23.7	-	6.59	436.4	24.7	20	6.78	425.9	24.8	32
May	03-05-22	7.14	488	21.8	137	7.28	396	21.6	-	7.34	430.5	21.7	166	6.57	403.9	21.8	21	6.76	422.7	21.9	26
May	04-05-22	7.45	401.7	29.9	-	7.25	461.1	28.9	354	7.31	464.4	29.8	-	6.66	427.4	29.7	18	6.8	437.9	29.1	42
May	05-05-22	7.33	382.9	31.5	141	7.21	423.8	31.7	-	7.23	441.8	25.9	372	6.35	406.9	23.2	41	6.91	483.8	26.3	43
May	06-05-22	7.58	417.3	31.5	150	7.21	472.5	31.5	-	7.61	462.1	31	349	6.52	394.2	30.7	35	6.96	429.4	31.6	34
May	07-05-22	7.8	542.9	20.1	-	7.31	435.9	20.8	-	7.33	426.3	20.4	-	7.22	463	20.8	-	7.02	417.2	21	-
May	08-05-22	7.34	426.3	18	-	7.04	383.5	17.8	-	7.11	444.1	18.4	-	7.02	418.2	18.2	-	6.92	393.6	18.1	-
May	09-05-22	7.51	458.1	21.4	-	7.34	430.4	21.4	115	7.26	453.5	20.3	-	6.93	421.1	20	58	6.94	423.1	21.1	39
May	10-05-22	7.4	491.9	26.7	129	7.29	457	25.6	-	6.98	408.1	25.4	107	7.16	415.5	25.5	38	6.93	407.8	25.3	26
May	11-05-22	7.52	417.5	23.2	-	7.2	451	25.3	188	7.22	434.5	25.6	-	6.62	386.1	25.1	46	7.02	389	24	23
May	12-05-22	7.68	487.4	28.3	186	7.2	444.7	28.5	-	7.38	468.4	28.6	188	6.72	388.1	28.5	21	7.06	404	28.5	34
May	13-05-22	7.78	481.6	26.4	127	7.11	424.8	27	-	7.13	426.4	27.2	68	6.6	385.5	28.1	35	7.18	415.3	28.7	28
May	14-05-22	7.5	478.5	20.2	-	7.16	413.6	21	-	7.17	480.2	21.1	-	6.8	386.5	20.6	-	7.21	416.8	20.3	-
May	15-05-22	7.53	384.5	20.6	-	7.06	280.7	20.3	-	7.01	279.9	20.4	-	6.78	397.2	20.7	-	7.2	407.7	20.6	-
May	16-05-22	7.87	361.5	28.8	-	7.01	320.6	27.8	340	7.07	289	27.8	-	6.77	405.8	28.5	21	7.14	432.3	27.7	23
May	17-05-22	7.78	595.3	23.3	58	7.46	474.1	22.7	-	7.57	500.2	22.3	99	6.88	360.5	22.8	20	7.21	443.1	23.3	8
May	18-05-22	6.49	531.3	27.1	-	7.12	314	28.1	70	7.33	409.1	29.8	-	6.91	380.2	29	20	7.25	421.8	28.9	29
May	19-05-22	6.82	426.4	25	332	7.27	482.5	26.4	-	7.19	448.5	26.6	115	6.81	385.5	26.5	27	7.21	411.4	25.9	65
May	20-05-22	7	296	26.4	322	7.13	180.7	25.9	-	7.05	219.5	25.9	97	6.86	334.3	25.4	30	7.19	375.8	25.8	13
May	21-05-22	7.6	521.6	24	-	7.03	322.4	23.3	-	7.3	432.1	23.3	-	6.79	340.9	23.6	-	7.18	390.6	23.3	-
May	22-05-22	7.46	477.2	23.7	-	7.14	323.5	23.5	-	7.19	463.1	23.3	-	6.89	351.7	23.4	-	7.03	284.5	23.4	-
May	23-05-22	7	626.9	26.8	-	7.22	423.2	26.3	137	7.48	496.2	27	-	6.9	280	28.1	14	7.1	320.7	28.1	10
May	24-05-22	7.57	408.4	28.5	138	7.12	385.2	29.2	-	6.99	306.3	28.7	100	6.99	391.6	28.6	22	7.22	351.7	28.5	7
May	25-05-22	7.15	487.9	22.6	-	7.09	369.5	21	78	7.07	378.1	21.9	-	7.15	335.1	22.3	22	7.42	373.3	23.1	12
May	26-05-22	7.59	426.3	26.8	90	7.4	493.1	26.7	-	7.44	492.2	25.8	73	7.05	339.1	26.6	15	7.4	399	26.7	16
May	27-05-22	7.08	689.7	27.1	495	7.24	503.1	28.6	-	7.37	539.3	29.1	42	7.03	362.6	28.7	17	7.31	438.5	29.6	14
May	28-05-22	7.56	298.4	24	-	7.32	478.7	24.2	-	7.32	492.1	23.9	-	6.86	344.8	23.5	-	7.29	406.6	240	-
May	29-05-22	7.62	513	23.7	-	6.92	386.3	23.5	-	7.25	417.7	23.7	-	7.04	355.8	23.7	-	7.3	419.3	23.7	-
May	30-05-22	6.9	380.7	25.8	-	7.04	324.3	30	59	6.97	319.4	30.7	-	6.92	369	30.3	3	7.32	422.6	30.4	18
May	31-05-22	7.59	475.9	27.7	67	6.98	420.5	27.9	-	7.04	410	27.5	117	6.98	391.6	26.9	19	7.33	446.7	27.3	25
Jun	01-06-22	7.15	477.7	26.8	-	7.26	417.7	29.1	107	7.38	449.3	28.2	-	6.95	370.8	28.3	27	7.34	444.8	27.2	39
Jun	02-06-22	7.3	394.7	24.9	105	6.98	484.1	24.6	-	7.4	430.1	24.1	195	7.44	421.4	24.5	33	6.95	388.4	25.1	32
Jun	03-06-22	7.31	456.8	29.9	382	7.04	431.9	27.3	-	6.98	383.2	26.6	43	6.95	394.5	27.6	31	7.37	410.2	26.7	24
Jun	04-06-22	6.87	431.2	23.7	-	6.94	322.3	23.2	-	6.87	348.4	23.1	-	6.75	384.2	23.4	-	7.31	421.2	23.2	-
Jun	05-06-22	7.26	307.5	23.2	-	7.05	438	23.1	-	6.97	439.4	23.3	-	7.01	376.2	23.3	-	7.34	407.2	23.3	-
Jun	06-06-22	6.9	401.9	23.3	-	7	233.8	23.3	62	7.06	236.6	23.3	-	6.93	359.3	23.2	35	7.35	393.1	23.3	49
Jun	07-06-22	7.24	454.3	21.9	357	7.22	372	24.8	-	7.29	368	24.6	35	6.95	322.4	25	33	7.31	355.4	25.3	38
Jun	08-06-22	7.06	955.3	29.3	-	6.81	307.4	29.2	173	6.97	337.9	29	-	6.88	317.9	28.8	30	7.24	360.9	29.2	19
Jun	09-06-22	7.16	366.4	27.8	351	6.87	345.1	28.1	-	7.15	477.3	27.7	145	6.91	307.3	27	19	7.1	379.7	27.8	41
Jun	10-06-22	7.26	270	27.8	178	7.04	348.9	30.3	-	7.01	383.7	30.5	73	6.94	339.9	28.8	29	6.86	327.6	30	62
Jun	11-06-22	7.19	278.7	22.6	-	6.82	205	22.7	-	6.92	368.8	22.8	-	6.8	249.7	22.8	-	7.11	290.9	22.8	-
Jun	12-06-22	7.47	332.5	22.7	-	6.73	267.7	22.6	-	6.76	299.7	22.4	-	6.77	237.7	22.6	-	7.12	261.4	22.7	-
Jun	13-06-22	7.04	288.5	25.8	-	6.96	212.9	27.5	103	6.87	218.6	27.5	-	6.88	242.1	27.7	12	7.18	252	27	21
Jun	14-06-22	7.45	344.9	27.8	41	7.18	316	22.5	-	7.03	245.6	22.8	177	7.08	234.7	23.1	30	7.23	273.3	22.3	15
Jun	15-06-22	7.11	383.8	26	-	6.82	234.1	25.4	86	6.8	230.3	25.2	-	6.93	244.3	25.4	22	7.21	291.4	25.3	6
Jun	16-06-22	7.33	374	28.2	107	6.97	356.1	27.9	-	7.04	367.9	27.8	110	6.93	309.3	28.3	11	7.22	304.1	28.6	20
Jun	17-06-22	7.07	528.3	29.5	531	6.85	267.8	29.3	-	6.84	263.3	29.6	90	6.9	312	29.8	16	7.1	326.9	29.7	44
Jun	18-06-22	7	374.8	33.5	-	6.76	347.3	23.5	-	6.79	314	23.5	-	6.71	310.2	23.5	-	7.02	355.9	23.6	-
Jun	19-06-22	7.4	360.1	23.3	-	6.91	308.9	22.9	-	6.83	307.3	22.7	-	6.86	329.9	22.8	-	7.07	344.5	23.2	-
Jun	20-06-22	7.49	348.5	26.7	-	6.71	377.2	26.5	55	6.79	371.1	26.5	-	6.88	298.6	26.7	29	7.11	367.3	26.7	36
Jun	21-06-22	7.31	340.8	26.7	138	6.89	251.4	26.8	-	7.05	355.5	27.3	30	6.86	353.5	27	18	7.08	284	26.8	22
Jun	22-06-22	7.21	351.1	26.8	-	6.88	176.2	24.9	36	6.85	175.4	24.6	-	7.01	243.7	24.3	27	6.97	269.5	24.1	28
Jun	23-06-22	7.43	408	28.5	966	6.65	201	29.7	-	6.87	205.8	29.5	242	6.96	218.7	29.2	7	6.91	269.3	29.8	32
Jun	24-06-22	7.22	408.1	25	67	6.74	181.9	24.6	-	7.01	428.4	24.5	110	6.82	212.9	25	16	6.87	272	24.5	8
Jun	25-06-22	6.39	319.4	22.7	-	6.8	205.7	22.8	-	6.8	179.9	22.8	-	6.92	229	23	-	7.02	256.2	22.9	-
Jun	26-06-22	5.7	341	23.7	-	6.77	344.8	23.7	-	6.77	346	23.9	-	6.81	255.7	23.7	-	7.1	318.5	23.7	-
Jun	27-06-22	6.45	431.6	26.5	-	6.9	201.9	25.7	45	6.89	203.4	25.6	-	6.86	240	25.1	6	7.13	308.1	25.7	22
Jun	28-06-22	6.45	586.1	27.9	578	7.02	272.7	25.4	-	7.08	268.8	25.8	63	6.91	313.4	25.6	36	7.2	242.2	25.1	46
Jun	29-06-22	6.67	616.4	26.4	-	6.88	263.4	29.2	76	6.93	266.4	28.9	-	7.28	331.8	28.8	26	6.9	273.9	29.2	5
Jun	30-06-22	5.74	573.3	26.2	619	6.88	296.3	23.8	-	7.08	413.7	22	159	6.72	297.4	23.1	25	6.97	344.3	23.4	11

Jul	31-07-22	4.92	400.2	24.6	313	6.58	290.8	25.5	-	8.56	269.0	25.3	558	0.40	322.2	24.9	0	8.63	366	25.8	24
Jul	30-07-22	3.90	541.3	22.5	-	8.71	349	22.7	-	8.72	241.5	23.2	-	0.67	269.8	22.1	-	8.12	302	22.3	-
Jul	29-07-22	4.85	339.0	22.3	-	6.81	306	22.1	-	8.74	241.1	21.8	-	6.82	276.2	22.1	-	7.75	327	22.1	-
Jul	28-07-22	4.73	338.6	25.8	-	8.76	220.3	24.6	52	4.02	340.6	23.3	-	7	267.7	25.1	15	7.20	267.3	25.4	13
Jul	27-07-22	5.04	476	26.0	184	6.85	197.5	25.5	-	8.58	276.2	26.2	319	0.69	233.2	26	19	8.81	269.4	25.7	21
Jul	26-07-22	4.57	365.1	25.9	-	6.01	227.2	24.9	65	0.36	243.5	24.2	-	6.8	196.4	25.5	18	7.7	220.7	25.1	24
Jul	25-07-22	0	0.0	26.0	107	6.88	286	33.2	-	8.66	310.1	30.5	203	7.03	286.5	29.4	27	7.06	281	24.1	69
Jul	24-07-22	6.31	340.2	25	537	6.87	176.5	24.5	-	6.72	193.9	24	160	6.8	224.7	24.2	21	7.05	296.3	23.7	134
Jul	23-07-22	5.09	300.0	24.5	-	6.87	280.5	24.8	-	8.68	248.6	24.9	-	6.82	252.6	24.8	-	8.66	279.6	24.8	-
Jul	22-07-22	6.61	387	24.8	-	8.71	294	24.8	-	0.68	246.5	24.5	-	6.81	241.2	25.9	-	7.06	296.7	24.9	-
Jul	21-07-22	5.10	320.0	27.5	-	6.77	193.	28.3	61	8.79	149.9	26.3	-	6.94	253.4	26.3	1	8.87	298	28.4	53
Jul	20-07-22	[illegible]			-	6.79	166.4	25.1	-	6.84	340.9	23.7	-	6.96	284.6	24.1	-	8.02	220.0	23.9	-
Jul	19-07-22	6.08	300.3	25.9	-	6.66	196.8	27.5	218	6.72	194.7	24.9	-	6.86	177.1	25.9	25	6.86	178.9	25.1	47
Jul	18-07-22	6.3	347.8	27	553	6.77	151.7	26.1	-	6.85	192.6	28	165	6.84	214.1	25.5	23	6.57	200.0	30.7	58
Jul	16-07-22	6.41	326	25.7	459	6.85	234.1	25.9	-	6.68	272	25.8	392	6.86	231.4	25.4	29	7.04	230.8	25.5	56
Jul	15-07-22	5.84	416.8	24.4	-	6.77	288.6	25.6	-	7.12	255.3	26.4	-	6.75	250.6	24.4	-	8.05	120.3	23.1	-
Jul	14-07-22	3.59	516.3	24.8	-	6.76	272.1	24.3	-	6.74	274.6	24.8	-	6.5	267.4	25.5	-	7.16	302.7	24.6	-
Jul	13-07-22	4.74	317.4	26	-	6.54	241.4	23.6	55	6.5	214	23	-	6.86	196	26.3	16	6.94	242.5	23.7	15
Jul	12-07-22	7.22	250.0	27.5	-	6.76	196.5	25.8	-	6.7	122.1	26.3	-	6.97	194.9	25.9	-	7.06	211.5	26.4	-
Jul	11-07-22	6.57	387	25.5	-	6.79	151	27.1	46	6.76	156.9	27.4	-	7.16	208	27.3	10	7.05	210.2	27.2	45
Jul	10-07-22	7.02	340.7	27.1	282	6.74	120.6	27.7	-	6.74	131	27.1	203	6.86	136.8	27.6	8	8.08	205.8	27.4	8
Jul	09-07-22	6.69	347.6	25.8	255	6.86	149.6	26	-	6.85	152.4	25.8	193	6.84	189.2	27	12	8.02	206.5	23.9	28
Jul	08-07-22	6.87	306.8	24	-	6.66	144.6	23.9	-	6.72	217.9	23.9	-	6.78	170.3	23.8	-	8.5	221.6	23.7	-
Jul	07-07-22	7.43	268.7	23.9	-	6.68	199.8	23.7	-	6.66	209.2	23.8	-	6.88	218.2	25	-	8.04	210.5	22	-
Jul	06-07-22	6.57	166.8	27.5	-	6.69	379.4	28.2	6	3.58	239.6	28.2	-	6.9	216.8	27.1	10	8.74	214.4	28.1	23
Jul	05-07-22	7.06	340.3	26.3	224	6.8	200.6	24.9	-	6.58	377.1	25	85	6.8	230.7	23.9	10	8.08	221	24.8	22
Jul	04-07-22	6.81	447.7	25.1	-	6.83	258	23.5	76	7.14	301.	25.3	-	6.74	285.5	23.5	21	8.07	251	23.5	43
Jul	03-07-22	6.80	377.4	25.4	218	6.87	340.2	26.1	-	6.88	346.9	26.7	175	6.71	316.2	25.9	12	8.07	322.7	25.7	23
Jul	02-07-22	6.87	387.7	31.9	180	6.66	306	27.5	-	7	854.1	28.1	412	6.76	343.4	27.4	26	8.87	382.9	26.5	0
Jul	01-07-22	6.73	347.7	23.2	-	6.7	357.9	23.5	-	7.06	567.9	22.2	-	6.75	351.9	22.3	-	8.64	403.2	22.4	-
Jul	30-06-22	6.59	341.7	22.7	-	6.6	466.2	23.1	-	6.64	853.6	23.5	-	6.59	376.6	23.3	-	8.74	404.6	23.7	-
Aug	31-06-22	7.74	466.4	27.5	-	6.8	341.7	23.5	56	6.74	311.4	23.3	-	6.66	387.7	24.3	-	8.67	436.8	25.5	49
Aug	02-09-22	7.4	500.2	24.9	467	7	283.3	25.8	-	7.12	584	24.8	52	6.79	371.1	23.9	5	8.76	441.2	25.7	10
Aug	03-09-22	7.23	416.8	25.1	-	6.97	293.6	24.3	65	6.84	218.7	24.1	-	6.6	354	24.2	15	8.77	430.7	24.3	6
Aug	04-09-22	7.04	346.4	26.5	377	6.65	151.5	26.8	-	8.91	213.6	26.9	5	6.67	233.1	26.8	24	8.81	370.7	26.6	39
Aug	05-09-22	6.7	342.6	26.2	450	6.84	173.4	24.7	-	6.89	173.5	24.7	104	6.62	193.6	24.6	26	8.6	363.6	24.9	28
Aug	06-09-22	6.3	362.3	25.	-	6.74	242.5	22.9	-	6.76	212.4	23.	-	6.75	216.9	23.1	-	8.65	377.9	23.1	-
Aug	07-09-22	6.07	240.2	23.9	-	6.66	176.1	23.7	-	6.7	193.1	23.8	-	6.96	224.6	23.8	-	8.88	315.7	24	-
Aug	08-09-22	5.45	296.8	27.2	-	6.69	164.5	27.3	54	7.06	197.	27.6	-	7.09	187	27.8	21	8.72	354.4	27.8	27
Aug	09-09-22	5.49	136.	24.5	367	6.68	150	26.1	-	6.67	153.6	25.5	36	6.56	232.6	25.6	16	8.75	294.5	23.8	24
Aug	10-09-22	6.68	304.7	27.4	-	6.58	211.5	28.3	61	6.92	120.3	28.	-	6.78	203.7	27.4	6	8.77	269	27.7	6
Aug	11-09-22	6.35	201.4	27.2	248	6.66	207.6	25.1	-	8.64	273.3	24.8	109	6.96	231.1	25.	17	8.58	285.5	25.8	17
Aug	12-09-22	6.84	243.	28.7	205	6.76	151	26.8	-	8.76	161	26.9	203	6.92	259.5	26.3	8	8.87	261.4	28.5	10
Aug	13-09-22	6.64	218.6	25	-	6.87	328.8	24.	-	8.88	320.3	24.1	-	6.89	195.2	24	-	8.93	230.1	24.3	-
Aug	14-09-22	7.07	388.7	27	-	6.6	182.9	24.7	-	6.96	589	24.7	-	6.84	259.1	24.9	-	8.82	288	24.1	-
Aug	15-09-22	7.0	376.1	26.4	-	6.64	185.2	24.8	300	8.78	189.2	24.7	-	6.85	249.6	24.8	67	8.9	278.3	24.5	58
Aug	16-09-22	7.17	311	27.1	302	8.74	317.2	27.	-	6.78	219.5	27.4	37	6.83	262.8	27.4	6	8.84	289.3	27.3	4
Aug	17-09-22	7.12	377.7	26.5	-	6.66	308.5	28.7	76	6.89	192.9	28.2	-	6.77	318.8	28.9	16	8.79	256.3	28.8	16
Aug	18-09-22	6.67	316.7	26.2	348	8.65	193.8	27.5	-	8.75	200.3	27.5	136	6.75	307.9	27.4	23	8.55	180.5	27.6	11
Aug	19-09-22	7.15	286.1	25.7	56	8.72	264	26.7	-	6.87	224.9	26.7	60	6.81	223.8	26.7	21	8.96	321.5	26.9	16
Aug	20-09-22	7.16	254.5	24.5	-	8.45	181.7	24.5	-	6.91	180.4	24.5	-	6.98	234.3	24.5	-	8.91	282.3	24.4	-
Aug	21-09-22	7.13	279.2	25.4	-	6.58	293.7	24.8	-	6.72	240.8	24.5	-	6.8	241.9	24.5	-	8.89	267.9	24.6	-
Aug	22-09-22	7.09	313.8	27.7	-	6.91	252.5	28.9	0	7.01	226.9	28.9	-	6.92	259.3	28.6	14	7.08	257.3	29.6	3
Aug	23-09-22	6.13	304.3	25.7	340	6.97	241.5	24.8	-	6.53	218.8	25.5	341	6.99	282.5	25.6	15	7.07	279	25.6	14
Aug	24-09-22	5.51	327.6	27.8	-	6.74	585	29	105	6.46	670	27.	-	6.71	267	27	14	6.93	317.5	27.5	12
Aug	25-09-22	6.16	376.9	24.8	490	6.93	365.9	24.9	-	6.84	308.1	24.6	887	7.13	264.7	24.2	24	7.19	367.2	23.6	22
Aug	26-09-22	8.93	358.3	24.7	496	7.18	338.7	24.5	-	7.25	441.2	24.4	60	6.83	347.2	24.3	13	7.08	405.1	24.8	14
Aug	27-09-22	6.95	371	23.4	-	7.45	423	24.	-	7.33	340.7	24.1	-	6.81	336.8	24.2	-	7.2	402.7	23.6	-
Aug	28-09-22	7.1	383.3	24	-	7.32	382.1	24.	-	8.67	336.6	23.8	-	6.92	370.2	23.6	-	7.24	388.7	24	-
Aug	29-09-22	7.07	369	24.6	-	6.91	283.6	25.	59	7.23	362.7	25.5	-	6.83	308.2	25	5	6.76	293.5	25.8	11
Aug	30-09-22	7.17	418.4	25.4	426	6.83	288.5	27.2	-	6.85	378.5	27.1	230	6.87	317.3	27.6	10	7.24	365.8	27.9	16
Aug	3 09 22	7.16	382.9	26	-	7.43	333.9	25.6	112	6.9	364	25.7	-	6.88	328.6	25.8	3	7.18	410.7	25.6	2



Weekly STP Water Analysis Results

Month	Date	Zone A (Inlet) -1			Zone A (Inlet) -2			Outlet - 1								Outlet - 2							
		SS	BOD	T-P	SS	BOD	T-P	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	Max8	Max 200	Max 200	Max8	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	ppm	MNP/100ml	MNP/100ml	mg/L	ppm	ppm	ppm	ppm	ppm	MNP/100ml	MNP/100ml	mg/L
Mar	03-03-22	80	126	7.22	-	-	-	20	8.2	12	2.5	0.1	< 1	< 1	0.63	40	6.8	14	4.73	0.2	< 1	< 1	0.54
Mar	09-03-22	-	-	-	80	243	6.22	40	7.8	27	3.35	0	< 1	< 1	0.26	80	9.1	13	4.08	0	< 1	< 1	0.54
Mar	17-03-22	30	75	2.65	-	-	-	20	10	13	1.68	0	< 1	< 1	0.17	10	6.1	5	5.35	0.3	< 1	< 1	0.22
Mar	23-03-22	-	-	-	240	177	5.11	40	8.3	12	2.45	0.4	< 1	< 1	0.35	10	8.2	16	3.3	0.6	< 1	< 1	0.22
Mar	30-03-22	80	99	4.72	-	-	-	10	8.3	10	2.15	0	< 1	< 1	0.14	20	7.4	11	4.24	0.6	< 1	< 1	0.16
Apr	06-04-22	140	120	6.9	-	-	-	40	7.4	20	2.35	0	1	< 1	0.08	40	9.7	21	4.57	0	< 1	< 1	2.24
Apr	20-04-22	80	90	1.35	-	-	-	10	5.4	22	0.979	0.8	< 1	< 1	0.13	10	6.7	37	4	1	< 1	< 1	0.99
Apr	27-04-22	-	-	-	40	219	0.384	10	7.4	21	0.404	0.2	< 1	< 1	1.07	10	6.5	20	0.392	0.1	< 1	< 1	0.27
May	04-05-22	140	150	7.74	-	-	-	10	9.1	22	2.74	0.4	1	< 1	0.1	10	8.5	7	4.48	0.6	328	89	0
May	11-05-22	-	-	-	120	90	5.85	20	7.8	11	1.12	0.2	< 1	< 1	0.69	10	7.2	7	2.16	0.3	1	1	0.03
May	18-05-22	50	111	5.17	-	-	-	30	7.4	33	1.43	0	< 1	< 1	0.02	10	6.8	26	1.73	0	< 1	<1	0.01
May	25-05-22	-	-	-	40	168	1.3	10	8	5	0.955	0	< 1	< 1	0.05	10	7.3	5	1.1	0.3	213	213	0.02
June	01-06-22	60	96	1.2	-	-	-	20	7.6	9	0.801	0	1	1	0.04	10	7.8	8	0.989	0.1	2	2	0.02
June	07-06-22	-	-	-	20	84	1.59	10	6.5	15	0.42	0	< 1	< 1	0.83	20	8.6	14	1.73	0	1	1	0.05
June	15-06-22	80	135	2.9	-	-	-	10	9.2	8	0.422	0.4	< 1	< 1	0.02	20	7.6	6	0.905	0.1	< 1	< 1	0.07
June	22-06-22	-	-	-	60	117	5.5	35	7.5	9	0.337	0.3	< 1	< 1	0.8	28	7.3	8	1.14	0.4	< 1	< 1	0.81
June	28-06-22	20	105	1.14	-	-	-	14	7.7	12	0.699	0	89	89	0.02	17	6.7	18	1.15	0	< 1	< 1	1.45
July	05-07-22	30	264	0.851	-	-	-	10	8.8	9	0.714	0.1	13	13	0.05	50	49	2	1.48	0.1	1	1	0.25
July	13-07-22	-	-	-	90	168	4.55	15	8.6	10	0.57	0	1	1	0.07	25	9	12	0.314	0	< 1	< 1	0.09
July	20-07-22	70	153	1.77	-	-	-	20	8.9	8	0.558	0	<1	<1	0.1	30	8.6	4	0.877	0.1	< 1	< 1	0.16
July	27-07-22	-	-	-	40	150	2.12	20	9.8	9	0.336	0	<1	<1	0.05	20	8.1	10	0.603	0	< 1	< 1	0.21
Aug	03-08-22	30	72	1.34	-	-	-	10	5.4	12	0.41	0	<1	<1	0.08	10	5.8	13	1.02	0	< 1	< 1	0.02
Aug	10-08-22	-	-	-	90	246	1.29	10	7.7	13	0.778	0	1	<1	0.04	20	6.4	5	1.02	0	1	< 1	1.16
Aug	17-08-22	40	96	1.7	-	-	-	60	8	5	0.85	0	1	1	0.1	20	7.5	9	0.419	0	< 1	< 1	0.15
Aug	24-08-22	-	-	-	220	339	1.41	10	8.8	12	0.491	0	< 1	< 1	0.62	10	8	12	0.529	0	< 1	< 1	0.07
Aug	31-08-22	20	423	1.42	-	-	-	20	7.6	3	0.89	0	< 1	< 1	0.29	10	6.8	3	0.596	0	< 1	< 1	0.8

Monitoring Parameters Result for STP

Monitoring Parameters Result for ETP

Monitoring Parameters Result for ETP

Month	Date	Stream 01 - Inlet											Stream 02 - Outlet 01											Stream 03 - Outlet 02											Treated 01						Treated 02					
Parameters		Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit	Unit	Limit