

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



Myanmar Japan Thilawa
Development Limited.

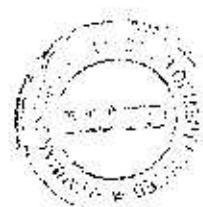
September 2023

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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 2023 to August 2023 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
8	Environmental Monitoring Report	Phase-1,2 & 3 Operation Phase	March, 2023
9	Environmental Monitoring Report	Phase-1,2 & 3 Operation Phase	September, 2023

Report (No.9 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 _x , SO _x , CO, PM ₁₀ , PM _{2.5}	Representative point inside the project area	1 week each in the dry and rainy seasons	June 2023, Air Quality Monitoring Report
Water Quality	Water temperature, pH, SS, DO, BOD ₅ , 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, BOD ₅ , COD, color and odor, Every 6 month: all parameters	February 2023, April 2023 Water and Wastewater Quality Monitoring Report (Bi-monthly report) June 2023 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 2023 Traffic Count Monitoring Report June 2023
Bottom Sediment	Water quality monitoring (as indicator of the pollution of the bottom sediment)	Same as the water quality monitoring	Additional analysis on the bottom sediment of creek, in case of finding continuous high concentration	Refer in Environmental Monitoring report
Hydrological Situation	Checking the function of retention pond at heavy rain	Retention Pond	When the heavy rain	
Living and Livelihood/ Vulnerable Group/ Misdistribution of Benefit and Damage/ Children's Right	The implementation status for CSR activities such as community support program	Around Project Site	Once/year	Refer in Environmental Monitoring report
Risks for Infectious 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



Category	Item	Location	Frequency	Remark
	The implementation status for CSR activities such as community support program	Around project site	Once/year	Refer in Environmental Monitoring form
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)		29 th 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	5 th January 2018	10 th 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 2023)
NO₂, SO₂, CO, PM_{2.5}, PM₁₀

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max)	Country's Standard ²	Target value to be applied ^{*1}	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
AQ-1 (Monastery Compound of Phalan Village)	NO ₂	mg/m ³	0.058	0.100	0.2 mg/m ³ (1 Hour)	0.1 mg/m ³ (24 Hour)	-	One time / 6 months	Haz-Scanner EPAS	Refer to air quality report
	SO ₂	mg/m ³	0.016	0.021	0.02 mg/m ³ (24 Hours)	0.02 mg/m ³ (24 Hours)	-			
	CO	mg/m ³	0.461	0.673	-	10.26 mg/m ³ (24 Hours)	-			
	PM _{2.5}	mg/m ³	0.017	0.025	0.025 mg/m ³ (24 Hours)	0.025 mg/m ³ (24 Hours)	-			
	PM ₁₀	mg/m ³	0.026	0.050	0.05 mg/m ³ (24 Hours)	0.05 mg/m ³ (24 Hours)	-			

^{*1}Remarks: Referred to the tentative target value of ambient air quality (Thilawa SEZ-B EIA Report for industrial area, Table 2.4-1), Reference to the air quality monitoring report (June 2023)

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

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 2023

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	Measur ed Value (Max)	Country's Standard ²	Target value to be applied ¹	Frequ- ency	Method	Note (Reason of excess of the standard)
SW-2 (Reference point)	Temperature	°C	29	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH ⁵	-	9.2	6-9	6.0 - 9.0		Instrument Analysis Method	
	Suspended Solids (SS)	mg/L	26	50	Max 50		APHA 2540D (Dry at 103-105°C Method)	
	Dissolved Oxygen (DO)	mg/L	11.84	-	-		Instrument Analysis Method	
	BOD ₅	mg/L	5.51	50	Max 30		APHA 5210 B (5days BOD Test)	
	COD _{Cr}	mg/L	22.4	250	Max 125		APHA 5220 D (Close Reflux Colorimetric Method)	



Location	Item	Unit	Measured Value (Max)	Country's Standard ²	Target value to be applied ¹	Frequency	Method	Note (Reason of excess of the standard)
SW-2 (Reference point)	Total Nitrogen (T-N)	mg/L	1.5	-	Max. 80		HACH Method 10072 (TNT Persulfate Digestion Method)	Refer to water quality report
	Total Phosphorous (T-P)	mg/L	0.09	2	Max. 2		APHA 4500-PE (Ascorbic Acid Method)	
	Color	TCU	14.37	-	150 Co.Pt *		APHA 2120C (Spectrophotometric Method)	
	Odor	TON	1	-	-		APHA 2150B (Threshold Odor Test)	
	Total Coliform ⁴	MPN/100ml	92000	400	Max 400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	<3.1	10	Max 10		APHA 5520 B (partition Gravimetric Method)	
	Total Dissolved solids (TDS) ^{*6}	mg/L	1402	-	Max 2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron ^{*6}	mg/L	0.264	3.5	Mas 3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury ^{*6}	mg/L	≤ 0.002	0.01	Max 0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
SW-4 (Reference point)	Temperature	°C	29	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	8.1	6-9	6.0 - 9.0		Instrument Analysis Method	
	Suspended Solids (SS) ^{*3}	mg/L	78	50	Max 50		APHA 2540D (Dry at 103-105°C Method)	
	Dissolved Oxygen (DO)	mg/L	6.63	-	-		Instrument Analysis Method	
	BOD5	mg/L	5.07	50	Max 30		APHA 5210 B (5days BOD Test)	
	CODCr	mg/L	16.2	250	Max 125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Nitrogen (T-N)	mg/L	0.9	-	Max. 80		HACH Method 10072 (TNT Persulfate Digestion Method)	
	Total Phosphorous (T-P)	mg/L	<0.05	2	Max. 2		APHA 4500-PE (Ascorbic Acid Method)	
	Color	TCU	3.69	-	150 Co.Pt *		APHA 2120C (Spectrophotometric Method)	
	Odor	TON	1	-	-		APHA 2150B (Threshold Odor Test)	
	Total Coliform ⁴	MPN/100ml	54000	400	Max 400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	<3.1	10	Max 10		APHA 5520 B (partition Gravimetric Method)	
	Total Dissolved solids (TDS) ^{*6,3}	mg/L	3882	-	Max 2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron ^{*6}	mg/L	0.316	3.5	Mas 3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury ^{*6}	mg/L	≤ 0.002	0.01	Max 0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	

Location	Item	Unit	Measured Value (Max)	Country's Standard ²	Target value to be applied ¹	Frequency	Method	Note (Reason of excess of the standard)
SW-7 (Discharge Point)	Temperature	°C	27	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	8.4	6-9	6.0 - 9.0		Instrument Analysis Method	
	Suspended Solids (SS)	mg/L	30	50	Max 50		APHA 2540D (Dry at 103-105°C Method)	
	Dissolved Oxygen (DO)	mg/L	5.52	-	-		Instrument Analysis Method	
	BOD5	mg/L	4.39	50	Max 30		APHA 5210 B (5days BOD Test)	
	CODCr	mg/L	16.4	250	Max 125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Nitrogen (T-N)	mg/L	1.8	-	Max. 80		HACH Method 10072 (TNT Persulfate Digestion Method)	
	Total Phosphorous (T-P)	mg/L	0.07	2	Max. 2		APHA 4500-PE (Ascorbic Acid Method)	
	Color	TCU	3.82	-	150 Co.Pt *		APHA 2120C (Spectrophotometric Method)	
	Odor	TON	1	-	-		APHA 2150B (Threshold Odor Test)	
	Total Coliform ⁷	MPN/100ml	2300	400	Max 400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	<3.1	10	Max 10		APHA 5520 B (partition Gravimetric Method)	
	Total Dissolved solids (TDS) ⁶	mg/L	1792	-	Max 2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron ⁶	mg/L	1.080	3.5	Max 3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury ⁶	mg/L	≤ 0.002	0.01	Max 0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
GW-2 (Reference point)	Temperature	°C	28	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.1	6-9	6.0 - 9.0		Instrument Analysis Method	
	Suspended Solids (SS)	mg/L	6	50	Max 50		APHA 2540D (Dry at 103-105°C Method)	
	Dissolved Oxygen (DO)	mg/L	5.66	-	-		Instrument Analysis Method	
	BOD5	mg/L	3.86	50	Max 30		APHA 5210 B (5days BOD Test)	
	CODCr	mg/L	< 0.7	250	Max 125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Nitrogen (T-N)	mg/L	1.7	-	Max. 80		HACH Method 10072 (TNT Persulfate Digestion Method)	
	Total Phosphorous (T-P)	mg/L	0.66	2	Max. 2		APHA 4500-PE (Ascorbic Acid Method)	
	Color	TCU	14.21	-	150 Co.Pt *		APHA 2120C (Spectrophotometric Method)	
	Odor	TON	1	-	-		APHA 2150B (Threshold Odor Test)	

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)	Total Coliform ^{*4}	MPN/100ml	13	400	Max 400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	Refer to water quality report
	Oil and Grease	mg/L	<3.1	10	Max 10		APHA 5520 B (partition Gravimetric Method)	
	Total Dissolved solids (TDS) ^{*6}	mg/L	190	-	Max 2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron ^{*6,*8}	mg/L	5.62	3.5	Mas 3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury ^{*6}	mg/L	≤ 0.002	0.01	Max 0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	

^{*1}Remark: Reference to the Water and Wastewater Quality Monitoring Report (February 2023)

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

^{*3}Remark: SS and Total Dissolved Solid results exceeded in the monitoring point of 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.

^{*4}Remark: For the monitoring point of SW2 and SW-4 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.

^{*5}Remark: For the monitoring points of SW-2 the result of pH exceeded might be due to wastewater discharged that may contains detergents and soap-based products from the local industrial zone outside of Thilawa SEZ.

^{*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-7, the results of T-Coli exceeded due to expected reason i) due to 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 2. It is considered that there is no significant impact to human health.

^{*8} Remark: For the monitoring point of GW-2, the results of Iron exceeded due to the influence of natural origin (iron can reach out from soil by run-off).

2) (a) Water Quality – April 2023

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	Measure d Value (Max)	Country's Standard ²	Target value to be applied ¹	Frequ- ency	Method	Note (Reason of excess of the standard)
SW-2 (Reference point)	Temperature	°C	30	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.6	6-9	6.0 – 9.0		Instrument Analysis Method	
	Suspended Solids (SS)	mg/L	50	50	Max 50		APHA 2540D (Dry at 103-105°C Method)	
	Dissolved Oxygen (DO)	mg/L	5.76	-	-		Instrument Analysis Method	
	BOD5	mg/L	10.55	50	Max 30		APHA 5210 B (5days BOD Test)	
	CODCr	mg/L	31	250	Max 125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Nitrogen (T-N)	mg/L	1.2	-	Max. 80		HACH Method 10072 (TNT Persulfate Digestion Method)	
	Total Phosphorous (T-P)	mg/L	<0.05	2	Max. 2		APHA 4500-PE (Ascorbic Acid Method)	
	Color	TCU	17.44	-	150 Co.Pt *		APHA 2120C (Spectrophotometric Method)	
	Odor	TON	17000	-	-		APHA 2150B (Threshold Odor Test)	
	Total Coliform ⁴	MPN/100 ml	400	400	Max 400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	<3.1	10	Max 10		APHA 5520 B (partition Gravimetric Method)	
	Total Dissolved solids (TDS) ^{6,5}	mg/L	8162	-	Max 2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron ⁶	mg/L	0.062	3.5	Mas 3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury ⁶	mg/	≤ 0.002	0.01	Max 0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
SW-4 (Reference point)	Temperature	°C	33	< 3 (increase)	≤ 35	Once per	Instrument Analysis Method	
	pH	-	8.8	6-9	6.0 – 9.0		Instrument Analysis Method	

Location	Item	Unit	Measure d Value (Max)	Country's Standard ²	Target value to be applied ¹	Frequ- ency	Method	Note (Reason of excess of the standard)
SW-4 (Reference point)	Suspended Solids (SS)	mg/L	46	50	Max 50	2 months	APHA 2540D (Dry at 103-105°C Method)	Refer to water quality report
	Dissolved Oxygen (DO)	mg/L	12.13	-	-		Instrument Analysis Method	
	BOD5	mg/L	13.92	50	Max 30		APHA 5210 B (5days BOD Test)	
	CODCr	mg/L	39.9	250	Max 125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Nitrogen (T-N)	mg/L	1.6	-	Max. 80		HACH Method 10072 (TNT Persulfate Digestion Method)	
	Total Phosphorous (T-P)	mg/L	<0.05	2	Max. 2		APHA 4500-PE (Ascorbic Acid Method)	
	Color	TCU	10.98	-	150 Co.Pt *		APHA 2120C (Spectrophotometric Method)	
	Odor	TON	2	-	-		APHA 2150B (Threshold Odor Test)	
	Total Coliform ⁴	MPN/100 ml	4600	400	Max 400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	<3.1	10	Max 10		APHA 5520 B (partition Gravimetric Method)	
	Total Dissolved solids (TDS) ^{6,3}	mg/L	6284	-	Max 2000		APHA 2540C (Total Dissolved Solids Dried at 180.C)	
	Iron ⁶	mg/L	0.070	3.5	Mas 3.5		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
	Mercury ⁶	mg/	≤ 0.002	0.01	Max 0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	
SW-7 (Discharge d Point)	Temperature	°C	30	< 3 (increase)	≤ 35	Once per 2 months	Instrument Analysis Method	Refer to water quality report
	pH	-	8.1	6-9	6.0 - 9.0		Instrument Analysis Method	
	Suspended Solids (SS)	mg/L	52	50	Max 50		APHA 2540D (Dry at 103-105°C Method)	
	Dissolved Oxygen (DO)	mg/L	7.19	-	-		Instrument Analysis Method	
	BOD5	mg/L	10.59	50	Max 30		APHA 5210 B (5days BOD Test)	
	CODCr	mg/L	26.1	250	Max 125		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Nitrogen (T-N)	mg/L	0.4	-	Max. 80		HACH Method 10072 (TNT Persulfate Digestion Method)	
	Total Phosphorous (T-P)	mg/L	<0.05	2	Max. 2		APHA 4500-PE (Ascorbic Acid Method)	
	Color	TCU	7.21	-	150 Co.Pt *		APHA 2120C (Spectrophotometric Method)	
	Odor	TON	1	-	-		APHA 2150B (Threshold Odor Test)	
	Total Coliform ⁴	MPN/100 ml	400	400	Max 400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	<3.1	10	Max 10		APHA 5520 B (partition Gravimetric Method)	
	Total Dissolved solids	mg/L	9874	-	Max 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}	Frequency	Method	Note (Reason of excess of the standard)
SW-7 (Discharge Point)	(TDS) ^{*6,5} Iron ^{*6} Mercury ^{*6}	mg/L mg/	0.072 ≤ 0.002	3.5 0.01	Mas 3.5 Max 0.005		APHA 3120 B (Inductively Coupled Plasma (ICP) Method) APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	Refer to water quality report
GW-2 (reference point)	Temperature pH Suspended Solids (SS) Dissolved Oxygen (DO) BOD ₅ COD _{Cr} Total Nitrogen (T-N) Total Phosphorous (T-P) Color Odor Total Coliform ^{*7} Oil and Grease Total Dissolved solids (TDS) ^{*6} Iron ^{*6} Mercury ^{*6}	°C - mg/L mg/L mg/L mg/L mg/L mg/L TCU TON MPN/100 ml mg/L mg/L mg/L mg/	27 6.5 4 7.20 3.56 <0.7 0.7 0.54 27.06 1 2700 <3.1 182 0.108 ≤ 0.002	< 3 (increase) 6-9 50 - 50 250 - 2 - - 400 10 - 3.5 0.01	≤ 35 6.0 - 9.0 Max 50 - Max 30 Max 125 Max 80 Max 2 150 Co.Pt * - Max 400 Max 10 Max 2000 Mas 3.5 Max 0.005	Once per 2 months	Instrument Analysis Method Instrument Analysis Method APHA 2540D (Dry at 103-105°C Method) Instrument Analysis Method APHA 5210 B (5days BOD Test) APHA 5220 D (Close Reflux Colorimetric Method) HACH Method 10072 (TNT Persulfate Digestion Method) APHA 4500-PE (Ascorbic Acid Method) APHA 2120C (Spectrophotometric Method) APHA 2150B (Threshold Odor Test) APHA 9221 B (Standard Total Coliform Fermentation Technique) APHA 5520 B (partition Gravimetric Method) APHA 2540C (Total Dissolved Solids Dried at 180.C) APHA 3120 B (Inductively Coupled Plasma (ICP) Method) APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	Refer to water quality report

^{*1}Remark: Reference to the Water and Wastewater Quality Monitoring Report (April 2023)

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

^{*3}Remark: 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 backflow by tidal fluctuation.

^{*4}Remark: 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 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.

⁵ Remark: For the monitoring point of SW-7, the result of SS and TDS exceeded than the target value due to the surface water run-off from bare land in Zone B.

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

⁷ Remark: For the monitoring point at GW-2, the results of T-Coli exceeded than target value it may be possible due to the poor maintenance of well which can increase the risk of bacteria and other harmful organisms. However, the result of E. Coli of (GW-2) was under the reference value. Therefore, although the target value of total coliform exceeded at monitoring point of (GW-2), it is considered that there is no significant impact on human health.

2) (b) Water Quality – June 2023

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	26	< 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	
	Suspended Solids (SS) ³	mg/L	90	50	Max 50		APHA 2540 D Method	
	Dissolved Oxygen (DO)	mg/L	3.88	-	-		Instrument Analysis Method	
	BOD (5)	mg/L	3.86	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	24.3	250	Max 125		APHA 5220D Method	
	Total Coliform ⁴	MPN/100 ml	>160000	400	Max 400		APHA 9221B Method	
	Total Nitrogen (T-N)	mg/L	14.7	-	Max 80		HACH Method 10072 Method	
	Total Phosphorous (T-P)	mg/L	0.65	2	Max 2		APHA 4500-P E Method	
	Color	TCU	24.17	-	Max 150		APHA 2120C Method	



Location	Item	Unit	Measured Value (Max)	Country's Standard ²	Target value to be applied ¹	Frequency	Method	Note (Reason of excess of the standard)
SW-2 (Reference point)	Odor	TON	1	-	-	Once per 6 months	APHA 2150 B Method	Refer to water quality report
	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	≤ 0.002	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.010	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.002	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.010	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.002	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	≤ 0.002	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	≤ 0.002	0.5	Max 0.2		APHA 3120 B Method	
	Cyanide	mg/L	< 0.002	0.1	Max 0.1		HACH 8027 Method	
	Total Cyanide	mg/L	0.003	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	0.371	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.213	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	0.002	0.5	Max 0.5		USEPA Method 420.1	
	Iron ⁵	mg/L	8.346	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids	mg/L	224	-	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 ⁹	mg/L	14	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.187	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
SW-4 (Reference point)	Temperature	°C	27	< 3 (increase)	≤ 35	Once per 6 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7	6-9	6-9		Instrument Analysis Method	
	Suspended Solids (SS) ³	mg/L	502	50	Max 50		APHA 2540 D Method	
	Dissolved Oxygen (DO)	mg/L	6.02	-	-		Instrument Analysis Method	
	BOD (5)	mg/L	4.44	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	5.0	250	Max 125		APHA 5220D Method	
	Total Coliform ⁴	MPN/100 ml	>160000	400	Max 400		APHA 9221B Method	
	Total Nitrogen (T-N)	mg/L	1.6	-	Max 80		HACH Method 10072 Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard ²	Target value to be applied ¹	Frequency	Method	Note (Reason of excess of the standard)
SW-4 (Reference point)	Total Phosphorous (T-P)	mg/L	0.72	2	Max 2		APHA 4500-P E Method	Refer to water quality report
	Color	TCU	3.58	-	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	0.026	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.010	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.002	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.010	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.002	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	≤ 0.002	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	≤ 0.002	0.5	Max 0.2		APHA 3120 B Method	
	Cyanide	mg/L	< 0.002	0.1	Max 0.1		HACH 8027 Method	
	Total Cyanide	mg/L	0.004	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	0.333	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.178	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	< 0.002	0.5	Max 0.5		USEPA Method 420.1	
	Iron ⁵	mg/L	22.626	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids	mg/L	266	-	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	0.71	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.301	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
SW-7 (Discharge point)	Temperature	°C	27	< 3 (increase)	≤ 35	Once per 6 months	Instrument Analysis Method	Refer to water quality report
	pH	-	7.5	6-9	6-9		Instrument Analysis Method	
	Suspended Solids (SS)	mg/L	32	50	Max 50		APHA 2540 D Method	
	Dissolved Oxygen (DO)	mg/L	4.86	-	-		Instrument Analysis Method	
	BOD (5)	mg/L	7.55	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	15	250	Max 125		APHA 5220D Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard ²	Target value to be applied ¹	Frequency	Method	Note (Reason of excess of the standard)
SW-7 (Discharge point)	Total Coliform ⁸	MPN/100 ml	> 160000	400	Max 400		APHA 9221B Method	Refer to water quality report
	Total Nitrogen (T-N)	mg/L	0.6	-	Max 80		HACH Method 10072 Method	
	Total Phosphorous (T-P)	mg/L	0.09	2	Max 2		APHA 4500-P E Method	
	Color	TCU	8.95	-	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	0.11	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.010	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.002	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.010	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.002	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	≤ 0.002	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	≤ 0.002	0.5	Max 0.2		APHA 3120 B Method	
	Cyanide	mg/L	< 0.002	0.1	Max 0.1		HACH 8027 Method	
	Total Cyanide	mg/L	0.003	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	0.080	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.041	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	< 0.002	0.5	Max 0.5		USEPA Method 420.1	
	Iron	mg/L	1.882	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids	mg/L	90	-	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	0.15	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.131	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
GW-2 (Reference point)	Temperature	°C	28	< 3 (increase)	≤ 35	Once per 6 months	Instrument Analysis Method	Refer to water quality report
	pH	-	6.4	6-9	6-9		Instrument Analysis Method	
	Suspended Solids (SS)	mg/L	14	50	Max 50		APHA 2540 D 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)	Dissolved Oxygen (DO)	mg/L	6.63	-	-		Instrument Analysis Method	Refer to water quality report
	BOD (5)	mg/L	7.88	50	Max 30		APHA 5210 B Method	
	COD (Cr)	mg/L	20	250	Max 125		APHA 5220D Method	
	Total Coliform ⁷	MPN/100 ml	1600	400	Max 400		APHA 9221B Method	
	Total Nitrogen (T-N)	mg/L	< 0.5	-	Max 80		HACH Method 10072 Method	
	Total Phosphorous (T-P)	mg/L	0.60	2	Max 2		APHA 4500-P E Method	
	Color	TCU	14.55	-	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	≤ 0.002	2	Max 2		APHA 3120 B Method	
	Arsenic	mg/L	≤ 0.010	0.1	Max 0.1		APHA 3120 B Method	
	Chromium	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Cadmium	mg/L	≤ 0.002	0.1	Max 0.03		APHA 3120 B Method	
	Selenium	mg/L	≤ 0.010	0.1	Max 0.02		APHA 3120 B Method	
	Lead	mg/L	≤ 0.002	0.1	Max 0.1		APHA 3120 B Method	
	Copper	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	
	Barium	mg/L	≤ 0.002	-	Max 1		APHA 3120 B Method	
	Nickel	mg/L	≤ 0.002	0.5	Max 0.2		APHA 3120 B Method	
	Cyanide	mg/L	< 0.002	0.1	Max 0.1		HACH 8027 Method	
	Total Cyanide	mg/L	< 0.002	1	Max 1		APHA 4500-CN-C Method	
	Free Chlorine	mg/L	< 0.01	-	Max 1		APHA 4500-CL G Method	
	Sulphide (S ₂ -)	mg/L	0.029	1	Max 1		HACH 8131 Method	
	Formaldehyde	mg/L	0.004	-	Max 1		HACH 8110 Method	
	Phenols	mg/L	0.007	0.5	Max 0.5		USEPA Method 420.1	
	Iron ⁶	mg/L	6.714	3.5	Max 3.5		APHA 3120 B Method	
	Total Dissolved Solids	mg/L	178	-	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	0.02	10	Max 10		HACH Method 10205 Method	
	Fluoride	mg/L	0.514	20	Max 20		APHA 4110 B Method	
	Silver	mg/L	≤ 0.002	0.5	Max 0.5		APHA 3120 B Method	



*1Remark: Reference to the Water and Wastewater Quality Monitoring Report (June 2023)

*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 is located outside of Thilawa SEZ, and ii) influence by water from the downstream of monitoring points due to backflow by tidal fluctuation along Shwe Pyauk creek.

*4Remark: For the monitoring point of SW2, SW4 the result of total coliform exceeded than the target value due to expected reasons i) the existing of various kinds of vegetation and animals, especially the excrement of the creature and death of freshwater fishes 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-2 and SW-4, the result of iron exceeded due to expected reason i) maybe due to the influence of natural origin (iron can reach out from the soil by runoff). Surroundings of the Thilawa SEZ especially small hilly areas are mainly composed of iron rich soil (lateritic soil), and it can be transported to the low land area by run-off.

*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 GW-2, the results of Total Coliform exceeded due to the poor maintenance of well which can increase the risk of bacteria and other harmful organisms. However, the result of E. Coli of (GW-2) was under the reference value. Therefore, although the target value of total coliform exceeded at monitoring point of (GW-2), it is considered that there is no significant impact on human health.

*8 Remark: For the monitoring point of SW-7, the results of Total Coliform exceeded due to the expected reason i) natural bacteria existed in all area of Zone B because the existing of various kinds of vegetation and animals, especially the excrement of the creature and death of freshwater fishes 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 17. It is considered that there is no significant impact to human health.

*9 Remark: For the monitoring point of SW-2, the results of Ammonia exceeded due to the expected reason i) due to the discharged wastewater from the local industrial zone, nitrogenous waste from animals and runoff from agricultural land.

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 2023)

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 (5 June 2023)	Leq (day)	dB(A)	56	63	Refer to NEQG Article 1.3	60	Refer the section 2.4 in EIA main report	One time / 3 months		
	Leq (evening)	dB(A)	-	-		55				
	Leq(night)	dB(A)	-	-		50				
Along the road (NV-1) (6 June 2023)	Leq (day)	dB(A)	62	63		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 2023)

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	Disposed to
General Waste with Green Waste	14 March 2023	Landscaping and Plantation	Kg	2800	Waste disposing to Than Lynn Development Committee, Yangon Division
General Waste with Green Waste	25 April 2023	Landscaping and Plantation	Kg	2850	Waste disposing to Than Lynn Development Committee, Yangon Division
General Waste with Green Waste	30 May 2023	Landscaping and Plantation	Kg	2900	Waste disposing to Than Lynn Development Committee, Yangon Division
General Waste with Green Waste	19 June 2023	Landscaping and Plantation	Kg	2950	Waste disposing to Than Lynn Development Committee, Yangon Division
General Waste with Green Waste	31 August 2023	Landscaping and Plantation	Kg	2750	Waste disposing to Than Lynn Development Committee, Yangon Division
Total			Kg	14250	
Sludge	7 March 2023	Sewage Treatment Plant	Kg	5380	Golden DOWA Eco- System Myanmar Co., Ltd
Sludge	20 March 2023	Sewage Treatment Plant	Kg	6000	Golden DOWA Eco- System Myanmar Co., Ltd
Sludge	20 April 2023	Sewage Treatment Plant	Kg	5820	Golden DOWA Eco- System Myanmar Co., Ltd
Sludge	16 May 2023	Sewage Treatment Plant	Kg	5980	Golden DOWA Eco- System Myanmar Co., Ltd
Sludge	5 July 2023	Sewage Treatment Plant	Kg	6920	Golden DOWA Eco- System Myanmar Co., Ltd
Sludge	18 August 2023	Sewage Treatment Plant	Kg	6900	Golden DOWA Eco- System Myanmar Co., Ltd
Total			Kg	37000	



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 type of Trash collector car. Green Waste (Grass cutting waste) are used in Bio-fertilizer.

Note: Zone-B wastewater treated at Sewage Treatment of TSEZ-A. Above data are sludge generated from Sewage treatment plant of TSEZ-A.

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

Duration (Month)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
13 March -2023			+6.303	m	There is no tube well water consumption and Ground level monitor once per month

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

Duration (Month)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
21 April -2023			+6.303	m	There is no tube well water consumption and Ground level monitor once per month

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

Duration (Month)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
12 May -2023			+6.303	m	There is no tube well water consumption and Ground level monitor once per month

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

Duration (Month)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
21 June -2023			+6.301	m	There is no tube well water consumption and Ground level monitor once per month

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

Duration (Month)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	



28 July -2023			+6.299	m	There is no tube well water consumption and Ground level monitor once per month
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6) (f) Ground Subsidence Hydrology (GPS Location 16.67 N, 96.29E)

Duration (Month)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
25 August -2023			+6.299	m	There is no tube well water consumption and Ground level monitor once per month

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.

Resettlement Works		Progress in Narrative	Remarkable Issues
Projected Affected Persons	Land Acquisition and Relocation	There is no case during March 2023 to August 2023.	
	Income Restoration Program	1) Supporting rice and cooking oil to PAPs for Valuable People Program in Zone B (Phase 3 and 4) (March to June). 13 HHs from Zone B (Phase 3) and 6 HHs from Zone B (Phase 4) are received rice and cooking oil. (10 baskets of rice and 2liters of cooking oil for each household) 2) Providing electricity charges for streetlight for Zone B PAPs at relocation site. (March to June)	TSMC will not be provided for VPP provision from July 2023 as provision period is finished for three years for Phase 3 and 4 as well as electricity charges for relocation site (Phase 1&2) too.
Common Assets	Relocation		

- Are there any grievances submitted, solved and pending regarding resettlement works?
If yes, please describe the contents of grievances to fill in below the table.

☐ Yes, ☒ No


Contents of Grievance	Response/ Countermeasures
There is no grievance during March to August 2023	

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)	Available Photos
4,5 March 2023	All Locators Sepak Takraw Championships 2023	The TSEZ All Locators Sepak Takraw Championships was also held at MJTD's rental area with the total 31 teams from 21 locators and the Foster Electric (Thilawa) Co., Ltd won the Champion title of TSEZ All Locators Sepak Takraw Championships and the second place by RK Yangon Steel Co., Ltd, the third place by Chemical Industries Co., Ltd and the Grace Award (the fourth place) was awarded to PEB Steel Co., Ltd.	

28,29,30 March 2023	Food assistance program	Donated 10-kg rice bags to 1,700 hardship households in neighboring communities of TSEZ which are Shwe Pyauk Village Tract, Aye Mya Thida Ward and Shwe Pyi Thar Yar Ward (Kyauk Tan Township) and Ah Lwan Suk Village (Thanlyin Township) and 5-Bags for each to six monasteries around the Thilawa SEZ	
5 April 2023	TSEZ CSR Planning Meeting	Hosted at MJTD's multipurpose hall, total 26 locators joined the meeting	
27 April 2023	Employees Health Care Program (Covid-19 Vaccination) to employees in TSEZ	At Foster Electric	N/A





25,29,30,31 May 2023	Cash Assistance Program to Elder people 80years and above	Provide 100,000 MMK to 121 elderly people who are age of 80years and above from five villages of neighboring communities, there are 38 Elders from Thida Myaing Ward, 19 from Ah Lwan Suk Village Tract, 30 from Shwe Pyauk Village Tract, 5 from Aye Mya Thida Ward and 29 from Shwe Pyi Thar Yar Ward	
29 May 2023	Renovation and Repair Education Facilities for safe learning environment (Two schools in PACs)	Renovation work to 2 class rooms for KG students (160 nos) at Myaing Thar Yar High School	
18 May 2023	Renovation and Repair Education Facilities for safe learning environment (Two schools in PACs)	Flooring filling and Wall plastering work at Primary School at Ah Lwan Suk Village	

May, June, July, August 2023	Scholarship/Provision of academic coverages for outstanding students around PACs	Provide the TSEZ Monthly Scholarship Payment 150,000 MMK to Medical Student from Shwe Pyouk Village (Mg Zaw Htet - Medical Year 2 at UM-1 Yangon)	N/A
May, June 2023	Employees Health Care Program (Covid-19 Vaccination) to employees in TSEZ	Provide Booster Dose and Complete Dose of Covid-19 Vaccines at Thilawa SEZ for about 8,700 employees.	N/A
June, July 2023	Support to public access of bus-shutter (Bus - stop) alongside Dagon- Thilawa Road	Support the 4-Bus stops alongside the Dagon-Thilawa Road	




MJTD

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

June, July, August 2023	Scholarship/ Provision of academic coverages for outstanding students around PACs	Provide the TSEZ Monthly Scholarship/Student Grant for High School Students at Two Highschool around PACs	
7 July 2023	Employees Health Care Program For the COVID-19 vaccination program for employees in TSEZ (above 650 employees)	COVID-19 vaccination program for employees in TSEZ (above 650 employees)	N/A
20 July 2023	Renovation and Repair Education Facilities for safe learning environment (Aye Mya Thida High School)	Provide water resistant form for Roof Repairing Work at Aye Mya Thid High School	



17 August 2023	Workshop on Promotion for a Safe Working Environment	Hosted on 17 th August at MJTD Multipurpose Hall and a total of 79 representatives from 40 locators joined the workshop	
March to August 2023	Electricity Support Program	At Moe Kyo Swan Monastery	N/A

End of Document



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

Appendix-A

Water and Waste Water Monitoring Report

February 2023



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

(Bi-Monthly Monitoring)

**February 2023
Myanmar Koei International Ltd.**



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CHAPTER 1: INTRODUCTION

1.1 General

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



Source: Google Earth

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

CHAPTER 2: WATER QUALITY MONITORING

2.1 Monitoring Items

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

Water quality sampling was carried out at four locations. Among the four locations, water flow measurement was carried out at two locations (SW-2 and SW-4) where can be measured by current meter. However, water flow measurement cannot be conducted with current meter at one location (SW-7) because water gate is closed. 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 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, Thilawa SEZ Zone A and Zone B, 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 7 February 2023, and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar 7 February 2023 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Point

No.	Station	Sampling Time
1	SW-2	7/02/2023 14:17
2	SW-4	7/02/2023 13:42
3	SW-7	7/02/2023 11:13
4	GW-2	7/02/2023 11:59

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
7/02/2023	00:52	0.62	Low Tide
	05:36	5.41	High Tide
	13:27	0.34	Low Tide
	17:54	5.23	High Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2023.

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 pH, suspended solid (SS), total coliform and total dissolved solid (TDS) exceeded the target values.

Result of Discharged point

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 pH, results at the surface water monitoring point (SW-2) exceeded the target value might be due to wastewater discharged that may contains detergents and soap-based products from the local industrial zone outside of Thilawa SEZ.

As for the result of SS and TDS, results at the surface water monitoring point (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 backflow 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	29	29	27	≤ 35
2	pH	-	9.2	8.1	8.4	6-9
3	Suspended Solid (SS)	mg/l	26	78	30	50
4	Dissolved Oxygen (DO)	mg/l	11.84	6.63	5.52	-
5	BOD ₍₅₎	mg/l	5.51	5.07	4.39	30
6	COD _(Cr)	mg/l	22.4	16.2	16.4	125
7	Total Nitrogen (T-N)	mg/l	1.5	0.9	1.8	80
8	Total Phosphorus (T-P)	mg/l	0.09	< 0.05	0.07	2
9	Color	TCU (True Color Unit)	14.37	3.69	3.82	150
10	Odor	TON (Threshold Odor Number)	1	1	1	-
11	Total Coliform	MPN/100ml	92000.0	54000.0	2300.0	400
12	Oil and Grease	mg/l	< 3.1	< 3.1	< 3.1	10
13	Total Dissolved solids (TDS)	mg/l	1402	3882	1792	2000
14	Iron	mg/l	0.264	0.316	1.080	3.5
15	Mercury	mg/l	≤ 0.002	≤ 0.002	≤ 0.002	0.005
16	Escherichia Coli	MPN/100ml	-	-	2.0	(1000)* (CFU/100ml)
17	Flow Rate	m ³ /s	0.001	0.122	-	-

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) – 9.182 mg/l (August, 2022) and most of the iron concentration measured results (from April, 2019 to February, 2023) 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	28	≤ 35
2	pH	-	7.1	6-9
3	Suspended Solid (SS)	mg/l	6	50
4	Dissolved Oxygen (DO)	mg/l	5.66	-
5	BOD ₍₅₎	mg/l	3.86	30
6	COD _(Cr)	mg/l	< 0.7	125
7	Total Nitrogen (T-N)	mg/l	1.7	80
8	Total Phosphorous (T-P)	mg/l	0.66	2
9	Color	TCU (True Color Unit)	14.21	150
10	Odor	TON (Threshold Odor Number)	1	-
11	Total Coliform	MPN/100ml	13.0	400
12	Oil and Grease	mg/l	< 3.1	10
13	Total Dissolved solids (TDS)	mg/l	190	2000
14	Iron	mg/l	5.620	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: Red color means exceeded value than target value.

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

Source: Myanmar Koei International Ltd.



CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

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

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.

There are some possible reasons for exceeding the target values of pH at (SW-2), suspended solids and total dissolved solids (TDS) at (SW-4) and total coliform at (SW-2 and SW-4). The exceeded result for pH might be due to wastewater discharged that may contains detergents and soap-based products from the local industrial zone outside of Thilawa SEZ. The exceeded results for total coliform might be natural origin such as natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds and small animals in and along the discharged creek. The exceeded reason for suspended solids and TDS maybe due to two expected reasons; i) delivered from upstream area such as natural origin and wastewater from the local industrial zone which outside of Thilawa SEZ, ii) delivered from surrounding area by tidal effect.

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) - 9.182 mg/l (August, 2022) and most of the iron concentration measured results (from April, 2019 to February, 2023) 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 total coliform and appropriate water quality monitoring to continue monitoring *Escherichia coli* (*E. coli*) level to identify health impact by coliform bacteria.

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

DOWA

GOLDEN GEM LTD (PVT) LTD
1st Floor, 11, Thilawa SEZ Zone A, Yangon Region, Myanmar
Phone No. Fax No. 0951 1 2 808011

Headquarter Myanmar
Email No. GEM-CHINA@GEM-TH
Page 1/45

Report No. : GEM-LAB-202302068
Revision No. : 1
Report Date : 20 February, 2023
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koe 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-2-0207
Sample No. : W-2302038
Waste Profile No. : -
Sampling date : 7 February, 2023
Sampling By : Customer
Sample Received Date : 7 February, 2023
Analytical Date : 7-20/02/2023

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	26	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.51	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	22.4	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	<3.1	3.1
5	Color	APHA 2120C (Spectrophotometric Method)	TCU	14.37	0.00
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.5	0.5
7	Total Phosphorus	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.09	0.05
8	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	1402	-
9	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
11	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.264	0.002
12	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	92000 D	1.8
13	Odor	APHA 2150 B (Threshold Odor Test)	TCN	1	0

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 :


20-2-23

Cherry Myint Thin

Supervisor



Approved By :


Feb 20, 2023
Managing Director

REPORT RESULT IS ONLY OF THE SAMPLE SUBMITTED FOR ANALYSIS.
THE ANALYSIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT WRITTEN APPROVAL OF THE LABORATORY OF
GOLDEN GEM LTD (PVT) LTD (GEM-TH).



Water Quality Monitoring Report for Development of Industrial Area in Thilawa SEZ Zone B
(Bi-Monthly Monitoring in FY February-2023)

DOWA

DOWA (PUN) LTD (PUN) (PUN) LTD
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Report No. : GEM-LAB-202302069
Revision No. : 1
Report Date : 20 February, 2023
Application No. : 0001 (001)

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Famine Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description
 Sample Name : MKI-SW-4-0207
 Sample No. : W-2302039
 Waste Profile No. : -

Sampling Date : 7 February, 2023
Sampling By : Customer
Sample Received Date : 7 February, 2023
Analytical Date : 7-20/02/2023

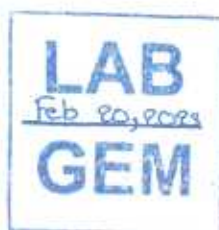
No.	Parameter	Method	Unit	Result	LOQ
1	Sl	APHA 2540D (Dry at 103-105°C Method)	mg/l	78	-
2	BOD (5)	APHA 5210-B (5 Days BOD Test)	mg/l	5.07	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	18.2	0.7
4	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	<3.1	3.1
5	Color	APHA 2120C (Spectrophotometric Method)	TCU	3.69	0.00
6	Total Nitrogen	HACH Method 10072 (TN ⁺ Persulfate Digestion Method)	mg/l	0.9	0.5
7	Total Phosphorous	APHA 4500-P-E (Ascorbic Acid Method)	mg/l	40.05	0.05
8	TDS	APHA 2540-C (Total Dissolved Solids Dried at 180°C Method)	mg/l	3882	-
9	Chromium	APHA 3120-B (Inductively Coupled Plasma (ICP) Method)	mg/l	50.002	0.002
10	Mercury	APHA 3120-B (Inductively Coupled Plasma (ICP) Method)	mg/l	50.002	0.002
11	Iron	APHA 3120-B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.315	0.002
12	Total Coliform	APHA 9221B (Standard Tatar Coliform Fermentation Technique)	MPN/100ml	54000.0	1.0
13	Odor	APHA 2150-B (Threshold Odor Test)	TON	1	0

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

20-2-23
Cherry Myint Thein
Supervisor



Approved By

Feb 20, 2023
Managing Director

REPORT FILED IN ONLY ONE FILE (SAMPLE) SUBMITTED FOR ANALYSIS.
THIS ANALYSIS REPORT SHALL NOT BE REPRODUCED IN FULL, WITHOUT WRITTEN APPROVAL OF THE LABORATORY OF
DOWA (PUN) LTD (PUN) (PUN) LTD



Water Quality Monitoring Report for Development of Industrial Area in Thilawa SEZ Zone B
(Bi-Monthly Monitoring in FY February-2023)

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
(Set No. 11, Thilawa SEZ Zone B, Yangon Region, Myanmar)
Phone No. Fax No. (455) 1 100001



Report No. : GEM-LAB-202302072
Revision No. : 1
Report Date : 20 February, 2023
Application No. : 0001-C001

Analysis Report

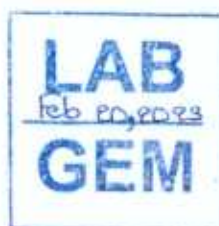
Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamiwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-GW-2-0227
Sample No. : W-2302042
Waste Profile No. : -
Sampling Date : 7 February, 2023
Sampling By : Customer
Sample Received Date : 7 February, 2023
Analytical Date : 7-20/02/2023

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	3.86	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	<0.7	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	<3.1	3.1
5	Color	APHA 2120C (Spectrophotometric Method)	TCU	14.25	0.00
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.7	0.5
7	Total Phosphorous	APHA 4500-P-E (Ascorbic Acid Method)	mg/l	0.66	0.05
8	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	190	—
9	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
11	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	5.620	0.002
12	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	13.0	1.8
13	Odor	APHA 2150 B (Threshold Odor Test)	TCN	1	0
14	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 :

20-2-23
Cherry Myint Thin
Supervisor



Approved By :

Feb 20, 2023
Hideo Yano
Managing Director

REPORT RESULT IS ONLY OF THE SAMPLE SUBMITTED FOR ANALYSIS
THIS ANALYSIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT WRITTEN APPROVAL OF THE LABORATORY OF
GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.



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

Appendix-B

Water and Waste Water Monitoring Report

April 2023



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

(Bi-Monthly Monitoring)

April 2023

Myanmar Koei International Ltd.



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CHAPTER 1: INTRODUCTION

1.1 General

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



Source: Google Earth

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



CHAPTER 2: WATER QUALITY MONITORING

2.1 Monitoring Items

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

Water quality sampling was carried out at four locations. Among the four locations, water flow measurement was carried out at two locations (SW-2 and SW-4) where can be measured by current meter. However, water flow measurement cannot be conducted with current meter at one location (SW-7) because water gate is closed. 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	<p>Coordinate- N - 16° 40' 20.69", E - 96° 17' 18.04"</p> <p>Location - Upstream of Shwe Pyauk Creek</p> <p>Survey Item - Surface water sampling and water flow rate measurement</p>
2	SW-4	<p>Coordinate- N - 16° 39' 42.84", E - 96° 16' 27.42"</p> <p>Location - Downstream of Shwe Pyauk Creek</p> <p>Survey Item - Surface water sampling and water flow rate measurement</p>
3	SW-7	<p>Coordinate - N - 16° 40' 13.25", E - 96° 17' 5.66"</p> <p>Location - Outlet of retention pond of Zone B before connecting to Shwe Pyauk Creek</p> <p>Survey Item - Discharge water sampling</p>
4	GW-2	<p>Coordinate - N - 16° 39' 25.30", E - 96° 17' 15.60"</p> <p>Location - In the monastery compound of Phalan village</p> <p>Survey Item - Ground water sampling</p>

Source: Myanmar Koen 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, Thilawa SEZ Zone A and Zone B, 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 25 April 2023, and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar 25 April 2023 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Point

No.	Station	Sampling Time
1	SW-2	25/04/2023 08:52
2	SW-4	25/04/2023 13:45
3	SW-7	25/04/2023 09:19
4	GW-2	25/04/2023 08:23

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
25/04/2023	02:53	0.60	Low Tide
	07:42	4.91	High Tide
	14:21	0.91	Low Tide
	19:40	5.24	High Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2023.



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 total dissolved solids (TDS) exceeded the target values.

Result of Discharged point

As for the result of SS and TDS, 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.

Result of Reference Monitoring points (Discharged Creek)

As for the result of TDS, results at the surface water monitoring point (SW-2) and (SW-4) exceeded the target values. The exceeded results for 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 backflow 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.

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	30	33	30	≤ 35
2	pH	-	7.6	8.8	8.1	6~9
3	Suspended Solid (SS)	mg/l	50	46	52	50
4	Dissolved Oxygen (DO)	mg/l	5.76	12.13	7.19	-
5	BOD ₅	mg/l	10.55	13.92	10.59	30
6	COD _{Cr}	mg/l	31.0	39.9	26.1	125
7	Total Nitrogen (T-N)	mg/l	1.2	1.6	0.4	80
8	Total Phosphorus (T-P)	mg/l	< 0.05	< 0.05	< 0.05	2
9	Color	TCU (True Color Unit)	17.44	10.98	7.21	150
10	Odor	TON (Threshold Odor Number)	1	2	1	-
11	Total Coliform	MPN/100ml	17000.0	4600.0	400.0	400
12	Oil and Grease	mg/l	< 3.1	< 3.1	< 3.1	10
13	Total Dissolved solids (TDS)	mg/l	8162	6284	9874	2000
14	Iron	mg/l	0.062	0.070	0.072	3.5
15	Mercury	mg/l	≤ 0.002	≤ 0.002	≤ 0.002	0.005
16	Escherichia Coli	MPN/100ml	-	-	9.2	(1000)* (CFU/100ml)
17	Flow Rate	m ³ /s	0.006	0.114	-	-

Note: Red color means exceeded value than target value.

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

Source: Myanmar Koei International Ltd.



2.5.2 Result of Reference Tube Well

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

As for the result of total coliform in ground water, results at (GW-2) exceeded the target value. It may be possible due to the poor maintenance of well which can increase the risk of bacteria and other harmful organisms. However, the result of E. Coli of (GW-2) was under the reference value. Therefore, although the target value of total coliform exceeded at monitoring point of (GW-2), it is considered that there is no significant impact on human health.

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	-	6.5	6-9
3	Suspended Solid (SS)	mg/l	4	50
4	Dissolved Oxygen (DO)	mg/l	7.20	-
5	BOD ₍₅₎	mg/l	3.56	30
6	COD _(Cr)	mg/l	< 0.7	125
7	Total Nitrogen (T-N)	mg/l	0.7	80
8	Total Phosphorous (T-P)	mg/l	0.54	2
9	Color	TCU (True Color Unit)	27.06	150
10	Odor	TON (Threshold Odor Number)	1	-
11	Total Coliform	MPN/100ml	2700.0	400
12	Oil and Grease	mg/l	< 3.1	10
13	Total Dissolved solids (TDS)	mg/l	182	2000
14	Iron	mg/l	0.108	3.5
15	Mercury	mg/l	≤ 0.002	0.005
16	Escherichia Coli	MPN/100ml	9.1	(100)* (MPN/100ml)
17	Flow Rate	m ³ /s	-	-

Note: Red color means exceeded value than target value.

*Note: Based on the water utilization at monitoring point for ground water, BI(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) at (SW-7), total dissolved solids (TDS) at (SW-2, SW-4 and SW-7), and total coliform at (SW-2 and SW-4) in surface water, and the results of total coliform 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 and TDS, 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.

There are some possible reasons for exceeding the target values of TDS and total coliform at (SW-2 and SW-4). The exceeded reason for TDS maybe due to two expected reasons: i) delivered from upstream area such as natural origin and wastewater from the local industrial zone which outside of Thilawa SEZ, and ii) delivered from surrounding area by tidal effect. The exceeded results for total coliform might be due to natural origin such as natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds and small animals in and along the discharged creek.

As for the result of the total coliform, the result at the monitoring point of reference tube well (GW-2) exceeded the target value. It may be possible due to the poor maintenance of well which can increase the risk of bacteria and other harmful organisms. However, the result of E. Coli of (GW-2) was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of (GW-2), it is considered that there is no significant impact on human health.

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

- To continue monitoring Escherichia coli (E. coli) level to identify health impact by coliform bacteria.

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APPENDIX-1 FIELD SURVEY PHOTOS



FOR DISCHARGED POINT OF THILAWA SEZ ZONE B



Surface water sampling and onsite measurement at SW-7

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



Surface water sampling and onsite measurement at SW-2



Surface water sampling and onsite measurement at SW-4



Ground water sampling and onsite measurement at GW-2

APPENDIX-2 LABORATORY RESULTS



Water Quality Monitoring Report for Development of Industrial Area in Thilawa SEZ Zone B
(Bi-Monthly Monitoring in FY April-2023)

FOR DISCHARGED POINT

DOWA

SOLON DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. 01, Thilawa SEZ Zone A, Yangon Region, Myanmar
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Report No. : GEM-IAB-202305021
Revision No. : 1
Report Date : 8 May, 2023
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, Tamiwe Township, Yangon, Myanmar
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-SW-7-0425
Sample No. : W-2304085
Waste Profile No. :
Sampling Date : 25 April, 2023
Sampling By : Customer
Sample Received Date : 25 April, 2023
Analytical Date : 25/04-8/05/2023

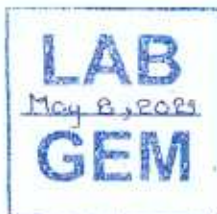
No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	52	—
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	10.59	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	26.1	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	<3.1	3.1
5	Color	APHA 2120C (Spectrophotometric Method)	TCU	7.21	0.00
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	0.4	0.5
7	Total Phosphorous	APHA 4500-P-E (Ascorbic Acid Method)	mg/l	<0.05	0.05
8	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	9874	—
9	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
11	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.072	0.002
12	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	400.0	1.8
13	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	0
14	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure using Fluorogenic Substrate	MPN/100ml	9.2	1.8

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 :

Ni Ni Aye Lwin
Manager



Approved By :

Hsiao Yonol
Managing Director

REPORT RESULT IS ONLY OF THE SAMPLE SUBMITTED FOR ANALYSIS.
THIS ANALYSIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT WRITTEN APPROVAL OF THE LABORATORY OF
STEELER DOWA ECO-SYSTEM MYANMAR CO., LTD.



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

DOWA

GOODWIN ECO SYSTEM MYANMAR CO., LTD.
Unit No.12 Thilawa SEZ Zone B, Yangon Region, Myanmar
Phone No. : (+65) 9-95113800



Report No. : GEM-LAB-202305018
Revision No. : 1
Report Date : 8 May, 2023
Application No. : 0001 CD01

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Pho Sein Condominium, Pho Sein Road, Tamiwa Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
Sample Name : MKI-EW-2-0425
Sample No. : W-2304082
Waste Profile No. : -

Sampling Date : 25 April, 2023

Sampling By : Customer

Sample Received Date : 25 April, 2023

Analytical Date : 25/04-8/05/2023

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	50	-
2	BOD (3)	APHA 5210 B (5 Days BOD Test)	mg/l	10.55	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	31.0	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	<3.1	3.1
5	Color	APHA 2120C (Spectrophotometric Method)	TCU	17.44	0.00
6	Total Nitrogen	HACH Method 100/2 (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	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	8162	-
9	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
11	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.062	0.002
12	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	NPM/100ml	17000.0	1.8
13	Odor	APHA 2150 B (Threshold Odor Test)	TCN	1	0

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 :

Aye Aye Lwin
Manager



Approved By :

Managing Director
May 8, 2023

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GOODWIN ECO SYSTEM MYANMAR CO., LTD.



Water Quality Monitoring Report for Development of Industrial Area in Thilawa SEZ Zone B
(Bi-Monthly Monitoring in FY April-2023)

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
1st Fl. 11, Thilawa SEZ Zone B, Yangon Region, Myanmar
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MOBILE QR CODE
Scan QR CODE (8-0042751)
Page 1 of 1

Report No. : GEM-LAB-202305019
Revision No. : 1
Report Date : 8 May, 2023
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koen 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-4-0425
Sample No. : W 2304083
Waste Profile No. : -
Sampling Date : 25 April, 2023
Sampling By : Customer
Sample Received Date : 25 April, 2023
Analytical Date : 25/04-8/05/2023

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	46	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	13.92	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	39.9	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	<3.1	3.1
5	Color	APHA 2120C (Spectrophotometric Method)	TCU	10.98	0.00
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.6	0.5
7	Total Phosphorus	APHA 4500-P E (Ascorbic Acid Method)	mg/l	<0.05	0.05
8	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	6284	-
9	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤0.002	0.002
11	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.070	0.002
12	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	4600.0	1.8
13	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	0

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
Manager



Approved By :

Hideo Yama
Managing Director

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GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.



Water Quality Monitoring Report for Development of Industrial Area in Thilawa SEZ Zone B
(Bi-Monthly Monitoring in FY April-2023)

DOWA

Jubilee Square PCL (Private) Limited (JSPCL)
(Incorporated in Myanmar)
Plot No. 1, Thilawa SEZ Zone B, Yangon Region, Myanmar
Phone No. (95-9) 1188888



Report No. : GEM-LAB-202305022
Revision No. : 1
Report Date : 8 May, 2023
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 Z-0425
Sample No. : W-2304056
Waste Profile No. : -
Sampling Date : 25 April, 2023
Sampling By : Customer
Sample Received Date : 25 April, 2023
Analytical Date : 25/04-05/05/2023

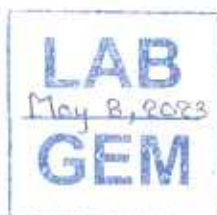
No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	4	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.56	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	<0.7	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	<3.1	3.1
5	Color	APHA 2120C (Spectrophotometric Method)	TCU	27.05	0.00
6	Total Nitrogen	HACH Method 10072 (TN Persulfate Digestion Method)	mg/l	0.7	0.5
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.54	0.05
8	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	180	-
9	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
11	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.108	0.002
12	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	2700.0	1.8
13	Odor	APHA 2150 B (Threshold Odor Test)	TCN	1	0
14	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	9.1	1.8

Remark : LOQ - Limit of Quantitation

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

Analysed By :

Aye Lwin
Manager



Approved By :

Hsaki Yomo
Managing Director

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



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

Appendix-C

Water and Waste Water Monitoring Report
June 2023



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

(Bi-Annually Monitoring)

June 2023

Myanmar Koei International Ltd.



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CHAPTER 1: INTRODUCTION

1.1 General

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



Source: Google Earth

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



CHAPTER 2: WATER QUALITY MONITORING

2.1 Monitoring Items

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

Water quality sampling was carried out at four locations. Among the four locations, water flow measurement was carried out at two locations (SW-2 and SW-4) where can be measured by current meter. However, water flow measurement cannot be conducted with current meter at one location (SW-7) because water gate is closed. Monitoring items and sampling points are summarized in Table 2.1-1.

Table 2.1-1 Monitoring Items for Water Quality

No.	Parameters	SW-2	SW-4	SW-7	GW-2	Remarks
1	Water Temperature	○	○	○	○	On-site measurement
2	pH	○	○	○	○	On-site measurement
3	DO	○	○	○	○	On-site measurement
4	BOD ₍₅₎	○	○	○	○	Laboratory analysis
5	COD _(Cr)	○	○	○	○	Laboratory analysis
6	Total Nitrogen	○	○	○	○	Laboratory analysis
7	Suspended Solids	○	○	○	○	Laboratory analysis
8	Total Coliform	○	○	○	○	Laboratory analysis
9	Total Phosphorous	○	○	○	○	Laboratory analysis
10	Color	○	○	○	○	Laboratory analysis
11	Odor	○	○	○	○	Laboratory analysis
12	Zinc	○	○	○	○	Laboratory analysis
13	Arsenic	○	○	○	○	Laboratory analysis
14	Chromium	○	○	○	○	Laboratory analysis
15	Cadmium	○	○	○	○	Laboratory analysis
16	Selenium	○	○	○	○	Laboratory analysis
17	Lead	○	○	○	○	Laboratory analysis
18	Copper	○	○	○	○	Laboratory analysis
19	Barium	○	○	○	○	Laboratory analysis
20	Nickel	○	○	○	○	Laboratory analysis
21	Cyanide	○	○	○	○	Laboratory analysis
22	Total Cyanide	○	○	○	○	Laboratory analysis
23	Free Chlorine	○	○	○	○	Laboratory analysis
24	Sulphide	○	○	○	○	Laboratory analysis
25	Formaldehyde	○	○	○	○	Laboratory analysis
26	Phenols	○	○	○	○	Laboratory analysis
27	Total Residual Chlorine	○	○	○	○	Laboratory analysis
28	Chromium (Hexavalent)	○	○	○	○	Laboratory analysis
29	Ammonia	○	○	○	○	Laboratory analysis
30	Fluoride	○	○	○	○	Laboratory analysis
31	Silver	○	○	○	○	Laboratory analysis
32	Oil and Grease	○	○	○	○	Laboratory analysis
33	Total Dissolved Solids	○	○	○	○	Laboratory analysis
34	Iron	○	○	○	○	Laboratory analysis
35	Mercury	○	○	○	○	Laboratory analysis
36	Escherichia Coli	-	-	○	○	Laboratory analysis
37	Flow Rate	○	○	-	-	On-site measurement

Source: Myanmar Koei International Ltd



2.2 Description of Sampling Points

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

Table 2.2-1 Outline of Sampling Points

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

Source: Myanmar Koci 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, Thilawa SEZ Zone A and Zone B, 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-Pyrazalane Method)
24	Total Cyanide	Distillation process: APHA 4500-CN-C. Total Cyanide after Distillation, Determine cyanide Concentration Process: HACH 8027 (Pyridine – Pyrazalane 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 (Siliclyate 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 2023, and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar 7 June 2023 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Point

No.	Station	Sampling Time
1	SW-2	07/06/2023 08:51
2	SW-4	07/06/2023 09:12
3	SW-7	07/06/2023 09:48
4	GW-2	07/06/2023 08:22

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height (m)	Tide Conditions
07/06/2023	02:07	1.01	Low Tide
	06:27	5.37	High Tide
	13:46	1.23	Low Tide
	18:52	5.93	High Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2023



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, iron and ammonia exceeded the target values.

Result of Discharged point

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 the existing of various kinds of vegetation and animals, especially the excrement of the creature and death of freshwater fishes in and along the retention pond.

Since the composition of the total coliform include bacteria from natural origin, and total coliform do not affect human health directly, E. Coli analysis was carried out alternatively to identify the 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 points (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 is located outside of Thilawa SEZ, and ii) influence by water from the downstream of monitoring points due to backflow by tidal fluctuation along Shwe Pyauk creek.

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) the existing of various kinds of vegetation and animals, especially the excrement of the creature and death of freshwater fishes 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-2) and (SW-4) exceeded the target value. The possible reason for exceeded values in surface water (SW-2) and (SW-4) maybe due to the influence of natural origin (iron can reach out from the soil by run-off). Surroundings of the Thilawa SEZ especially small hilly areas are mainly composed of iron rich soil (lateritic soil), and it can be transported to the low land area by run-off.

As for the result of ammonia, the result at the monitoring point of surface water monitoring point (SW-2) exceeded the target value. The possible reason for exceeded values in surface water (SW-2) may be due to the discharged wastewater from the local industrial zone, nitrogenous waste from animals, and runoff from agricultural land.



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	27	≤ 35
2	pH	-	7.4	7.0	7.5	6-9
3	Suspended Solid (SS)	mg/l	90	502	32	50
4	Dissolved Oxygen (DO)	mg/l	3.88	6.02	4.86	-
5	BOD ₅	mg/l	3.86	4.44	7.55	30
6	COD _{Cr}	mg/l	24.3	5.0	15.0	125
7	Total Coliform	MPN/100ml	> 160000	> 160000	> 160000	400
8	Total Nitrogen (T-N)	mg/l	14.7	1.6	0.6	80
9	Total Phosphorous (T-P)	mg/l	0.65	0.72	0.09	2
10	Color	TCU (True Color Unit)	24.17	3.58	8.95	150
11	Odor	TON (Threshold Odor Number)	1	1	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	≤ 0.002	0.026	0.11	2
15	Arsenic	mg/l	≤ 0.010	≤ 0.010	≤ 0.010	0.1
16	Chromium	mg/l	≤ 0.002	≤ 0.002	≤ 0.002	0.5
17	Cadmium	mg/l	≤ 0.002	≤ 0.002	≤ 0.002	0.03
18	Selenium	mg/l	≤ 0.010	≤ 0.010	≤ 0.010	0.02
19	Lead	mg/l	≤ 0.002	≤ 0.002	≤ 0.002	0.1
20	Copper	mg/l	≤ 0.002	≤ 0.002	≤ 0.002	0.5
21	Barium	mg/l	≤ 0.002	≤ 0.002	≤ 0.002	1
22	Nickel	mg/l	≤ 0.002	≤ 0.002	≤ 0.002	0.2
23	Cyanide	mg/l	< 0.002	< 0.002	< 0.002	0.1
24	Total Cyanide	mg/l	0.003	0.004	0.003	1
25	Free Chlorine	mg/l	< 0.1	< 0.1	< 0.1	1
26	Sulphide	mg/l	0.371	0.333	0.080	1
27	Formaldehyde	mg/l	0.213	0.178	0.041	1
28	Phenols	mg/l	0.002	< 0.002	< 0.002	0.5
29	Iron	mg/l	8.346	22.626	1.882	3.5
30	Total Dissolved Solids	mg/l	224	266	90	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	14.00	0.71	0.15	10
34	Fluoride	mg/l	0.187	0.301	0.131	20
35	Silver	mg/l	≤ 0.002	≤ 0.002	≤ 0.002	0.5
36	Escherichia Coli	MPN/100ml	-	-	17.0	(1000)* (CFU/100ml)
37	Flow Rate	m ³ /s	0.06	0.91	-	-

Note: Red color means exceeded value than target value.

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

Source: Myanmar Koei International Ltd.



2.5.2 Result of Reference Tube Well

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

As for the result of total coliform in ground water, results at (GW-2) exceeded the target value. It may be possible due to the poor maintenance of well which can increase the risk of bacteria and other harmful organisms. However, the result of E. Coli of (GW-2) was under the reference value. Therefore, although the target value of total coliform exceeded at monitoring point of (GW-2), it is considered that there is no significant impact on human health.

As for the result of the iron, the result at the monitoring point of reference tube well (GW-2) exceeded the target value. Comparison with previous monitoring results of reference tube well (GW-2), the iron concentration results ranged from 3.076 mg/l (August 2019) to 9.182 mg/l (August 2022) and most of the iron concentration measured results (from April 2019 to June 2023) exceeded the target value except the iron concentration result of August 2019, April 2022 and April 2023. Therefore, the possible reasons may due to the influence of natural origin (iron can reach out from soil by run-off). Surroundings of the Thilawa SEZ especially small hilly areas are mainly composed of iron rich soil (lateritic soil), and it can be transported to the low land area by run-off.

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	28	≤ 35
2	pH	-	6.4	6~9
3	Suspended Solid (SS)	mg/l	14	50
4	Dissolved Oxygen (DO)	mg/l	6.63	-
5	BOD ₍₅₎	mg/l	7.88	30
6	COD _(Cr)	mg/l	20.0	125
7	Total Coliform	MPN/100ml	1600.0	400
8	Total Nitrogen (T-N)	mg/l	< 0.5	80
9	Total Phosphorous (T-P)	mg/l	0.60	2
10	Color	TCU (True Color Unit)	14.55	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	≤ 0.002	2
15	Arsenic	mg/l	≤ 0.010	0.1
16	Chromium	mg/l	≤ 0.002	0.5
17	Cadmium	mg/l	≤ 0.002	0.03
18	Selenium	mg/l	≤ 0.010	0.02
19	Lead	mg/l	≤ 0.002	0.1
20	Copper	mg/l	≤ 0.002	0.5
21	Barium	mg/l	≤ 0.002	1
22	Nickel	mg/l	≤ 0.002	0.2
23	Cyanide	mg/l	< 0.002	0.1
24	Total Cyanide	mg/l	< 0.002	1
25	Free Chlorine	mg/l	< 0.1	1
26	Sulphide	mg/l	0.029	1
27	Formaldehyde	mg/l	0.004	1
28	Phenols	mg/l	0.007	0.5
29	Iron	mg/l	6.714	3.5
30	Total Dissolved Solids	mg/l	178	2000
31	Total Residual Chlorine	mg/l	< 0.1	0.2
32	Chromium (Hexavalent)	mg/l	< 0.05	0.1
33	Ammonia	mg/l	0.02	10
34	Fluoride	mg/l	0.514	20

No.	Parameters	Unit	GW-2	Target Value (Reference Value for Self-Monitoring)
35	Silver	mg/l	< 0.002	0.5
36	Escherichia Coli	MPN/100ml	22.0	(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, BI(Irrigation water) of National Technical Regulation on Surface Water Quality in Vietnam (No. QCVN 08: 2008/BTNM) is set as a reference value of self-monitoring for ground water monitoring.

Source: Myanmar Koei International Ltd.

2.5.3 Comparison of Results of Water Quality Exceed the Target Value between Previous Monitoring and June 2023 Monitoring

In order to overview the exceed the target values of the concerned parameters during the present monitoring (June 2023), the results of the exceed parameters with respective sampling points are compared with the previous monitoring results since June 2022.

Regarding the results of the parameter of discharge point, total coliform amount at SW-7 is higher than the target value in June 2022, August 2022, February 2023 and June 2023. The concentrations of coliform at SW-7 are extending from 2300 MPN/100ml to the detection limit (>160000 MPN/100ml). Total coliform concentration at SW-7 is obviously reached to the detection limit in the early and mid-rainy season and it might be the effect of storm water run-off. Moreover, iron concentration at GW-2 is always higher than the target value except the result of April 2023. It is observed that iron concentration at GW-2 is higher throughout monsoon and winter time. As for the total coliform results at GW-2, the values are higher than the target value only in April and June 2023.

On the other hand, it is observed that some parameters at the reference monitoring points (SW-2 and SW-4) are also higher than the target value. As for the result of ammonia at SW-2, it is higher than the target value in this monitoring survey (June 2023), but the results are lower than the target value in previous surveys. Although the results of iron at SW-2 is higher than the target value only in August 2022 and June 2023, iron at SW-4 is higher in five monitoring surveys (June, August, October, December 2022 and June 2023) ranging from 3.618 to 22.626 mg/l. It is revealed that high concentration of iron at SW-4 occurred throughout rainy season till the beginning of winter time. Regarding the SS concentration, the results of SW-2 is higher in June, August, December 2022 and June 2023, ranging from 88 to 370 mg/l. Distinctly, except the result of April 2023, SS concentration at SW-4 is higher than the target value in the remaining surveys, ranging from 78 to 558 mg/l. It is clear that SS concentration at SW-2 and SW-4 are higher during rainy season due to the storm water run-off from the surrounding. It is obvious that total coliform at SW-2 is higher in six monitoring surveys among seven (ranging from 1300 to >160000 MPN/100ml) while the results at SW-4 is higher in all monitoring surveys (ranging from 4600 to >160000 MPN/100ml). Especially the total coliform amount at SW-4 was reached to the detection limit (>160000 MPN/100ml) in June, August, October 2022 and June 2023 respectively. It is possible to say that the present condition of the water quality reflects the background condition of the surrounding environment of Thilawa SEZ.

The expected reasons for the results exceed the target value of concerned parameters are discussed in the upper section of this monitoring report.



CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As described in Chapter 2 (Section 2.5), the results of suspended solid (SS) and iron at (SW-2 and SW-4), total coliform at (SW-2, SW-4 and SW-7) and ammonia at (SW-2) in surface water, and the results of total coliform 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 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 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.

As for the result of SS, total coliform and iron at reference monitoring point (SW-2 and SW-4) exceeded the target values. The exceeded results for SS at (SW-2 and SW-4) maybe due to two expected reasons; i) delivered from upstream area such as natural origin and wastewater from local industrial zone which is located outside of Thilawa SEZ, and ii) influence by water from the downstream of monitoring points due to backflow by tidal fluctuation along Shwe Pyauk creek. The expected reasons for exceeding the target values of total coliform at (SW-2 and SW-4) are natural origin (natural bacteria existed). The expected reason for exceeding the target value of iron at reference monitoring point (SW-2 and SW-4) may be due to the influence of natural origin (iron can reach out from soil by run-off), the surrounding high land areas is comprised of lateritic soils and it can be transported to the low land area by run-off.

As for the result of ammonia, the result at the monitoring point of surface water monitoring point (SW-2) exceeded the target value. The possible reason for exceeded values in surface water (SW-2) maybe due to the discharged wastewater from the local industrial zone, nitrogenous waste from animals, and runoff from agricultural land.

As for the result of the total coliform, the result at the monitoring point of reference tube well (GW-2) exceeded the target value. It may be possible due to the poor maintenance of well which can increase the risk of bacteria and other harmful organisms. However, the result of E. Coli of (GW-2) was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of (GW-2), it is considered that there is no significant impact on human health.

As for the result of the iron, the result at the monitoring point of reference tube well (GW-2) exceeded the target value. Comparison with previous monitoring results of reference tube well (GW-2), the iron concentration results ranged from 3.076 mg/l (August 2019) to 9.182 mg/l (August 2022) and most of the iron concentration measured results (from April 2019 to June 2023) exceeded the target value except the iron concentration result of August 2019, April 2022 and April 2023. Therefore, the possible reasons may due to the influence of natural origin (iron can reach out from soil by run-off). Surroundings of the Thilawa SEZ especially small hilly areas are mainly composed of iron rich soil (lateritic soil), and it can be transported to the low land area by run-off.

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 total coliform and appropriate water quality monitoring:

- To continue monitoring Escherichia coli (E. coli) level to identify health impact by coliform bacteria.

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



Water Quality Monitoring Report for Development of Industrial Area in Thilawa SEZ Zone B
(Bi-Annually Monitoring in FY June-2023)

FOR DISCHARGED POINT

CH2M Hill

Myanmar Kiosk International LTD (MKI)
No. 36/A, 1st Floor, Grand Pro Seis Condominium, Phis Seis Road, Tanintharyi Township, Yangon, Myanmar
Phone No. (95) 91 111 111 (10 Lines)



Report No: GEM-LAB-202306022
Revision No: 1
Report Date: 30 June, 2023
Application No: 0001-0001

Analysis Report

Client Name: Myanmar Kiosk International LTD (MKI)
Address: No. 36/A, 1st Floor, Grand Pro Seis Condominium, Phis Seis Road, Tanintharyi Township, Yangon, Myanmar
Project Name: Environment Monitoring report for Zone A & B
Sample Description:
Sample Name: MKI-SW-F-0607
Sample No.: W-2306058
Waste Profile No.:
Sampling Date: 7 June, 2023
Sampling By: Customer
Sample Received Date: 7 June, 2023
Analysis Date: 7-30/06/2023

No.	Parameter	Method	Unit	Result	LOG
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	32	
2	BOD (5)	APHA 521C H (5 Days BOD Test)	mg/l	7.55	0.00
3	COD (Cr)	APHA 5220D (Diplo Reflux Colorimetric Method)	mg/l	15.0	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	Color	APHA 2120C (Spectrophotometric Method)	TCU	8.93	0.00
7	Total Nitrogen	HACH Method 10072 (TNB Persulfate Digestion Method)	mg/l	0.6	0.5
8	Total Phosphorus	APHA 4500 P C (Ascorbic Acid Method)	mg/l	0.09	0.05
9	Ammonia	HACH Method 10205 (Nesslerization Method)	mg/l	0.13	0.02
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	90	
11	Odor	APHA 2150 B (Threshold Odor Test)	TOR	1	0
12	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
13	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.11	0.002
14	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.010	0.010
15	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
16	Calcium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
17	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.010	0.010
18	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
19	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
20	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
21	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
22	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
23	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	1.882	0.002
24	Cyanide	HACH 8027 (Pyridine - Pyrazolone Method)	mg/l	<0.002	0.002
25	Total Cyanide	Distillation Process APHA 4500 CN C Total Cyanide after Distillation, Distillation Cyanide Concentration Process, HACH 8027 (Pyridine - Pyrazolone Method)	mg/l	0.001	0.002
26	Hexavalent Chromium (Cr6+)	ISO 11885:2004 (Determination of Chromium(VI) Spectrometric method using 1,5-Diphenylpicrylhydrazole)	mg/l	<0.03	0.05
27	Fluoride	APHA 4110 B (Ion Chromatography with Chemical Suppression of Electrode Conductivity)	mg/l	0.13	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	Sulfide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.086	0.005
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.041	0.001
32	Electrical Conductivity	APHA 9221 F (Electrical Conductivity Procedure Using Fluorometer Substrate)	µmho/cm	178	1.8
33	Phenols	APHA Method 8261 (Phenols (Spectrophotometric, Resazurin Method with Oxidation))	mg/l	<0.002	0.002

Remark

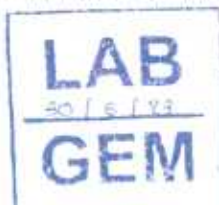
LOG - Limit of Quantitation

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.

APHA 2120B-5(b), Color Unit - (TCU) True Color Unit: One TCU is equivalent to one Hazen unit and to one Pt-Co unit.

Analysed by

Cherry Myint Thant
Assistant Manager



Approved by

Jittha Aung Mye
Managing Director

CH2M HILL (MYANMAR) PTE. LTD. (CH2M HILL MYANMAR)
150/11585 2004 (Determination of Chromium(VI) Spectrometric method using 1,5-Diphenylpicrylhydrazole)
CH2M HILL (MYANMAR) PTE. LTD.



Water Quality Monitoring Report for Development of Industrial Area in Thilawa SEZ Zone B
(Bi-Annually Monitoring in FY June-2023)

DDMMYY

ANALYSIS REPORT FOR WATER QUALITY MONITORING
IN FY 2023, TIER 1 (Zone A, Large Region Monitoring)
Report No. TQM-1 (2023) (0001)



Report No. : TQM-LAB-202306070
Revision No. : 1
Report Date : 30 June, 2023
Application No. : 0001/2001

Analysis Report

Client Name : Myanmar Koei International LTD (PKI)
Address : No. 36/A, 1st Floor, Grand Phe Sein Condominium, Phe Sein Road, Tarnier Township, Yangon, Myanmar
Project Name : Environmental Monitoring report for Zone A & B
Sample Description
Sample Name : HRI SW-4-0107
Sample No. : W-2306056
Waste Profile No. :
Sampling Date : 7 June, 2023
Sampling By : Customer
Sample Received Date : 7 June, 2023
Analytical Date : 7-30/06/2023

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	302	—
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.44	0.00
3	COD (Cr)	APHA 5220B (Dose Reflux Colorimetric Method)	mg/l	5.0	0.2
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	>160000	3.8
5	Oil and Grease	APHA 5520B (Petroleum Gravimetric Method)	mg/l	<3.1	3.1
6	Color	APHA 2120C (Spectrophotometric Method)	PCU	3.58	0.06
7	Total Nitrogen	HACH Method 10072 (TN Persulfate Digestion Method)	mg/l	1.4	0.5
8	Total Phosphorus	APHA 4500-P-E (Ascorbic Acid Method)	mg/l	0.72	0.05
9	Ammonia	HACH Method 10205 (Salicylate TNB Plus Method)	mg/l	0.71	0.02
10	TDS	APHA 2540 C (Total Dissolved Solids Dried at 180°C Method)	mg/l	266	—
11	DO	APHA 2150 B (Threshold DO Test)	TCM	1	0
12	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
13	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.026	0.002
14	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.010	0.010
15	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.003	0.003
16	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
17	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.010	0.010
18	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
19	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
20	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
21	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.003	0.003
22	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.002	0.002
23	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	22.828	0.002
24	Cyanide	HACH 8027 (Pyridine Pyrazolone Method)	mg/l	<0.002	0.002
25	Total Cyanide	Oxidation Process APHA 4500-CN C, Total Cyanide after Oxidation, Determined Cyanide Colorimetric Method, HACH 8027 (Pyridine Pyrazolone Method)	mg/l	0.004	0.002
26	Hexavalent Chromium (Cr6+)	ISO 11063-1994 (Determination of Chromium(VI) Spectrometric Method using 1,5-diphenylarsine)	mg/l	<0.05	0.05
27	Fluoride	APHA 4110 B (Ion Chromatography with Chemical Suppressor of Eluent Conductivity)	mg/l	0.301	0.024
28	Free Chlorine	APHA 4500 CL G (DPO Colorimetric Method)	mg/l	<0.1	0.1
29	Total Residual Chlorine	APHA 4500 CL G (DPO Colorimetric Method)	mg/l	<0.1	0.1
30	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.333	0.005
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.178	0.003
32	Phenols	USEPA Method 420.1 (Phenolics Spectrophotometric, Manual AAR 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 Method for the Examination of Water and Wastewater, 22nd edition.

APHA 2220B BOD₅, Color (PCU - True Color Unit). One PCU is equivalent to one Hazen unit and also one Pt-Co unit.

Analysed By

Cherry Hsiao Thaw
Assistant Manager



Approved by

Helen Hsiao Thaw, MSc, PhD
Managing Director

REPORT SHALL BE ONE OF THE SAMPLES SUBMITTED FOR ANALYSIS
THIS ANALYSIS REPORT SHALL NOT BE REPRODUCED OR FULLY REPRODUCED WITHOUT THE WRITTEN PERMISSION OF THE LABORATORY
ISSUED UNDER THE CONTROL OF THE LABORATORY



**Water Quality Monitoring Report for Development of Industrial Area in Thilawa SEZ Zone B
(Bi-Annually Monitoring in FY June-2023)**

ES/CS/MS

GEMCO DEVELOPMENT PTE. LTD.
(INCORPORATED IN MYANMAR)
Phone No. (95) 9-551 1111 (10 Lines)
Fax No. (95) 9-551 1112



Report No. : GEM-LAB-202306073
Revision No. : 1
Report Date : 30 June, 2023
Application No. : 0001-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No. 36/A, 1st Floor, Grand Phe Sen Condominium, Phe Sein Road, Tamee Township, Yangon, Myanmar.
Project Name : Environment Monitoring report for Zone A & B
Sample Description :
 Sample Name : MKI-GW-Z-0407
 Sample No. : W-2306059
 Waste Profile No. :
Sampling Date : 7 June, 2023
Sampling By : Customer
Sample Received Date : 7 June, 2023
Analytical Date : 7-30/06/2023

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	14	—
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	7.88	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	29.0	0.3
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	1600.0	1.8
5	Oil and Grease	APHA 5320B (Partition-Gravimetric Method)	mg/l	<3.1	3.1
6	Color	APHA 2120C (Spectrophotometric Method)	TCU	14.55	0.00
7	Total Nitrogen	HACH Method 10072 (TNF Persulfate Digestion Method)	mg/l	<0.5	0.5
8	Total Phosphorus	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.60	0.05
9	Ammonia	HACH Method 10205 (Silylate TNT Plus Method)	mg/l	0.02	0.02
10	TDS	APHA 2540 C (Total Dissolved Solids Evoked at 180°C Method)	mg/l	178	—
11	Odor	APHA 2150 B (Threshold Odor Test)	TCN	1	0
12	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
13	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
14	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.010	0.010
15	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
16	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
17	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.010	0.010
18	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
19	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
20	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
21	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
22	Silver	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	±0.002	0.002
23	Iron	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	6.714	0.002
24	Cyanide	HACH 8027 (Pyridine-Pyrazolone Method)	mg/l	<0.002	0.002
25	Total Cyanide	Digestion Process: APHA 4500-Cy C Total Cyanide after Distillation, Determination: Cadmate Colorimetric Process, HACH 8027 (Pyridine-Pyrazolone Method)	mg/l	<0.002	0.002
26	Hexavalent Chromium (Cr6+)	ISO 11883:1994 (Determination of Chromium(VI) Spectrometric Method Using 1,5-Diphenylcarbazide)	mg/l	<0.05	0.05
27	Fluoride	APHA 4130 B (Ion Chromatography with Chemical Suppression of Eluent Conductivity)	mg/l	0.514	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	Sulfide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.074	0.005
31	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.004	0.003
32	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	22.0	1.8
33	Phenols	USEPA Method 420.1 (Phenols) (Spectrophotometric Method 44AP With Distillation)	mg/l	0.007	<0.002

Remarks

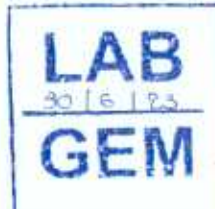
LOQ - Limit of Quantitation

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

APHA 2120B.6(b), Color Unit - TCU (True Color Unit). One TCU is equivalent to one Hazen unit and to one Pt-Co unit.

Analysed By

Cherry Myint Thien
Assistant Manager



Approved by


Htet Htet June 30, 2023
Managing Director

REPRODUCED BY THE CLIENT FROM THE ANALYSIS REPORT
THIS ANALYSIS REPORT AND THE INFORMATION CONTAINED HEREIN ARE THE PROPERTY OF GEMCO DEVELOPMENT PTE. LTD.



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

Appendix-D

Air Quality Monitoring Report

June 2023



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

(BI-ANNUALLY MONITORING)

June 2023

Myanmar Koei International Ltd.



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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

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

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the operation of industrial area in and around Thilawa SEZ Zone B, air quality had been monitored from 5 June 2023 to 12 June 2023 as follows;

Table 1.2-1 Outlines of Air Quality Monitoring Plan

Monitoring Date	Monitoring Item	Parameters	Number of Point	Duration	Monitoring Methodology
From 5 June to 12 June, 2023	Air Quality	CO, NO _x , 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, NO₂, PM_{2.5}, PM₁₀ and SO₂.

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. As the monitoring point (AQ-1) is adjacent to the southern boundary of Thilawa SEZ Zone B, it is surrounded by Thilawa SEZ Zone B in the north and east. In the south and west of AQ-1, the residential houses of Phalan village and the fields are occurred respectively. Besides, Thilawa SEZ Zone A is distanced about 2 km north of AQ-1 as well as the Thilawa Industrial Zone is about 1 km northeast. Due to the air quality monitoring is carried out at above location which is closed to the residential houses of Phalan village, the possible emission sources are exhaust gas and dust emissions from the fuel-burning equipment and other tasks of construction activities of Zone B but also from the daily human activities in Phalan village. The location of air quality monitoring is shown in the Figure 2.2-1.



Figure 2.2-1 Location of Air Quality Monitoring Point

2.3 Monitoring Period

Air quality monitoring was conducted seven consecutive days from 5 June, 2023 to 12 June, 2023.

2.4 Monitoring Method

Monitoring of CO, NO₂, PM_{2.5}, PM₁₀ and SO₂ 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, NO₂, PM_{2.5}, PM₁₀ and SO₂. 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, NO₂, PM_{2.5}, PM₁₀ and SO₂ are described in Table 2.5-1. Comparing with the target value of CO, NO₂, PM_{2.5}, PM₁₀ and SO₂ prescribed in EIA report for Thilawa SEZ development project Zone B, seven days average concentration of CO, NO₂, PM_{2.5}, PM₁₀ and SO₂ were lower than the target value.

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

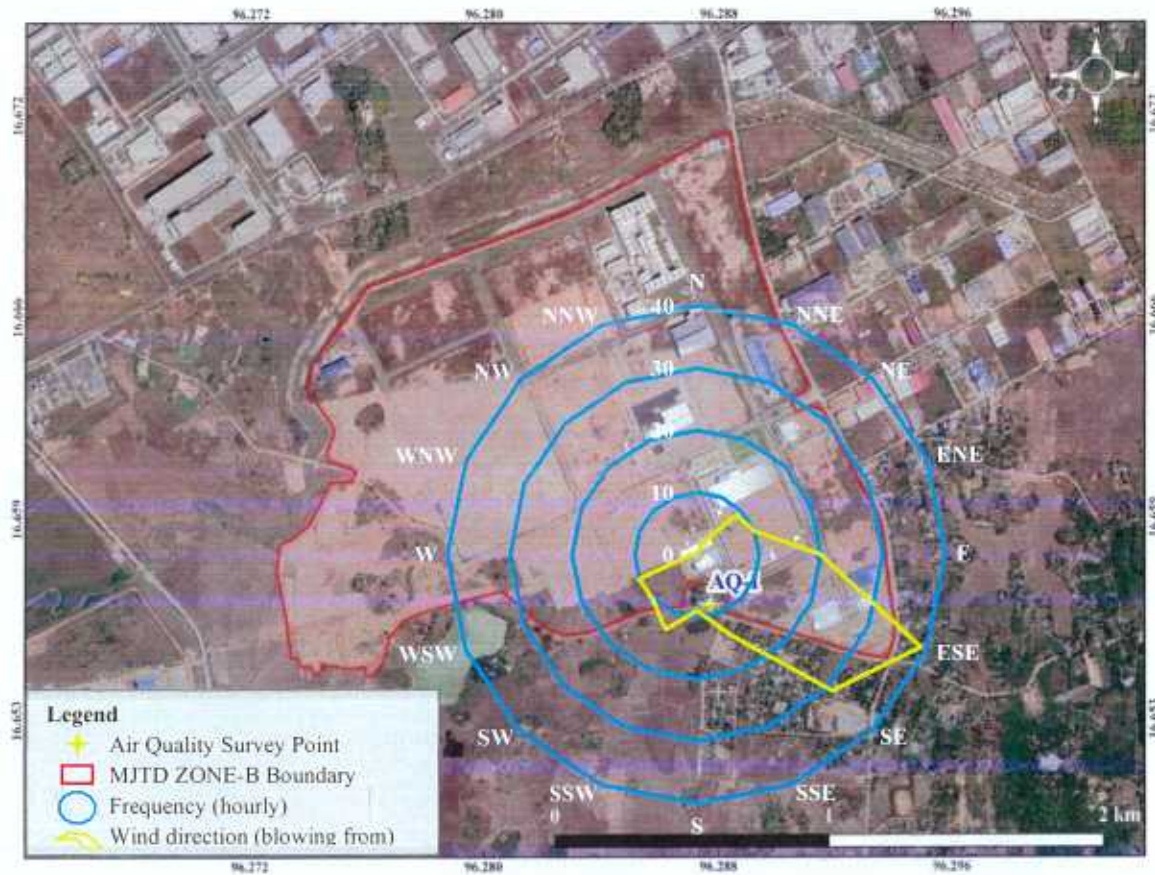
Date	CO mg/m ³	NO ₂ mg/m ³	PM _{2.5} mg/m ³	PM ₁₀ mg/m ³	SO ₂ mg/m ³
05-06 June, 2023	0.364	0.070	0.015	0.021	0.015
06-07 June, 2023	0.493	0.071	0.017	0.027	0.016
07-08 June, 2023	0.489	0.052	0.016	0.025	0.016
08-09 June, 2023	0.490	0.032	0.018	0.029	0.017
09-10 June, 2023	0.503	0.049	0.016	0.026	0.019
10-11 June, 2023	0.412	0.072	0.018	0.029	0.017
11-12 June, 2023	0.475	0.061	0.017	0.025	0.015
7 Days Average Value	0.461	0.058	0.017	0.026	0.016
Target Value	10.26	0.1	0.025	0.05	0.02

Note: The target value of CO, NO₂ and SO₂ 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. (NO₂, mg/m³) = (NO₂, ppm) * (Molecular Weight of NO₂ (46)) / 24.45 at 25°C and 1 atm condition
3. (SO₂, mg/m³) = (SO₂, ppm) * (Molecular Weight of SO₂ (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. Frequency of wind direction at AQ-1 is described in Figure 2.5-1. According to the wind data analysis, the prevailing wind direction during monitoring was East-Southeast (ESE) and the least frequency wind direction was West (W). During the monitoring period, while the maximum wind speed was 1.6 m/s, the average speed is 0.4 m/s. The calm wind is 67%, whereas the calm wind is defined below 0.5 m/s. As the average wind speed is lower than the defined calm wind, it is assumed that the wind was calm during the monitoring period.



Source: Myanmar Koei International Ltd.

Figure 2.5-1 Frequency of Wind Direction at AQ-1

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



CHAPTER 3: CONCLUSION AND RECOMMENDATION

By means of the result of air quality at AQ-I, concentration of CO, NO₂, PM_{2.5}, PM₁₀ and SO₂ 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.

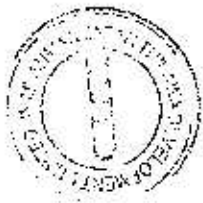


APPENDIX-1 HOURLY AIR RESULTS



Air Quality Monitoring Report for Development of Industrial Area Thilawa SEZ Zone B
(Phase 1, 2 & 3 Operation Stage, FY June 2023)

Date	Time	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	Wind Speed	Wind Direction	
		mg/m ³	ppm	mg/m ³	mg/m ³	mg/m ³	m/s	Dir.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
05 June, 2023	13:00 ~ 13:59	0.127	0.070	0.012	0.014	0.015	0.72	120	ESE
05 June, 2023	14:00 ~ 14:59	0.475	0.030	0.010	0.015	0.016	1.05	128	SE
05 June, 2023	15:00 ~ 15:59	0.548	0.032	0.017	0.024	0.014	1.13	127	SE
05 June, 2023	16:00 ~ 16:59	0.517	0.058	0.019	0.027	0.016	1.12	179	S
05 June, 2023	17:00 ~ 17:59	0.334	0.071	0.015	0.021	0.015	0.83	212	SSW
05 June, 2023	18:00 ~ 18:59	0.190	0.096	0.015	0.023	0.014	0.43	143	SE
05 June, 2023	19:00 ~ 19:59	0.104	0.098	0.012	0.018	0.016	0.18	179	S
05 June, 2023	20:00 ~ 20:59	0.148	0.097	0.011	0.016	0.017	0.12	79	E
05 June, 2023	21:00 ~ 21:59	0.190	0.097	0.011	0.016	0.015	0.05	90	E
05 June, 2023	22:00 ~ 22:59	0.573	0.094	0.014	0.020	0.013	0.15	103	ESE
05 June, 2023	23:00 ~ 23:59	0.582	0.084	0.012	0.018	0.013	0.23	107	ESE
06 June, 2023	00:00 ~ 00:59	0.569	0.089	0.018	0.025	0.014	0.08	96	E
06 June, 2023	01:00 ~ 01:59	0.517	0.084	0.010	0.014	0.017	0.20	122	ESE
06 June, 2023	02:00 ~ 02:59	0.353	0.085	0.010	0.015	0.017	0.14	96	E
06 June, 2023	03:00 ~ 03:59	0.311	0.080	0.012	0.017	0.014	0.02	43	NE
06 June, 2023	04:00 ~ 04:59	0.167	0.077	0.024	0.035	0.014	0.03	37	NE
06 June, 2023	05:00 ~ 05:59	0.165	0.076	0.025	0.025	0.015	0.00	29	NNE
06 June, 2023	06:00 ~ 06:59	0.201	0.078	0.025	0.036	0.014	0.02	55	NE
06 June, 2023	07:00 ~ 07:59	0.342	0.069	0.020	0.028	0.014	0.08	46	NE
06 June, 2023	08:00 ~ 08:59	0.376	0.045	0.015	0.022	0.014	0.03	49	NE
06 June, 2023	09:00 ~ 09:59	0.572	0.036	0.010	0.015	0.015	0.30	51	NE
06 June, 2023	10:00 ~ 10:59	0.621	0.009	0.010	0.015	0.014	0.87	51	NE
06 June, 2023	11:00 ~ 11:59	0.425	0.018	0.014	0.020	0.014	0.62	57	ENE
06 June, 2023	12:00 ~ 12:59	0.339	0.098	0.011	0.017	0.014	0.15	157	SSE
Max		0.621	0.098	0.025	0.036	0.017			
Avg		0.364	0.070	0.015	0.021	0.015			
Min		0.104	0.009	0.010	0.014	0.013			



Air Quality Monitoring Report for Development of Industrial Area Thilawa SEZ Zone B
(Phase 1, 2 & 3 Operation Stage, FY June 2023)

Date	Time	CO	NO ₂	PM _{2.5}	PM ₁₀	SO ₂	Wind Speed	Wind Direction	
		mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³	m/s	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
06 June, 2023	13:00 ~ 13:59	0.573	0.057	0.021	0.045	0.015	0.40	67.83	ENE
06 June, 2023	14:00 ~ 14:59	0.490	0.079	0.020	0.049	0.014	0.30	61.50	ENE
06 June, 2023	15:00 ~ 15:59	0.449	0.073	0.020	0.029	0.015	0.17	41.00	NE
06 June, 2023	16:00 ~ 16:59	0.263	0.085	0.012	0.017	0.015	0.23	99.00	E
06 June, 2023	17:00 ~ 17:59	0.349	0.076	0.014	0.019	0.015	0.55	111.33	ESE
06 June, 2023	18:00 ~ 18:59	0.584	0.060	0.023	0.034	0.014	0.48	106.67	ESE
06 June, 2023	19:00 ~ 19:59	0.515	0.069	0.021	0.030	0.014	0.27	107.67	ESE
06 June, 2023	20:00 ~ 20:59	0.563	0.063	0.012	0.018	0.015	0.27	101.33	ESE
06 June, 2023	21:00 ~ 21:59	0.476	0.062	0.016	0.022	0.015	0.13	97.33	E
06 June, 2023	22:00 ~ 22:59	0.595	0.067	0.023	0.033	0.014	0.17	90.00	E
06 June, 2023	23:00 ~ 23:59	0.625	0.064	0.020	0.029	0.014	0.43	105.67	ESE
07 June, 2023	00:00 ~ 00:59	0.551	0.062	0.021	0.030	0.014	0.70	93.00	E
07 June, 2023	01:00 ~ 01:59	0.557	0.065	0.019	0.028	0.015	0.45	111.83	ESE
07 June, 2023	02:00 ~ 02:59	0.578	0.060	0.013	0.019	0.014	0.20	105.20	ESE
07 June, 2023	03:00 ~ 03:59	0.625	0.057	0.018	0.026	0.019	0.03	80.50	E
07 June, 2023	04:00 ~ 04:59	0.423	0.061	0.023	0.033	0.018	0.10	153.50	SSE
07 June, 2023	05:00 ~ 05:59	0.542	0.092	0.023	0.044	0.017	0.03	64.00	ENE
07 June, 2023	06:00 ~ 06:59	0.602	0.099	0.013	0.019	0.016	0.30	152.67	SSE
07 June, 2023	07:00 ~ 07:59	0.206	0.098	0.013	0.019	0.017	0.27	97.33	E
07 June, 2023	08:00 ~ 08:59	0.455	0.096	0.013	0.019	0.017	0.40	96.83	E
07 June, 2023	09:00 ~ 09:59	0.342	0.092	0.012	0.018	0.016	0.37	86.50	E
07 June, 2023	10:00 ~ 10:59	0.454	0.095	0.013	0.019	0.015	0.33	86.50	E
07 June, 2023	11:00 ~ 11:59	0.354	0.061	0.016	0.023	0.017	0.80	113.83	ESE
07 June, 2023	12:00 ~ 12:59	0.673	0.023	0.011	0.016	0.018	0.52	83.50	E

Max	0.673	0.099	0.023	0.049	0.019
Avg	0.493	0.071	0.017	0.027	0.016
Min	0.206	0.023	0.011	0.016	0.014



Air Quality Monitoring Report for Development of Industrial Area Thilawa SEZ, Zone B
(Phase 1, 2 & 3 Operation Stage, FY June 2023)

Date	Time	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	Wind Speed	Wind Direction	
		mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³	m/s	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
07 June, 2023	13:00 ~ 13:59	0.523	0.004	0.012	0.015	0.014	0.92	115.67	ESE
07 June, 2023	14:00 ~ 14:59	0.537	0.004	0.024	0.035	0.013	0.80	119.00	ESE
07 June, 2023	15:00 ~ 15:59	0.564	0.097	0.016	0.024	0.015	0.97	197.67	SSW
07 June, 2023	16:00 ~ 16:59	0.114	0.082	0.015	0.022	0.012	0.53	206.50	SSW
07 June, 2023	17:00 ~ 17:59	0.297	0.060	0.016	0.023	0.018	0.23	179.83	S
07 June, 2023	18:00 ~ 18:59	0.205	0.050	0.024	0.035	0.015	0.02	223.00	SW
07 June, 2023	19:00 ~ 19:59	0.444	0.089	0.011	0.017	0.015	0.78	241.00	WSW
07 June, 2023	20:00 ~ 20:59	0.584	0.098	0.013	0.019	0.018	0.07	222.00	SW
07 June, 2023	21:00 ~ 21:59	0.562	0.073	0.016	0.023	0.018	0.12	230.50	SW
07 June, 2023	22:00 ~ 22:59	0.580	0.073	0.012	0.018	0.015	0.30	217.17	SW
07 June, 2023	23:00 ~ 23:59	0.605	0.060	0.018	0.026	0.014	0.10	192.33	SSW
08 June, 2023	00:00 ~ 00:59	0.614	0.057	0.014	0.023	0.017	0.15	149.67	SSE
08 June, 2023	01:00 ~ 01:59	0.584	0.054	0.022	0.050	0.018	0.05	143.83	SE
08 June, 2023	02:00 ~ 02:59	0.554	0.054	0.017	0.028	0.016	0.08	184.20	S
08 June, 2023	03:00 ~ 03:59	0.535	0.041	0.017	0.029	0.017	0.00	158.00	SSE
08 June, 2023	04:00 ~ 04:59	0.518	0.053	0.016	0.029	0.015	0.15	219.67	SW
08 June, 2023	05:00 ~ 05:59	0.556	0.043	0.017	0.029	0.012	0.02	109.33	ESE
08 June, 2023	06:00 ~ 06:59	0.602	0.048	0.017	0.029	0.015	0.02	142.33	SE
08 June, 2023	07:00 ~ 07:59	0.282	0.043	0.018	0.028	0.018	0.00	125.50	SE
08 June, 2023	08:00 ~ 08:59	0.461	0.007	0.014	0.020	0.018	0.40	118.00	ESE
08 June, 2023	09:00 ~ 09:59	0.503	0.017	0.012	0.016	0.015	0.65	151.17	SSE
08 June, 2023	10:00 ~ 10:59	0.554	0.097	0.011	0.016	0.014	0.60	116.33	ESE
08 June, 2023	11:00 ~ 11:59	0.565	0.034	0.013	0.016	0.017	0.33	106.17	ESE
08 June, 2023	12:00 ~ 12:59	0.554	0.005	0.017	0.025	0.018	0.58	125.83	SE

Max	0.614	0.098	0.024	0.050	0.018
Avg	0.489	0.052	0.016	0.025	0.016
Min	0.114	0.004	0.011	0.015	0.012



Date	Time	CO	NO ₂	PM _{2.5}	PM ₁₀	SO ₂	Wind Speed	Wind Direction	
		mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³	m/s	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
08 June, 2023	13:00 ~ 13:59	0.486	0.054	0.012	0.017	0.016	1.60	233.67	SW
08 June, 2023	14:00 ~ 14:59	0.328	0.019	0.013	0.023	0.017	0.63	144.00	SE
08 June, 2023	15:00 ~ 15:59	0.615	0.004	0.015	0.026	0.015	0.58	140.83	SE
08 June, 2023	16:00 ~ 16:59	0.559	0.004	0.017	0.029	0.016	0.80	140.50	SE
08 June, 2023	17:00 ~ 17:59	0.237	0.095	0.017	0.027	0.018	0.73	169.50	S
08 June, 2023	18:00 ~ 18:59	0.246	0.068	0.019	0.027	0.015	0.32	208.17	SSW
08 June, 2023	19:00 ~ 19:59	0.626	0.049	0.012	0.017	0.014	0.30	152.33	SSE
08 June, 2023	20:00 ~ 20:59	0.532	0.044	0.015	0.022	0.017	0.20	256.33	WSW
08 June, 2023	21:00 ~ 21:59	0.594	0.038	0.022	0.031	0.016	0.27	247.33	WSW
08 June, 2023	22:00 ~ 22:59	0.474	0.032	0.020	0.037	0.016	0.22	250.50	WSW
08 June, 2023	23:00 ~ 23:59	0.574	0.022	0.023	0.042	0.017	0.07	202.17	SSW
09 June, 2023	00:00 ~ 00:59	0.620	0.038	0.022	0.032	0.018	0.03	141.33	SE
09 June, 2023	01:00 ~ 01:59	0.574	0.040	0.014	0.021	0.018	0.02	124.67	SE
09 June, 2023	02:00 ~ 02:59	0.555	0.040	0.013	0.019	0.018	0.00	183.80	S
09 June, 2023	03:00 ~ 03:59	0.405	0.043	0.021	0.031	0.019	0.00	66.17	ENE
09 June, 2023	04:00 ~ 04:59	0.419	0.040	0.022	0.031	0.019	0.02	62.33	ENE
09 June, 2023	05:00 ~ 05:59	0.279	0.050	0.021	0.039	0.018	0.00	76.17	ENE
09 June, 2023	06:00 ~ 06:59	0.372	0.054	0.021	0.046	0.016	0.07	72.33	ENE
09 June, 2023	07:00 ~ 07:59	0.470	0.021	0.015	0.022	0.018	0.57	114.83	ESE
09 June, 2023	08:00 ~ 08:59	0.569	0.004	0.019	0.035	0.015	0.78	115.83	ESE
09 June, 2023	09:00 ~ 09:59	0.577	0.004	0.018	0.037	0.014	0.80	128.17	SE
09 June, 2023	10:00 ~ 10:59	0.556	0.004	0.014	0.024	0.017	0.52	86.83	E
09 June, 2023	11:00 ~ 11:59	0.596	0.004	0.023	0.033	0.017	0.97	133.00	SE
09 June, 2023	12:00 ~ 12:59	0.500	0.008	0.019	0.037	0.016	0.88	135.67	SE

Max	0.626	0.095	0.023	0.046	0.019
Avg	0.490	0.032	0.018	0.029	0.017
Min	0.237	0.004	0.012	0.017	0.014



Air Quality Monitoring Report for Development of Industrial Area Thudawa ST.7, Zone B
(Phase 1, 2 & 3 Operation Stage, FY June 2023)

Date	Time		PM ₁₀	SO ₂	PM _{2.5}	PM ₁₀	SO ₂	Wind Speed	Wind Direction	
			mg/m ³ Hourly	mg/m ³ Hourly	mg/m ³ Hourly	mg/m ³ Hourly	mg/m ³ Hourly	ms Hourly	Deg Hourly	Direction Hourly
09 June, 2023	13:00	~ 13:59	0.651	0.004	0.014	0.019	0.018	1.10	136.67	SE
09 June, 2023	14:00	~ 14:59	0.495	0.005	0.020	0.037	0.020	0.97	128.67	SE
09 June, 2023	15:00	~ 15:59	0.555	0.034	0.019	0.040	0.019	0.87	135.83	SE
09 June, 2023	16:00	~ 16:59	0.510	0.036	0.013	0.019	0.017	0.80	127.33	SE
09 June, 2023	17:00	~ 17:59	0.506	0.056	0.019	0.035	0.010	0.73	128.00	SE
09 June, 2023	18:00	~ 18:59	0.360	0.076	0.018	0.026	0.019	0.57	139.50	SE
09 June, 2023	19:00	~ 19:59	0.476	0.092	0.013	0.018	0.019	0.42	136.83	SE
09 June, 2023	20:00	~ 20:59	0.156	0.091	0.011	0.015	0.018	0.18	184.17	S
09 June, 2023	21:00	~ 21:59	0.623	0.084	0.020	0.045	0.019	0.55	250.50	WSW
09 June, 2023	22:00	~ 22:59	0.646	0.080	0.019	0.034	0.018	0.75	249.17	WSW
09 June, 2023	23:00	~ 23:59	0.559	0.070	0.014	0.024	0.018	0.47	253.17	WSW
10 June, 2023	00:00	~ 00:59	0.492	0.067	0.010	0.015	0.017	0.43	208.17	SSW
10 June, 2023	01:00	~ 01:59	0.621	0.067	0.012	0.017	0.018	0.58	247.67	WSW
10 June, 2023	02:00	~ 02:59	0.547	0.077	0.013	0.034	0.020	0.22	250.40	WSW
10 June, 2023	03:00	~ 03:59	0.604	0.072	0.010	0.014	0.018	0.05	211.67	SSW
10 June, 2023	04:00	~ 04:59	0.590	0.068	0.014	0.030	0.018	0.27	145.33	SE
10 June, 2023	05:00	~ 05:59	0.433	0.059	0.021	0.030	0.020	0.30	102.00	ESE
10 June, 2023	06:00	~ 06:59	0.428	0.058	0.014	0.024	0.019	0.18	121.83	ESE
10 June, 2023	07:00	~ 07:59	0.496	0.051	0.019	0.038	0.017	0.18	103.00	ESE
10 June, 2023	08:00	~ 08:59	0.435	0.021	0.020	0.037	0.018	0.37	120.33	ESE
10 June, 2023	09:00	~ 09:59	0.353	0.004	0.018	0.028	0.019	0.68	132.50	SE
10 June, 2023	10:00	~ 10:59	0.415	0.004	0.013	0.019	0.019	0.92	138.83	SE
10 June, 2023	11:00	~ 11:59	0.542	0.004	0.011	0.016	0.021	0.82	165.00	SSE
10 June, 2023	12:00	~ 12:59	0.590	0.004	0.022	0.039	0.021	0.63	169.00	S

Max	0.651	0.092	0.022	0.045	0.021
Avg	0.503	0.049	0.016	0.026	0.019
Min	0.156	0.004	0.010	0.014	0.017



Air Quality Monitoring Report for Development of Industrial Area Thilawa SEZ Zone B
(Phase 1, 2 & 3 Operation Stage, FY June 2023)

Date	Time	CO	NO ₂	PM _{2.5}	PM ₁₀	SO ₂	Wind Speed	Wind Direction	
		mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³	m/s	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
10 June, 2023	13:00 ~ 13:59	0.617	0.004	0.016	0.036	0.019	0.78	143.67	SE
10 June, 2023	14:00 ~ 14:59	0.519	0.040	0.018	0.026	0.016	0.97	170.33	S
10 June, 2023	15:00 ~ 15:59	0.205	0.097	0.017	0.024	0.019	1.18	217.33	SW
10 June, 2023	16:00 ~ 16:59	0.176	0.091	0.020	0.029	0.015	0.57	229.00	SW
10 June, 2023	17:00 ~ 17:59	0.222	0.090	0.016	0.024	0.018	0.77	164.17	SSE
10 June, 2023	18:00 ~ 18:59	0.319	0.092	0.012	0.018	0.016	0.62	110.00	ESE
10 June, 2023	19:00 ~ 19:59	0.587	0.088	0.014	0.019	0.017	0.98	111.00	ESE
10 June, 2023	20:00 ~ 20:59	0.395	0.085	0.016	0.024	0.020	1.02	112.50	ESE
10 June, 2023	21:00 ~ 21:59	0.547	0.096	0.022	0.032	0.018	0.62	110.83	ESE
10 June, 2023	22:00 ~ 22:59	0.495	0.096	0.017	0.025	0.016	0.20	88.67	E
10 June, 2023	23:00 ~ 23:59	0.527	0.078	0.013	0.019	0.017	0.40	117.67	ESE
11 June, 2023	00:00 ~ 00:59	0.533	0.059	0.020	0.029	0.015	0.17	142.50	SE
11 June, 2023	01:00 ~ 01:59	0.568	0.071	0.023	0.033	0.017	0.00	102.67	ESE
11 June, 2023	02:00 ~ 02:59	0.280	0.060	0.014	0.019	0.018	0.00	29.20	NNE
11 June, 2023	03:00 ~ 03:59	0.608	0.057	0.023	0.034	0.020	0.00	62.00	ENE
11 June, 2023	04:00 ~ 04:59	0.558	0.069	0.023	0.036	0.017	0.13	85.00	E
11 June, 2023	05:00 ~ 05:59	0.526	0.065	0.024	0.044	0.015	0.12	276.00	W
11 June, 2023	06:00 ~ 06:59	0.209	0.062	0.022	0.040	0.018	0.00	49.67	NE
11 June, 2023	07:00 ~ 07:59	0.410	0.059	0.021	0.039	0.016	0.00	93.00	E
11 June, 2023	08:00 ~ 08:59	0.473	0.061	0.019	0.040	0.019	0.25	196.33	SSW
11 June, 2023	09:00 ~ 09:59	0.215	0.100	0.020	0.038	0.017	0.22	206.83	SSW
11 June, 2023	10:00 ~ 10:59	0.316	0.069	0.012	0.017	0.020	0.37	143.83	SE
11 June, 2023	11:00 ~ 11:59	0.417	0.071	0.019	0.028	0.018	0.05	194.33	SSW
11 June, 2023	12:00 ~ 12:59	0.162	0.077	0.017	0.025	0.019	0.02	122.83	ESE

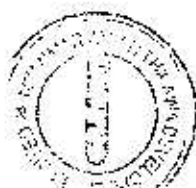
Max	0.617	0.100	0.024	0.044	0.020
Avg	0.412	0.072	0.018	0.029	0.017
Min	0.162	0.004	0.012	0.017	0.015



Air Quality Monitoring Report for Development of Industrial Area Thilawa SEZ Zone B
(Phase 1, 2 & 3 Operation Stage, FY June 2023)

Date	Time	CO	NO _x	PM ₁₀	PM _{2.5}	SO ₂	Wind Speed	Wind Direction	
		mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³	m/s	Dir	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
11 June, 2023	13:00 ~ 13:59	0.225	0.069	0.019	0.027	0.015	0.00	138.33	SE
11 June, 2023	14:00 ~ 14:59	0.520	0.054	0.017	0.019	0.014	0.12	161.67	SSE
11 June, 2023	15:00 ~ 15:59	0.497	0.033	0.015	0.025	0.017	0.27	225.67	SW
11 June, 2023	16:00 ~ 16:59	0.375	0.004	0.014	0.020	0.013	0.15	148.33	SSE
11 June, 2023	17:00 ~ 17:59	0.651	0.004	0.018	0.039	0.014	0.38	116.00	ESE
11 June, 2023	18:00 ~ 18:59	0.576	0.004	0.017	0.024	0.017	0.05	98.00	E
11 June, 2023	19:00 ~ 19:59	0.650	0.015	0.013	0.019	0.017	0.48	109.50	ESE
11 June, 2023	20:00 ~ 20:59	0.526	0.093	0.018	0.025	0.013	0.85	201.83	SSW
11 June, 2023	21:00 ~ 21:59	0.250	0.099	0.013	0.019	0.014	0.17	157.67	SSE
11 June, 2023	22:00 ~ 22:59	0.511	0.087	0.015	0.022	0.016	0.17	164.67	SSP
11 June, 2023	23:00 ~ 23:59	0.557	0.072	0.015	0.021	0.017	0.03	106.67	ESE
12 June, 2023	00:00 ~ 00:59	0.553	0.059	0.012	0.017	0.017	0.10	67.33	ENE
12 June, 2023	01:00 ~ 01:59	0.540	0.056	0.016	0.023	0.014	0.27	128.00	SE
12 June, 2023	02:00 ~ 02:59	0.571	0.060	0.022	0.032	0.014	0.25	151.33	SSE
12 June, 2023	03:00 ~ 03:59	0.649	0.047	0.021	0.030	0.015	0.12	195.17	SSW
12 June, 2023	04:00 ~ 04:59	0.428	0.071	0.017	0.025	0.016	0.07	98.83	E
12 June, 2023	05:00 ~ 05:59	0.177	0.084	0.021	0.031	0.014	0.25	114.33	ESE
12 June, 2023	06:00 ~ 06:59	0.536	0.076	0.020	0.029	0.013	0.47	114.00	ESE
12 June, 2023	07:00 ~ 07:59	0.352	0.063	0.013	0.018	0.012	0.37	108.17	ESE
12 June, 2023	08:00 ~ 08:59	0.443	0.049	0.019	0.027	0.016	0.65	137.33	SE
12 June, 2023	09:00 ~ 09:59	0.534	0.092	0.023	0.033	0.017	0.58	238.33	WSW
12 June, 2023	10:00 ~ 10:59	0.514	0.098	0.024	0.035	0.014	0.35	230.17	SW
12 June, 2023	11:00 ~ 11:59	0.556	0.097	0.018	0.025	0.013	0.20	114.50	ESE
12 June, 2023	12:00 ~ 12:59	0.201	0.079	0.019	0.027	0.015	0.47	115.83	ESE

Max	0.651	0.099	0.024	0.039	0.017
Avg	0.475	0.061	0.017	0.025	0.015
Min	0.177	0.004	0.012	0.017	0.012



APPENDIX-2 CERTIFICATE OF CALIBRATION





SYSTEM HEALTH CHECK REPORT

Information

Instrument..... Haascommer
Model..... EPAS
Serial number..... 918189
Unit Sensor..... CO,NO2,O3,NO,SO2,PM10
PM2.5,T & RH,WS/WD,SLHR
Customer..... Myanmar Koei International LTD.
Date..... Feb 21st 2023

Check List

Physical Check..... OK
Supply Voltage Check..... OK
PM 10,PM2.5 Air Flow Check..... OK
SLHR,T & RH,WS/WD sensor Check..... OK
NO Sensor Health Check..... Moderate
CO,NO2,O3,SO2 Sensor Health Check..... Still Good
Lithium Battery Voltage Check..... OK
Data Logging Check..... OK
Data Downloading Check..... OK

Recommend

Need to replace new acid gas scrubber (schedule is 6 months)
Need to replace internal filters (schedule is 6 months)
Need to perform factory calibration or in-field calibration (schedule is 12 months)


Performed by
Daw Saw Hsaw
Technical Service Engineer
NANOVA CO.,LTD


Approved by
Myo Oo
Technical Service Manager
NANOVA CO.,LTD

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

Appendix-E

Noise and Vibration Monitoring Report
June 2023



**NOISE AND VIBRATION
MONITORING REPORT
FOR DEVELOPMENT OF INDUSTRIAL AREA
THILAWA SEZ ZONE B
(PHASE 1, 2 & 3 OPERATION STAGE)**

(BI-ANNUALLY MONITORING)

June 2023

Myanmar Koei International Ltd.



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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

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

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the operation of industrial area in and around Thilawa SEZ Zone B, noise and vibration levels had been monitored from 5 June 2023 to 6 June 2023 as follows;

Table 1.2-1 Outlines of Noise and Vibration Level Monitoring

Monitoring Date	Monitoring Item	Parameters	Number of Points	Duration	Monitoring Methodology
6 June 2023	Noise Level	L_{Aeq} (dB)	1 (NV-1)	8 hours	On-site measurement by "Rion NL-42 sound level meter"
5 June 2023	Noise Level	L_{Aeq} (dB)	1 (NV-2)	8 hours	On-site measurement by "Rion NL-42 sound level meter"
6 June 2023	Vibration Level	L_{wv} (dB)	1 (NV-1)	8 hours	On-site measurement by "Vibration Level Meter- VM-53A"
5 June 2023	Vibration Level	L_{wv} (dB)	1 (NV-2)	8 hours	On-site measurement by "Vibration Level Meter- VM-53A"

Source: Myanmar Koel 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, namely NV-1 (N: 16°40'18.22", E: 96°17'18.18") for traffic noise concerned and inside the monastery compound of Phalan village, adjacent to the southern boundary of the Thilawa SEZ Zone B, as NV-2 (N: 16°39'24.90", E: 96°17'16.70") for sensitive area noise level. The location of the noise and vibration monitoring points are shown in Figure 2.2-1.



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



NV-1

NV-1 is located in front of 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 inside the monastery compound of Phalan village, adjacent to the southern boundary of the Thilawa SEZ Zone B and surrounded by the residential houses of Phalan village in the south and the fields in west. Thilawa SEZ Zone A is distanced about 2 km north of NV-2 and local industrial zone about 1 km 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 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 for NV-2 respectively. Noise measurement was carried out for 8-hour as working time (8:00 AM to 4:00 PM) at the designated locations 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 (L_{Aeq}) 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 show the results of noise level (L_{Aeq}) 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. Regarding the hourly noise level, one-hour L_{Aeq} during 11:00 - 12:00 at NV-2 was slightly higher than the target value though there were no construction activities at that time. According to the field surveyor record, it was due to the heavy rain at that time. Therefore, it is considered that there is no impact from operation activities of Zone B to the surrounding environment.

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

Date	(Traffic Noise Level) Equivalent Noise Level (L_{Aeq} , dB)	
	Day Time (6:00 AM – 10:00 PM)	Night Time (10:00 PM – 6:00 AM)
6 June, 2023	62	-
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 (L_{Aeq}) Monitoring at NV-2

Date	(A side next to sensitive area such as monastery, hospital and school) Equivalent Noise Level (L_{Aeq} , dB)		
	Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
5 June, 2023	56	-	-
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 (L_{Aeq}) Monitoring Results at NV-1

Table 2.4-5 Hourly Noise Level (L_{Aeq}) Monitoring Results at NV-1					
Date	Time	Result L_{Aeq} (dB)	Each Category L_{Aeq} (dB)	Target Value L_{Aeq} (dB)	Remark
6 June, 2023	6:00-7:00	-	62	75	No construction Activities
	7:00-8:00	-			
	8:00-9:00	60			
	9:00-10:00	62			
	10:00-11:00	61			
	11:00-12:00	63			
	12:00-13:00	62			
	13:00-14:00	62			
	14:00-15:00	62			
	15:00-16:00	63			
	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	-			

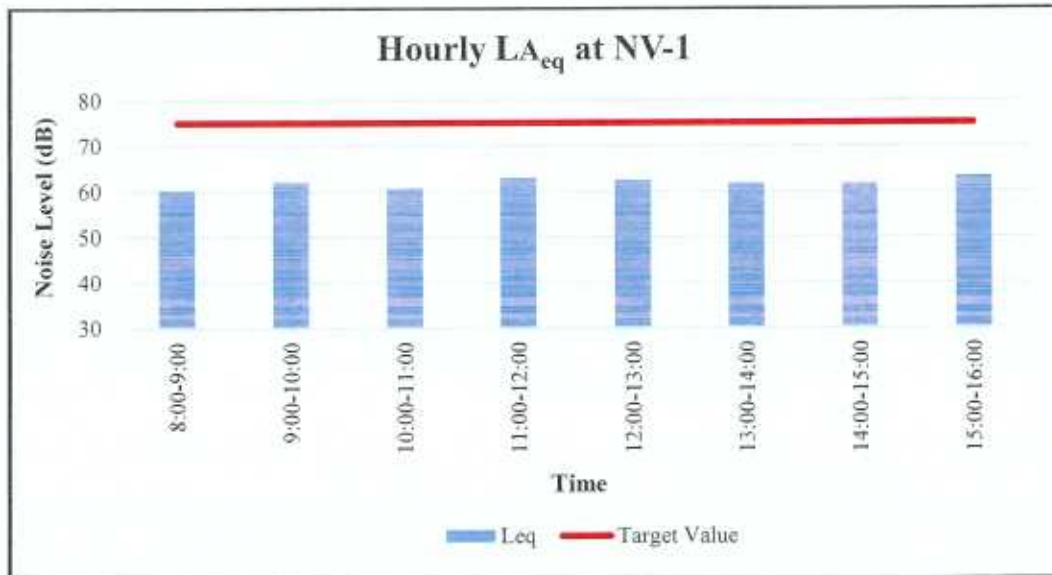
Source: Myanmar Koei International Ltd.

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

Table 2.4-4 Hourly Noise Level (L_{Aeq}) Monitoring Results at NY-2					
Date	Time	(L_{Aeq} , dB)	(L_{Aeq} , dB) Each Category	(L_{Aeq} , dB) Target Value	Remark
5 June, 2023	7:00-8:00	-	56	60	No construction Activities
	8:00-9:00	49			
	9:00-10:00	49			
	10:00-11:00	51			
	11:00-12:00	63			
	12:00-13:00	51			
	13:00-14:00	51			
	14:00-15:00	55			
	15:00-16:00	51			
	16:00-17:00	-			
	17:00-18:00	-			
	18:00-19:00	-			
	19:00-20:00	-			
	20:00-21:00	-	-	55	
	21:00-22:00	-			
	22:00-23:00	-			
	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	-			

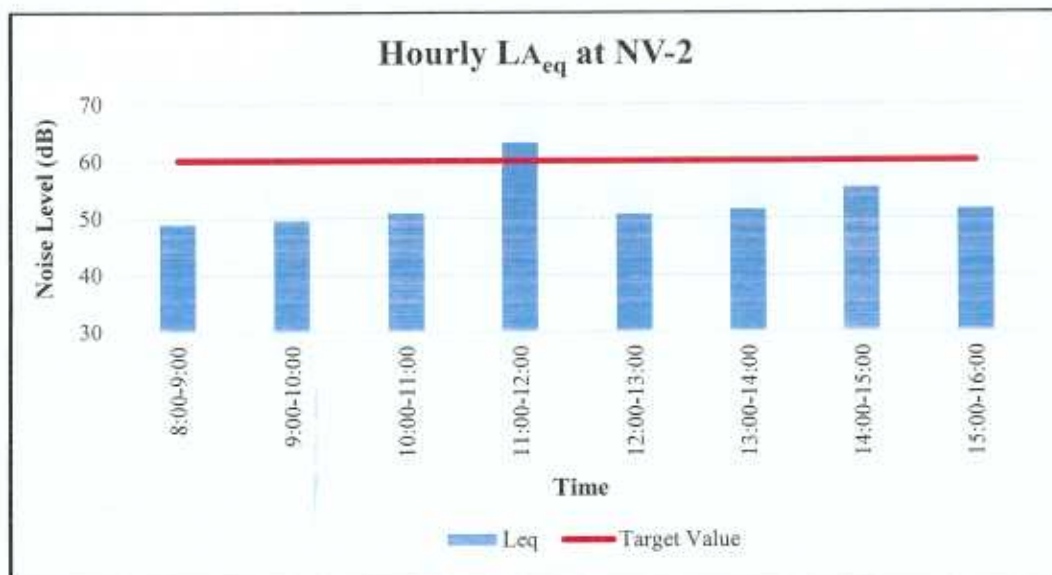
Source: Myanmar Koei International Ltd.





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 for 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)
6 June, 2023	39	-	-
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)
5 June, 2023	22	-	-
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

Table 2.4-7 Results of Hourly Vibration Levels (L_{v10}) Monitoring at NV-1						
Date	Time	Result L_{v10} (dB)	Each Category L_{v10} (dB)	Target Value L_{v10} (dB)	Remark	
6 June, 2023	7:00-8:00	-	39	70	No construction Activities	
	8:00-9:00	37				
	9:00-10:00	38				
	10:00-11:00	39				
	11:00-12:00	41				
	12:00-13:00	40				
	13:00-14:00	39				
	14:00-15:00	41				
	15:00-16:00	40				
	16:00-17:00	-				
	17:00-18:00	-				
	18:00-19:00	-	-	65		
	19:00-20:00	-				
	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	-				

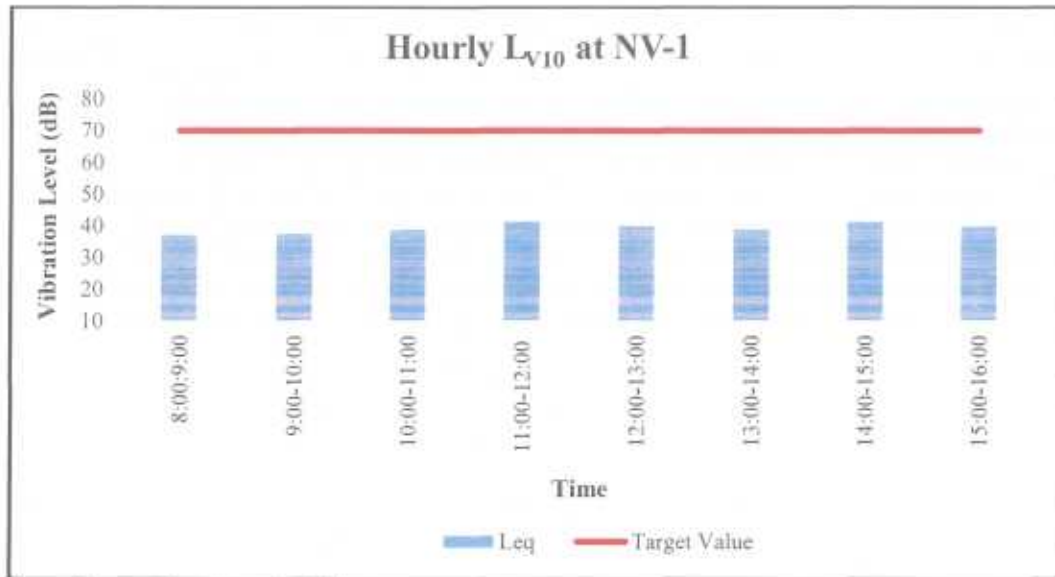
Source: Myanmar Koei International Ltd.

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

Table 2.4-8 Results of Hourly Vibration Levels (L _{v10}) Monitoring at NV-2					
Date	Time	Result L _{v10} (dB)	Each Category L _{v10} (dB)	Target Value L _{v10} (dB)	Remark
5 June, 2023	7:00-8:00	-	22	65	No construction Activities
	8:00-9:00	19			
	9:00-10:00	20			
	10:00-11:00	23			
	11:00-12:00	25			
	12:00-13:00	19			
	13:00-14:00	20			
	14:00-15:00	21			
	15:00-16:00	22			
	16:00-17:00	-			
	17:00-18:00	-			
	18:00-19:00	-	-	60	
	19:00-20:00	-			
	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	-			

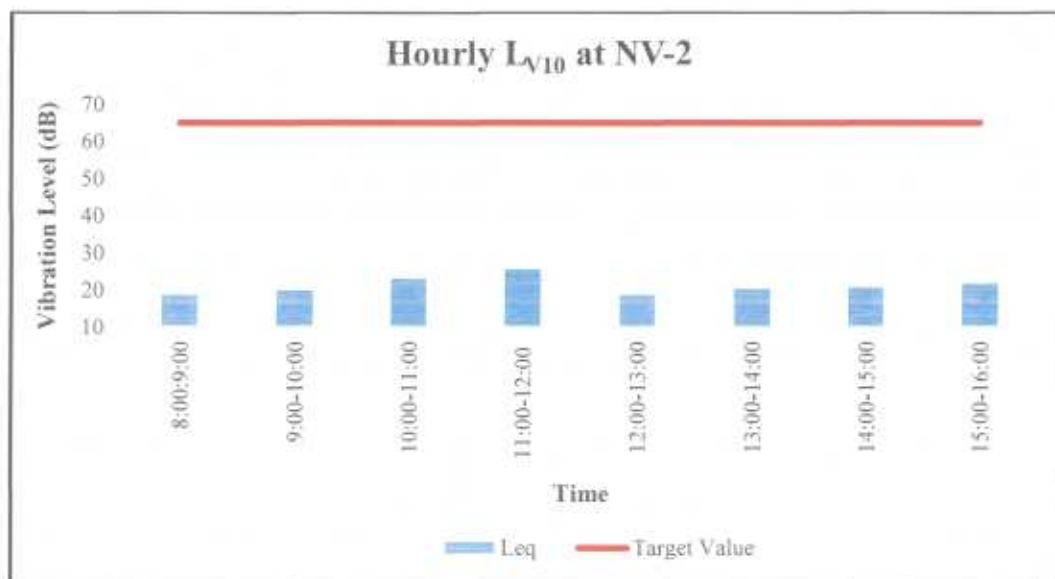
Source: Myanmar Koei International Ltd.





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 except for NV-2 during day time. The results at NV-2 were higher than the target value for one hour (11:00 to 12:00) during the day time and there were no construction activities at that time. According to the field surveyor record, it was due to the heavy rain at that time. Therefore, it is considered that there is no impact from operation activities of Zone B to the surrounding environment. The results of vibration level for NV-1 and NV-2 were also lower than the targets levels. Thus, there is no negative impact on noise and vibration from operation activities of Zone B to the surrounding environment.

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



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

Appendix-F

Traffic Volume Monitoring Report

June 2023



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

(BI-ANNUALLY MONITORING)

June 2023

Myanmar Koei International Ltd.

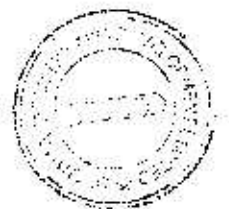


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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

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

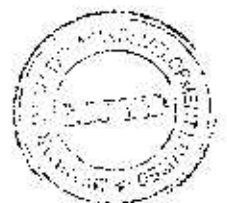
1.2 Outlines of Monitoring Plan

To assess the environmental condition under the operation of industrial area in and around Thilawa SEZ Zone B, Traffic volume monitoring was carried out for 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 on 6 June 2023 as follows;

Table 1.2-1 Outlines of Traffic Volume Monitoring

Monitoring Date	Monitoring Item	Parameter	Number of Point	Duration	Monitoring Methodology
6 June 2023	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 recorded 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 survey monitoring is shown in Figure 2.2-1.

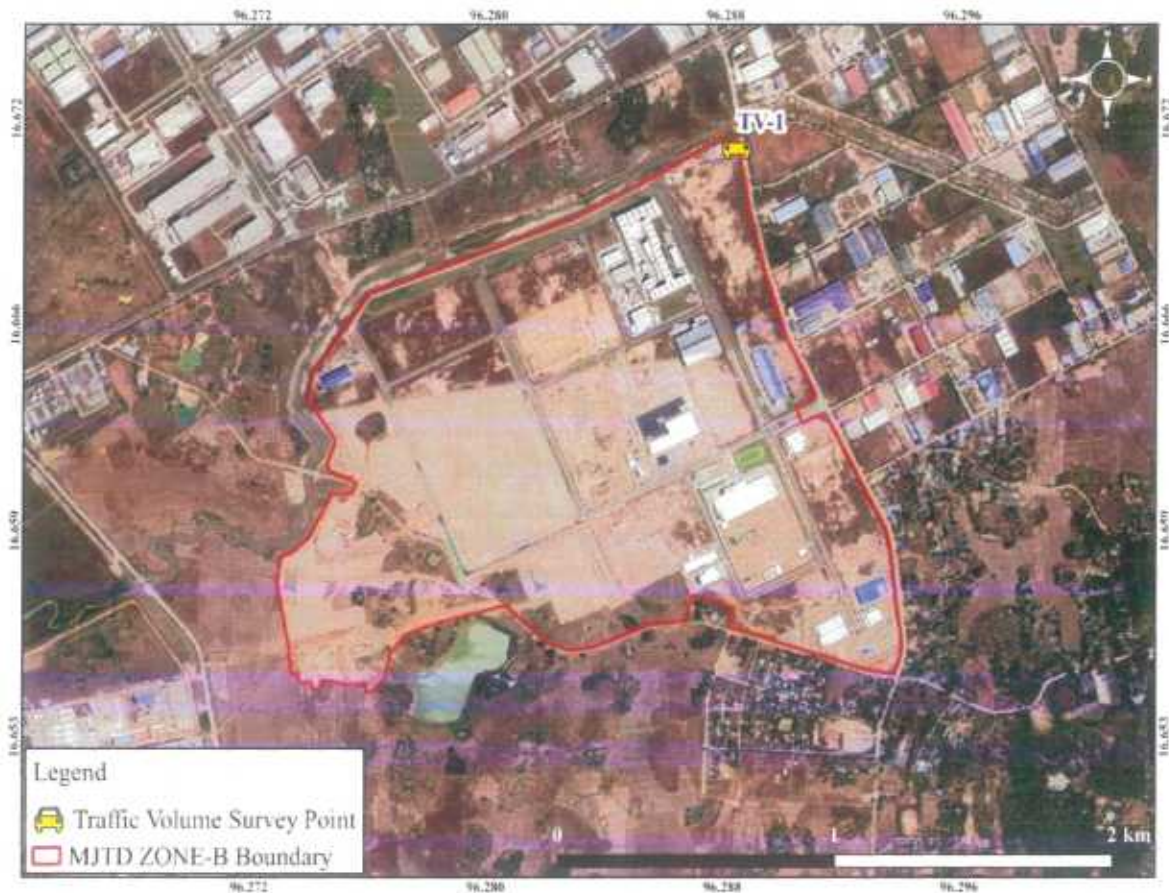


Figure 2.2-1 Location of Traffic Volume Monitoring Point

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 from Phalan village to Dagon-Thilawa Road and from Dagon-Thilawa Road to Phalan village in each direction. Manual count method was used and data was recorded using tally sheets. The status of the traffic volume monitoring at 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 quantity 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 vehicle moving from Phalan village to Dagon-Thilawa Road is five times lower than the number of 4-wheel light vehicles and Heavy vehicle moving from Dagon-Thilawa Road to Phalan village is also four times lower than the number of 4-wheel light vehicles.

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	6 June 2023	Tuesday	289	668	133	1	1,091
	Dagon-Thilawa road to Phalan village			295	672	155	23	1,145

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. Comparing the result of each direction in the morning as 8:00 to 9:00, traffic volume from Dagon-Thilawa Road to Phalan village is higher than that of opposite direction. Similarly, in the afternoon as 15:00 to 16:00, traffic volume from Dagon-Thilawa Road to Phalan village is also higher than that of opposite direction. It may be possible commuting vehicles are moving from Dagon-Thilawa Road to Phalan village in the morning and afternoon during the 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	
8:00	9:00	2	79	5	1	87
9:00	10:00	60	104	9	0	173
10:00	11:00	53	81	21	0	155
11:00	12:00	38	93	15	0	146
12:00	13:00	43	76	27	0	146
13:00	14:00	35	78	10	0	123
14:00	15:00	29	85	32	0	146
15:00	16:00	29	72	14	0	115
Total		289	668	133	1	1,091

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	
8:00	9:00	55	90	13	7	165
9:00	10:00	34	94	17	3	148
10:00	11:00	41	105	18	4	168
11:00	12:00	40	79	28	3	150
12:00	13:00	29	80	23	0	132
13:00	14:00	30	62	13	0	105
14:00	15:00	29	78	19	5	131
15:00	16:00	37	84	19	1	141
Total		293	672	155	23	1,145

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 is five times and four times significantly lower than the number of 4-wheel light vehicles for each direction. It seems that commuting vehicles are more utilized during this monitoring period as compared with construction related vehicles (Heavy vehicles).

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



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

Appendix-G

General Waste Disposal Record
(March 2023 to August 2023)



Solid Waste

Item	Date	Generated from	Unit	Value	Disposed to
General Waste with Green Waste	14 March 2023	Landscaping and Plantation	Kg	2800	Waste disposing to Than Lynn Development Committee, Yangon Division
General Waste with Green Waste	25 April 2023	Landscaping and Plantation	Kg	2850	Waste disposing to Than Lynn Development Committee, Yangon Division
General Waste with Green Waste	30 May 2023	Landscaping and Plantation	Kg	2900	Waste disposing to Than Lynn Development Committee, Yangon Division
General Waste with Green Waste	19 June 2023	Landscaping and Plantation	Kg	2950	Waste disposing to Than Lynn Development Committee, Yangon Division
General Waste with Green Waste	31 August 2023	Landscaping and Plantation	Kg	2750	Waste disposing to Than Lynn Development Committee, Yangon Division
Total			Kg	14250	
Sludge	7 March 2023	Sewage Treatment Plant	Kg	5380	Golden DOWA Eco-System Myanmar Co., Ltd
Sludge	20 March 2023	Sewage Treatment Plant	Kg	6000	Golden DOWA Eco-System Myanmar Co., Ltd
Sludge	20 April 2023	Sewage Treatment Plant	Kg	5820	Golden DOWA Eco-System Myanmar Co., Ltd
Sludge	16 May 2023	Sewage Treatment Plant	Kg	5980	Golden DOWA Eco-System Myanmar Co., Ltd
Sludge	5 July 2023	Sewage Treatment Plant	Kg	6920	Golden DOWA Eco-System Myanmar Co., Ltd
Sludge	18 August 2023	Sewage Treatment Plant	Kg	6900	Golden DOWA Eco-System Myanmar Co., Ltd
Total			Kg	37000	

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 type of Trash collector car. Green Waste (Grass cutting waste) are used in Bio-fertilizer.

Note: Zone-B wastewater treated at Sewage Treatment of TSEZ-A. Above data are sludge generated from Sewage treatment plant of TSEZ-A.





ငွေလွှဲပြောင်း/လက်ခံပြေစာ

အကြောင်းအရာ။

..... Paying for Jumping Service Charges

၂။ ငွေပေါင်း(စာရင်း)။ ၅၅၀၀၀/-

၃။ ငွေပေါင်း(စာဖြင့်)။ Fifty Five Thousand Kyats


(လွှဲပြောင်းပေးသူ)

အမည် U Kyaw Win Kywe
ရာထူး Finance Officer
နေရာ JICA
ရက်စွဲ ၂၃. ၇. ၂၀၂၅


(လက်ခံသူ)

အမည်
ရာထူး U Kyaw Win Kywe (သန်)
နေရာ မြန်မာ့စည်ပင်သာယာရေးအဖွဲ့
ရက်စွဲ သန်လျင်မြို့





ငွေလွှဲပြောင်း/လက်ခံပြေစာ

အကြောင်းအရာ။

Paying For Dumping service Charges

၂။ ငွေပေါင်း(ဂဏန်း)။ 55000/-

၃။ ငွေပေါင်း(စာဖြင့်)။ Fifty Five Thousand Kyats

၂၅.၂.၂၀၂၃


(လွှဲပြောင်းပေးသူ)


(လက်ခံသူ)

အမည် Kyau Kyau Kyau
ရာထူး Associate
နေရာ TBPE
ရက်စွဲ ၂၅.၂.၂၀၂၃

အမည်
ရာထူး
နေရာ
ရက်စွဲ
ရ-ဦးစီးမှူး(သန်)
မြို့နယ်စည်ပင်သာယာရေးအဖွဲ့
သန်လျင်မြို့





ငွေလွှဲပြောင်း/လက်ခံရရှိစာ

ပို့ကြောင်းအရာ။

..... Paying for Dumping Service Charges

၂။ ငွေပေါင်း(ဂဏန်း)။ ၅၅,၀၀၀/-

၃။ ငွေပေါင်း(စာဖြင့်)။ Fifty Five Thousand Kyats

Printed/Page Maker/ Form-3


(လွှဲပြောင်းပေးသူ)

အမည် Kyau Kyau Kyau

ရာထူး .. ဝန်ထုပ်မှူး၊ မြန်မာ့သစ်ကြေးနီကုမ္ပဏီလီမိတက်

နေရာ .. ၂၇၆၆၇

ရက်စွဲ .. ၁၀.၀၇.၂၀၂၃

လက်ခံသူ

အမည်

ရာထူး .. ၃-ဦးစီးမှူး(သန်)

နေရာ .. မြန်မာ့သစ်ကြေးနီကုမ္ပဏီလီမိတက်

ရက်စွဲ .. သန်လျင်မြို့





ငွေလွှဲပြောင်း/လက်ခံပြေစာ

အကြောင်းအရာ။


..... လုပ်ငန်း အကျဉ်းချုပ် အကျဉ်းချုပ် အကျဉ်းချုပ်

၂။ ငွေပေါင်း(ဂဏန်း)။ .. ၅၅၀၀၀

၃။ ငွေပေါင်း(စာဖြင့်)။ .. Fifty Five Thousand Kyats

..... ၂၇.၆.၂၀၂၃


(လွှဲပြောင်းပေးသူ)


(လက်ခံသူ)

အမည် Kyaw Khine Phyo

အမည်

ရာထူး .. ဗဟိုအဖွဲ့ချုပ်

ရာထူး .. ဗဟိုအဖွဲ့ချုပ် (သန်)

နေရာ .. ၂၀၂၃

နေရာ .. မြန်မာ့စည်ပင်သာယာရေးအဖွဲ့

ရက်စွဲ .. ၂၇.၆.၂၀၂၃

ရက်စွဲ .. သန်လျင်မြို့





ငွေလွှဲပြောင်း/လက်ခံပြုစာ

စွဲကြောင်းအရာ။

..... Paying For Dumping Service Charge

၂။ ငွေပေါင်း(ဂဏန်း)။ ၅၅၀၀၀/.....

၃။ ငွေပေါင်း(စာဖြင့်)။ Fifty Five Thousand Kyats

11. 7. 2023

(လွှဲပြောင်းပေးသူ)

အမည် Kyau Mye Phyo
ရာထူး Director General
နေရာ ISEZ
ရက်စွဲ 11. 07. 2023

(လက်ခံသူ)

အမည်
ရာထူး
နေရာ
ရက်စွဲ
.....
.....
.....





ငွေလွှဲပြောင်း/လက်ခံပြေစာ

အကြောင်းအရာ။

Buying for Dumping Service Charges

၂။ ငွေပေါင်း(ဂဏန်း)။ 70000/-

၃။ ငွေပေါင်း(စာဖြင့်)။ Seventy Thousand Kyats

31.6.2023

(လွှဲပြောင်းပေးသူ)

အမည် Pyaw Khin Phyo
ရာထူး Sr. Associate
နေရာ TGFZ
ရက်စွဲ 31 Aug 2023

(လက်ခံသူ)

အမည်
ရာထူး Sr. Finance (သန်)
နေရာ ပြန်လည်ပိုင်သောရေးအဖွဲ့
ရက်စွဲ သန်လျင်မြို့



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

Appendix-H

Sewage Treatment Plant Monitoring Record
March 2023 to August 2023

Daily Self Monitoring of STP Inlet, Outlet and Aeration

Month/Day	Date	Inlet (Zone B)				Inlet -1				Inlet -2				Outlet - 1				Outlet - 2			
		pH	TDS	Temp	COD	pH	TDS	Temp	COD	pH	TDS	Temp	COD	pH	TDS	Temp	COD	pH	TDS	Temp	COD
		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	01-03-23	7.2	457.5	26.1	-	7.17	479.3	25.3	348	7.18	463.9	25.1	-	6.74	481.4	24.9	33	7	519.4	25	35
Mar	02-03-23	7.03	313.6	25.2	-	7.2	433.3	25.3	-	7.08	514.4	25.3	-	6.74	460.2	25.6	-	7.04	470.5	25.3	-
Mar	03-03-23	7.26	339.4	27.5	179	7.19	515.2	25.9	-	7.12	469	25.6	219	6.87	450.9	25.2	22	7.07	472.1	25.5	27
Mar	04-03-23	6.97	261.8	24.3	-	6.76	522.6	24.3	-	6.88	468.8	24.3	-	6.51	448.2	24.4	-	6.92	470.6	24.6	-
Mar	05-03-23	7.26	296.9	26.9	-	7	410.4	24.3	-	7.03	423.3	24.5	-	6.44	430.7	25.5	-	6.94	459.8	24.9	-
Mar	06-03-23	7.08	609.9	25.5	-	6.88	490.8	27.0	158	6.95	462.2	27.4	-	6.98	458.3	27.5	8	6.40	448.7	27.6	38
Mar	07-03-23	7.21	471.8	25.9	349	7.05	519	27.3	-	7.12	469.3	27.2	138	6.3	428.2	26.6	11	6.94	448.2	26.8	25
Mar	08-03-23	6.64	1013	26.7	-	7.16	408	26.1	219	7.28	466	26.3	-	6.14	432.4	25.7	23	6.75	445.5	26.1	16
Mar	09-03-23	7.01	317.7	27.7	188	7.07	351	27.5	-	7.01	369.1	27.5	89	6.23	443.9	27.2	30	6.84	544.8	26.7	44
Mar	10-03-23	7.14	350.6	26.9	91	7.12	479.4	27.3	-	7.17	475.9	27.1	117	6.06	468.2	27.1	19	6.92	459.7	26.8	23
Mar	11-03-23	7.18	334.2	24.7	-	7.09	525.4	25	-	6.85	508.9	24.7	-	6.31	432.2	26.1	-	6.98	503.3	25.7	-
Mar	12-03-23	6.93	335.5	25.2	-	7.04	491.8	26	-	7.04	486.1	25.2	-	6.42	445.1	25.2	-	6.98	502.2	25	-
Mar	13-03-23	7.12	367.8	26.9	-	6.89	452.6	25.9	190	7.07	339.2	25.7	-	6.64	466.9	24.9	25	7.24	495.4	25.6	21
Mar	14-03-23	6.68	635.9	27.8	576	7.06	511.6	28.3	-	7.16	465.4	28.5	496	6.57	475.2	26.4	24	7.29	525.1	27.8	24
Mar	15-03-23	6.74	869.5	26.3	-	7.16	402	26.7	69	7.17	403.1	26.6	-	6.31	471.1	26.1	29	7.03	525.2	26.2	21
Mar	16-03-23	6.76	429	26.3	263	6.94	381.7	27.6	-	7.19	537.1	27.3	-	6.04	456.2	27	35	6.88	503.5	27.1	24
Mar	17-03-23	7.26	537.7	26	112	6.89	538	24.1	-	6.94	540.2	24.6	93	7.05	457.9	24	25	6.74	491	23.9	22
Mar	18-03-23	7.18	327.4	23.8	-	6.93	355.7	24.2	-	7	544.3	24.4	-	6.88	460	24.7	-	7.03	505.5	24.5	-
Mar	19-03-23	7.41	325	24	-	7.14	388.1	24.3	-	7.2	386.2	24.1	-	6.56	428.7	24.3	-	7.22	474.7	24.4	-
Mar	20-03-23	7.47	391.4	27.3	-	7.02	366.1	25.3	944	7.5	390.3	25.6	-	6.6	422.8	25.3	43	7.15	486.4	25.1	8
Mar	21-03-23	7.29	359.9	27.9	111	7.12	478.9	28.4	-	7.15	437.1	28.1	100	6.42	427.2	28.8	22	7.06	458.9	28.7	10
Mar	22-03-23	7.27	380.8	27.6	-	7.12	379.2	27.3	77	6.76	545.8	27.3	-	6.76	545.8	27.7	21	7.09	486.6	27.3	2
Mar	23-03-23	7.14	456	27.8	394	7.04	511.1	25.5	-	6.98	545.8	26.5	201	6.45	482	25.9	26	7.12	491.8	25.7	35
Mar	24-03-23	7.3	390.8	26.8	193	7.15	317.5	25.8	-	7.07	588.2	25.5	583	6.38	480.3	25.3	27	7.18	497.4	25.4	66
Mar	25-03-23	7.01	408.4	23.9	-	7.06	401.6	23.4	-	6.92	573.3	23.6	-	6.52	491.9	22.8	-	7.24	516.6	23.3	-
Mar	26-03-23	6.74	382.5	24.3	-	6.9	590.8	24.4	-	7.11	677.3	24.4	-	6.37	475.9	24.1	-	7.06	502.1	24.2	-
Mar	27-03-23	7.21	380.7	24.1	-	6.88	412	23.9	-	6.91	590.4	23.9	-	6.47	481	23.9	-	7.04	500.2	23.6	-
Mar	28-03-23	7.44	332.7	26.4	171	6.9	323.3	28.2	-	6.93	388.1	28.4	386	6.48	467.9	28.5	9	7.03	519.5	28.2	16
Mar	29-03-23	7.3	336.1	26.1	-	7	489.5	22.8	56	6.99	458.4	22.7	-	6.42	458.2	22.7	8	7.17	524.6	22	18
Mar	30-03-23	7.01	727.1	26.6	631	7.06	510.8	25.3	-	7.12	512.1	25.6	270	6.38	476.6	25.3	22	6.93	500	25.7	17
Mar	31-03-23	7.12	276.8	26.9	172	6.99	460.2	26.3	-	6.94	451	26.1	276	6.49	443.8	26.8	24	7.13	437.4	26.3	25
Apr	01-04-23	6.97	304.1	23.1	-	6.99	431.9	22.7	-	7.03	432.6	432.6	-	6.56	438.6	22.7	-	7.23	426.6	22.4	-
Apr	02-04-23	7.22	253.8	24.3	-	6.97	382.5	24.2	-	7.01	519.9	23.9	-	6.48	438.5	24.1	-	6.97	448	24.1	-
Apr	03-04-23	7.43	288.4	26.6	-	6.99	445.7	25.4	55	7.01	437.1	25.4	-	6.35	441.3	25.3	10	7.03	453.9	25.3	10
Apr	04-04-23	7.07	425.1	25.3	354	6.95	461.7	25.5	-	7.07	464.3	25.2	72	6.08	424.9	28.2	21	6.89	449.3	26.5	18
Apr	05-04-23	6.82	467.8	22.9	-	7.05	465.1	24	296	7.3	458.2	22.9	-	6.26	425	23.7	14	7.01	435.9	23.3	13
Apr	06-04-23	7.01	374.2	23.6	308	7.06	519.2	23.4	-	6.83	720.8	23.6	110	6.3	438.1	23.4	53	6.86	453.3	23.0	18
Apr	07-04-23	7.42	345	24.7	297	7.27	427.3	24.1	-	6.88	882.6	23.4	499	6.49	454.5	23.7	30	7.04	483.7	23.6	20
Apr	08-04-23	7.08	223.3	23.1	-	7.03	452.3	23.1	-	7.04	448	23	-	6.02	472.9	22.2	-	6.95	513.3	22.9	-
Apr	09-04-23	6.94	268.5	23	-	6.84	577.3	23	-	6.92	501.4	23	-	6.23	499.3	22.8	-	6.89	514.7	22.8	-
Apr	10-04-23	7.03	544.5	22.8	-	6.94	295.5	22.7	-	6.75	293.4	22.8	-	6.01	481.7	22.5	-	7.23	665.7	22.4	-
Apr	11-04-23	7.21	147.1	23	-	7.27	549.9	23	-	7.03	344.9	23.1	-	6.03	488	22.8	-	7.19	441.1	22.8	-
Apr	12-04-23	7.88	329.2	23.9	-	6.54	333.6	23.3	-	6.84	219.3	23.3	-	6.04	494	23.4	-	7.01	436.1	23.5	-
Apr	13-04-23	7.32	344.8	23.3	-	6.94	444.1	23.3	-	6.93	490.4	23.4	-	Tank cleaning				7.08	441	23.9	-
Apr	14-04-23	7.21	316.9	23.5	-	7.27	313.9	23.4	-	6.31	474.6	23.8	-	6.31	474.6	23.8	-	7.09	426.4	24	-
Apr	15-04-23	7.47	261.6	22.8	-	6.77	371.4	23.4	-	7.09	383.3	23.1	-	6.38	450.1	23.5	-	7.01	437	23.4	-
Apr	16-04-23	7.27	287	22.8	-	7.36	265.6	23.3	-	6.88	191.7	23.4	-	6.48	490.7	24.1	-	7.02	430.5	24	-
Apr	17-04-23	7.42	268	23.4	-	6.97	205.8	22.9	-	7.37	434.7	23.9	-	6.56	357.3	23.6	-	7.02	430.4	23.7	-
Apr	18-04-23	7.84	258.3	23.4	96	7.11	239	23.6	-	7.12	217.9	23.9	133	7.01	428.6	23.4	17	6.81	291.9	23.0	14
Apr	19-04-23	7.34	349.9	25.5	-	7.06	532.7	29.1	407	7.40	537.9	28	-	6.36	283	27.8	10	6.07	398.0	28.2	29
Apr	20-04-23	7.21	395	29.4	262	7.16	360	26.4	77	7.15	417.3	26.2	-	6.7	352.8	26.6	34	6.94	406.6	26.5	14
Apr	21-04-23	7.11	346.8	29.4	263	6.99	533.9	27.8	-	7.08	483.9	27.9	281	6.64	395.9	27.5	21	6.8			

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
		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	Unit	mg/L	°C	mg/L	Unit	mg/L	°C	mg/L	Unit	mg/L	°C	mg/L	Unit	mg/L	°C	mg/L
May	01-05-23	7.32	255.7	21.7	-	7.18	498.9	21.8	-	7.6	586.1	21.7	-	6.88	533.2	21.8	-	6.88	589.8	21.6	-
May	02-05-23	7.31	1168	21.7	105	6.82	433	21.8	-	6.83	430	21.8	88	6.67	545.8	21.8	17	6.66	561.6	21.5	26
May	03-05-23	7.02	295.9	22.4	-	6.91	403.4	22.3	-	6.9	443.8	22.3	-	6.72	551.8	22.3	-	6.76	528.3	22.4	-
May	04-05-23	7.05	346.5	25.4	123	7.77	537	25.2	-	7.02	439.4	24	282	6.89	545	25.3	16	6.82	520.7	25	25
May	05-05-23	7.54	387.7	24.6	96	7.82	579.8	24.1	-	7.15	645.3	24.1	143	6.36	521.6	24.1	12	6.75	524.8	24	24
May	06-05-23	7.31	363	24.7	-	7.06	545.8	24.5	-	7.14	523.7	24.4	-	6.76	507.4	23.8	-	7.13	508.4	24.4	-
May	07-05-23	7.31	344.6	24.6	-	7.07	415.3	24.3	-	6.71	416	24.2	-	6.94	495.3	24.1	-	7.09	488.5	24.3	-
May	08-05-23	7.07	457	26.3	-	7.98	640.5	26.8	79	8.03	637.9	26.6	-	7.11	499.6	26.8	17	7.2	514.2	26.3	12
May	09-05-23	7.36	549.7	24.5	472	7.77	592.2	27.8	-	7.4	458.2	27	138	6.94	487.3	26.1	13	7.2	486.7	25.7	10
May	10-05-23	7.36	338	27.9	-	6.89	467.6	27.7	341	7.31	505.3	27.6	-	7.05	489.9	27.5	25	7.26	490.7	27.5	29
May	11-05-23	7.45	336.4	24.9	207	7.19	503	24.3	-	7.21	498.1	24.2	245	6.96	439.1	24.6	22	7.34	466.2	24.3	30
May	12-05-23	7.32	342.9	27.0	193	7.18	372.9	27.8	-	7.15	373	27.7	108	7.06	418.5	27.7	23	7.22	446.9	27.6	13
May	13-05-23	7.18	289.8	24.7	-	7.23	348.8	24.6	-	7.25	347.7	24.7	-	6.93	407.4	24.5	-	7.3	423.3	24.7	-
May	14-05-23	7.37	251	24.5	-	7.01	188.5	24.7	-	7	141.6	24.7	-	6.88	393.2	24.6	-	7.03	420.8	24.7	-
May	15-05-23	7.38	347.3	24.8	-	7.06	356.4	26.8	81	7.06	358.8	26.4	-	6.95	395	27	31	7.28	386.4	26.1	31
May	16-05-23	7.39	410.4	25	335	7.13	412.8	26.9	-	7.18	425	26.2	92	7.2	364.6	26.5	15	7.06	369	24.7	28
May	17-05-23	7.27	258.4	27.2	-	7.64	254.4	28.1	50	7.31	377.9	27.8	-	6.99	376.4	27	35	7.25	411.4	27.7	31
May	18-05-23	6.85	357.9	26.8	278	6.93	357.4	23.3	-	6.86	359.9	23.9	212	7.04	386.7	24	38	7.24	403.2	23.4	50
May	19-05-23	7.14	663	24.4	628	6.98	375.6	25.6	-	7.11	417.5	25.4	159	7.1	405.2	25.6	27	7.11	407.4	24.7	47
May	20-05-23	7.14	317.9	23.6	-	7.16	362.7	23.8	-	7.11	365.1	23.7	-	7.23	431.9	23.6	-	7.15	461.5	23.7	-
May	21-05-23	7.19	585.4	23.8	-	6.98	386.4	23.7	-	6.93	391.2	23.8	-	7.29	447	23.8	-	7.23	487.1	23.9	-
May	22-05-23	7.29	485.7	27	-	7.13	361.5	25.4	105	7.17	368.1	25.5	-	7.41	446	25.9	28	7.4	508.9	26.1	31
May	23-05-23	7.22	458.7	27.3	238	6.99	404.9	24.9	-	7.03	444.8	25.1	414	7.23	466	24.6	37	7.19	488.8	24.8	34
May	24-05-23	7.06	289.1	25.1	-	7.1	502.9	25.8	126	7.11	480.6	25.5	-	7.22	461	25.4	49	7.28	502	25.4	41
May	25-05-23	7.3	275.6	28.6	145	7.74	474.4	29.2	-	7.29	267.3	28.4	310	7.28	432.7	29	47	7.22	494.6	28.9	61
May	26-05-23	7.24	306.5	26.4	177	7.42	366.7	27.1	-	7.31	255.3	26.9	127	7.27	436.4	26	54	7.25	438.9	26.1	60
May	27-05-23	6.81	295.6	24.2	-	7.02	505.4	24.3	-	6.99	501.1	24.2	-	7.14	436.1	24.2	-	7.28	496.8	24	-
May	28-05-23	7.35	299.4	24.7	-	7.05	425.9	24.2	-	7.16	306	24.7	-	7.16	474.3	24.8	-	7.37	515.8	24.7	-
May	29-05-23	7.27	254.6	26.9	-	7	343.5	27.4	50	7.02	335.1	27.2	-	7.51	508	27.3	13	7.38	495.9	27.6	17
May	30-05-23	7.36	310.4	26.6	201	7.64	410.4	26.7	-	7.61	408.2	26.5	360	7.36	464.5	26.8	18	7.23	432.2	26.5	15
May	31-05-23	7.23	483.7	26.8	-	6.98	297.5	27.4	291	7.16	457.7	27.3	-	7.33	439.6	27.1	14	7.25	408	27.1	14
June	01-06-23	7.19	381	29	107	7.08	411	28.1	-	7.15	421.3	28.5	329	7.32	422.3	28.2	15	7.24	479.9	29.2	16
June	02-06-23	7.34	333.1	27.2	146	7.45	329.1	27.8	-	7.05	375.6	28.1	54	7.32	360.6	27.4	19	7.26	464.7	27.4	17
June	03-06-23	7	116.6	24.4	-	6.94	283.1	24.5	-	7.19	348.1	24.6	-	7.26	351.6	24.3	-	7.2	480.4	24.3	-
June	04-06-23	7.17	282.6	24.5	-	7.36	326.3	24.7	-	7.15	307.1	24.7	-	7.21	337.3	24.7	-	7.28	413	24.7	-
June	05-06-23	7.23	239.8	27.9	-	6.93	285.8	28.7	376	6.95	286.5	28.2	-	7.22	316.5	28.1	23	7.3	397.2	28	21
June	06-06-23	7.19	319.4	25.2	133	6.94	290.7	25.8	-	7.06	337.4	25.7	106	7.13	301.6	25.6	16	7.08	384.7	25.7	27
June	07-06-23	7.13	218.7	26.3	-	7.04	416.1	26.6	152	6.99	404	26.6	-	7.32	333.3	26.9	39	7.28	362.5	26.5	23
June	08-06-23	6.98	341.6	22	288	7.08	320	22.2	-	7.12	317.5	22.8	88	7.18	328	22.8	32	7.22	372.2	22.5	28
June	09-06-23	7.12	351.3	27.9	253	7.31	191.1	27.6	-	6.85	358.2	27.5	132	7.16	330.3	27.6	31	7.09	392.2	27.2	98
June	10-06-23	6.73	369.7	25.2	-	6.84	208.2	24.6	-	6.72	386.2	24.6	-	6.94	420.1	25	-	7.11	345.7	24.2	-
June	11-06-23	6.89	276.8	24.2	-	7.24	234.7	24.1	-	6.84	253.9	24.1	-	7.02	327.8	24.1	-	7.16	335.8	24.2	-
June	12-06-23	6.95	180.8	24.7	-	6.84	214.7	24.6	27	6.81	216.7	24.7	-	6.99	277.5	24.6	20	7.11	304.4	24.4	66
June	13-06-23	6.92	264.5	26.5	174	6.84	196.9	24.1	-	6.82	216	24.2	80	6.83	233.9	25.4	49	6.85	316.7	25.5	65
June	14-06-23	7.11	445.4	24.8	-	6.88	319.4	24.6	42	6.95	306.6	26.2	-	6.98	228	25.4	18	6.86	323.5	26	32
June	15-06-23	7.1	376.8	26	231	7.4	136.6	25	-	6.92	323.8	25.2	106	7.13	356.7	26.3	25	7.02	337	26.4	33
June	16-06-23	7.7	316.8	27.2	223	6.73	294.7	24.4	-	6.72	275.2	24.6	55	6.81	296	26.2	21	6.96	351.1	24.6	41
June	17-06-23	6.84	343.9	25.2	-	6.81	310.9	25.3	-	6.7	528.4	25.3	-	6.84	258.8	25.1	-	6.81	261.3	25.4	-
June	18-06-23	6.05	194.2	25	-	7.18	126.9	25.1	-	6.83	396.8	25.1	-	6.93	268.3	25	-	6.99	269	25	-
June	19-06-23	7.29	347.7	26	-	7.24	126.9	25.5	198	7.3	119.4	25.4	-	6.93	266.6	25.9	28	7.05	321	25.9	32
June	20-06-23	7.23	270.5	25.2	86	6.64	217.1	26.3	-	6.86	269.9	25.8	83	6.88	276.9	24.4	39	7.22	339.7	24.4	54
June	21-06-23	7.21	332.6	25.6	-	7.27	110.9	25.9	51	7.13	346.2	26.2	-	6.78	332.3	26.8	7	7.08	251.1	26.2	34
June	22-06-23	7.31	284	24.4	73	7.34	302.4	24.4	-	7	303.9	24	25	6.78	224	24.3	18	7.13	347.1	24.3	45
June	23-06-23	7.25	234.7	26.9	138	7.06	417.3	27.5	-	6.98	354.9	27.5	33	6.99	224.5	27.4	11	6.95	407.7	27.1	80
June	24-06-23	7.09	286.5	23.5	-	6.68	157.5	24.1	-	6.63	159	24.3	-	6.87	335.0	23.4	-	7.1	354	23.5	-
June	25-06-23	7.16	233.5	23.8	-	7.01	138.3	23.9	-	6.75	191.4	23.6	-	7.08	250.5	23.6	-	7.11	249.3	23.6	-
June	26-06-23	7.29	280.3	25	-	6.63	149.3	26	24	6.54	148.4	25.3	-	7.12	167.6	24.9	31	7.15	212.9	24.9	49
June	27-06-23	7.06	273	26.1	137	6.75	244.6	27.8	-	6.73	232.5	27.8	106	7	188.3	28	23	7.01	226	27.4	30
June	28-06-23	7.04	313.3	24.8	-	6.82	236.7	25.3	29	6.81	233.7	24.5	-	6.91	212.1	23.9	31	6.98	270.6	24.8	33
June	29-06-23	6.85	500.7	24.1	-	8.17	135.1	24.1	-	8.4	195.19	24	-	7.06	343.4	25.1	-	7.08	342.7	24.8	-
June	30-06-23	6.86	498.8	23.9	436	6.															

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
July	01-07-23	6.86	444.4	24.4	-	6.81	753.1	24.6	-	6.92	910.1	24.6	-	6.9	248.8	24.4	-	6.94	307.8	24.6	-
July	02-07-23	6.93	336.2	25.8	-	7.02	106.6	25.5	-	6.71	256.7	25.2	-	6.67	279.2	25.8	-	7.04	386.8	25.5	-
July	03-07-23	7.34	349.5	26.8	-	6.87	244.1	26.7	132	7.01	319.8	26.8	-	6.9	283.7	26.8	8	7.03	305.8	26.6	4
July	04-07-23	7.4	306	26.4	35	7.03	185.9	27	-	6.81	267	26.6	72	6.98	245.7	26.7	42	6.99	255.7	27	12
July	05-07-23	7.29	261.5	25.9	-	6.83	177.7	27.1	34	6.77	225.7	26.5	-	6.8	238	26.1	27	6.75	229.1	26.6	30
July	06-07-23	7.18	247.4	25.1	31	6.87	333.9	25.3	-	6.94	325.7	25	69	6.85	209.7	24.8	20	6.87	277.5	24.7	25
July	07-07-23	7.14	253	26.9	81	7.05	523.1	26.3	-	7.14	574.9	25	74	6.9	196.1	25.1	19	6.82	254.7	24.7	28
July	08-07-23	7.11	260.3	23.6	-	7.18	70.8	23.5	-	7.09	71.3	23.7	-	6.65	234.2	23.6	-	6.71	233.6	23.9	-
July	09-07-23	7.19	243.1	23.3	-	6.75	288.7	23.9	-	6.88	376	23.4	-	6.77	320.1	23.6	-	6.77	271	23.8	-
July	10-07-23	7.08	292.4	28	-	6.93	286.4	28.6	-	7.3	330.8	25.1	-	6.91	265.9	25.1	-	6.89	307.8	26.8	-
July	11-07-23	7.09	304.8	26.1	-	6.82	263	24.2	-	6.85	250.3	23.9	-	6.89	273.3	24.1	-	6.76	323.1	24	-
July	12-07-23	7.49	338.4	26.6	-	7.01	90.54	26.7	19	7.13	87.83	26.7	-	6.78	288.4	27.1	6	6.86	361.8	27.1	22
July	13-07-23	7.44	373.9	28.1	128	7	385.4	28.1	-	6.97	460.2	28.9	163	6.79	290	26.6	10	6.9	388.3	28.3	24
July	14-07-23	7.32	315.2	24.8	118	6.8	243.3	25.5	-	6.78	237	24.9	87	6.7	292.7	24.7	12	6.89	341.1	24.7	22
July	15-07-23	6.99	419.7	27	-	7.01	83.77	26.5	-	6.85	184.9	27.1	-	7.14	357.7	26.5	-	7.1	367.5	26.6	-
July	16-07-23	7.32	271.4	23.6	-	7.02	286.1	23.5	-	7.08	385.7	23.2	-	6.89	236.3	23.4	-	7.16	341.6	23.7	-
July	17-07-23	7.46	329.9	24.3	-	7.07	247.1	24.7	200	7.01	232.2	25	-	6.94	208.8	24.2	22	7.04	271.1	24.8	20
July	18-07-23	7.19	312.4	25.5	77	6.9	309.2	26	-	7	462.5	25.8	288	7.1	340.3	25.4	12	6.99	251.7	25.8	32
July	19-07-23	7.21	203.5	24.5	-	6.86	212.6	24.7	-	6.74	266.2	24.7	-	6.79	225.4	24.6	-	6.87	276.8	24.6	-
July	20-07-23	7.13	218.9	27.4	33	7.14	115	27.9	-	7.15	172.2	27	87	6.92	197.2	27.9	18	6.87	262.2	27.1	17
July	21-07-23	7.18	207.3	26	53	6.78	183.7	27.5	-	7.27	187.6	26.9	36	6.85	221.1	26.9	22	6.88	244.2	27.4	31
July	22-07-23	7.16	261.8	24.1	-	6.78	213.8	24.3	-	6.8	221.9	24.4	-	6.95	215.1	23.6	-	6.96	276.9	23.7	-
July	23-07-23	7.32	284.2	23.8	-	6.73	289.8	23.8	-	6.74	289.7	23.9	-	7	224.8	23.7	-	6.9	278.7	23.9	-
July	24-07-23	7.38	345.3	27.1	-	6.7	239.7	27.1	49	6.82	230.2	26.8	-	6.89	230.7	26.3	10	6.91	276.1	26.4	22
July	25-07-23	7.12	372.9	25.4	266	7.09	416.1	25.3	-	7.11	368	25.2	50	6.84	280.8	24.8	10	6.83	280.9	25	11
July	26-07-23	7.62	353.1	27.9	-	7.39	378.1	28.4	-	7.5	375	27.5	-	6.89	312.7	27.7	-	6.93	341.2	28.2	-
July	27-07-23	7.22	235.4	25.2	68	7.05	425.8	25.6	-	7.14	543.9	26.5	171	6.9	286.3	24.8	17	7.13	353.3	24.8	22
July	28-07-23	7.27	200.2	24	21	7.01	174.4	26.5	-	6.92	171.4	24	39	6.85	279.2	24.1	27	7.09	337.1	24.1	39
July	29-07-23	6.64	642.8	24.1	-	6.73	259.5	24.1	-	6.75	260.3	24	-	6.88	219.9	24	-	6.82	220	24	-
July	30-07-23	6.78	358.6	27	-	6.76	208.8	27.1	-	6.79	210.7	27.3	-	6.82	224.4	27.1	-	6.88	263.5	26.9	-
July	31-07-23	6.82	237.4	24.7	-	6.71	141.8	24.7	22	6.71	141.8	24.6	-	6.87	198.1	24.7	18	6.99	240	24.7	17
Aug	01-08-23	6.97	164.5	24.4	-	6.7	135	24.4	-	6.69	135.5	24.4	-	6.77	133.3	24.3	-	6.78	142.9	24.4	-
Aug	02-08-23	7.03	206.8	26.3	-	6.94	137.6	26.9	52	6.87	135.1	26.8	-	6.82	147.9	26.5	17	7.02	172.3	26.2	32
Aug	03-08-23	7.52	229.6	26.3	26	6.91	138.7	26.3	-	7.05	199.8	26.8	33	7.37	187.88	26.9	16	7.08	229.9	27	14
Aug	04-08-23	7.3	285.8	25.9	110	6.96	189.2	25.1	-	6.95	250.6	26.1	51	7	180.1	26.3	8	7.02	254	25.2	24
Aug	05-08-23	7.36	123.7	25.1	-	6.83	171.9	24.9	-	6.84	171.1	25	-	6.97	245	25	-	6.98	265	24.8	-
Aug	06-08-23	6.62	327.2	25	-	6.82	103.3	25.1	-	6.74	196	24.4	-	6.79	243.8	25.1	-	7.07	260.4	24.8	-
Aug	07-08-23	7.33	169.4	26.7	-	6.89	190	27.1	34	7.05	187.5	27.1	-	7.06	244.3	26.3	22	6.99	268.4	27.1	26
Aug	08-08-23	7.33	281.5	27.9	50	7.2	324.3	27	-	7.24	325.4	27	39	6.98	264.9	27.5	19	7.03	257.2	27.4	37
Aug	09-08-23	7.24	295.4	26.8	-	6.94	315.9	26.9	118	7.06	375.4	27.1	-	7.04	268.1	27	26	7.02	276.8	26.9	34
Aug	10-08-23	7.22	240.6	27.2	47	6.79	250.1	27.6	-	6.83	251.4	27.8	75	7.26	269.2	27.1	12	6.89	269.8	27.3	25
Aug	11-08-23	7.19	232.3	27.5	42	6.86	274	27	-	7.03	313.7	26.8	58	6.96	232	27	14	6.88	235.3	27.1	18
Aug	12-08-23	7.01	215.1	23.9	-	6.74	288	23.7	-	6.76	282.9	23.9	-	6.87	214.4	23.8	-	6.83	272.7	24	-
Aug	13-08-23	7.03	224.7	23.6	-	6.73	183.7	23.8	-	6.76	184.3	23.8	-	6.86	237.8	24.1	-	6.79	281.5	24	-
Aug	14-08-23	7.24	185.2	27.2	-	6.92	292.2	27.4	41	6.89	297.1	27.5	-	6.94	251.8	28.1	12	6.82	280.1	27.6	31
Aug	15-08-23	7.14	247.8	25.3	59	6.85	269.3	26.2	-	6.84	210.2	26.4	86	6.9	243.4	26.1	10	6.91	281	26.3	38
Aug	16-08-23	7.26	427.6	27.4	-	6.88	268.8	24.8	46	6.98	345.2	25	-	6.96	264.1	25.1	21	6.97	309.6	24.8	27
Aug	17-08-23	6.88	186.1	26.3	285	6.82	214.9	25.2	-	6.91	200.8	24.9	21	6.94	288.7	25.1	11	6.81	316.3	25.3	34
Aug	18-08-23	7.16	246.1	25.9	98	6.97	184.6	24.6	-	6.85	186.7	24.4	34	6.7	287.2	24.2	6	6.88	383.4	24.9	3
Aug	19-08-23	6.82	448.2	25.1	-	6.68	201.5	25.3	-	6.89	343	26.1	-	6.88	284.4	25.2	-	6.74	283.1	25.3	-
Aug	20-08-23	7.01	188.3	28.3	-	6.6	272.8	26.2	-	6.81	222.6	25.3	-	6.7	287.1	25.6	-	6.78	260.6	25.5	-
Aug	21-08-23	7.32	184.9	28	-	6.86	220.2	28.1	210	6.84	223.6	28.5	-	6.87	246.2	28.9	2	6.9	259.5	25.5	-
Aug	22-08-23	7.14	208.3	24.7	52	6.84	269.1	26.1	-	6.85	260.2	26	27	6.72	260.1	26	19	7.1	266.9	25.8	6
Aug	23-08-23	7.01	219.9	25	-	6.83	192	25.1	139	6.85	186.8	25.3	-	6.7	268.3	25.1	12	6.67	277.9	25.1	18
Aug	24-08-23	7.11	205	28.3	228	6.8	182.2	26.5	-	6.86	176.5	26.6	81	6.52	218.1	28.8	21	6.55	222.6	28.5	20
Aug	25-08-23	6.94	226.1	26.7	48	6.86	177.6	26.4	-	6.88	290.3	26.2	66	6.75	184.8	25.8	16	6.74	228.6	25.9	28
Aug	26-08-23	7.02	202	23.9	-	6.88	198	23.9	-	6.85	204	24	-	6.84	163.2	23.9	-	6.88	162.8	23.9	-
Aug	27-08-23	7.04	181.1	24.2	-	6.86	171.7	24.3	-	6.83	170.5	24.2	-	6.85	161.6	24.2	-	6.89	152.5	24.7	-
Aug	28-08-23	7.1	152.5	26.8	-	6.74	178.3	27.8	340	6.85	173.6	27.4	-	6.96	170.5	27.4	1	6.92	188.1	27.5	3
Aug	29-08-23	6.88	197.7	26.2	30	6.92	346.6	26.5	-	6.72	193.4	26.3	39	6.96	191.8	26.7	9	6.94	181.3	26.4	19
Aug	30-08-23	7.33	264	28.4	-	6.83	339.1	27.5	661	6.77	260.2	27.1	-	6.82	183.2	27.1					

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-Cell	E-Cell	Free Chlorine	SS	BOD	T-N	T-P	O&G	T-Cell	E-Cell	Free Chlorine
Standard		Max 200	Max 200	Max8	Max 200	Max 200	Max8	Max 50	Max 30	Max 80	Max 2	Max 10	Max 400	Max 1000	Max 1	Max 50	Max 30	Max 80	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	01-03-23	50	363	3.08	-	-	-	2	9	20	1.53	0	1	1	0.06	2	8.7	16	1.97	0	<1	<1	0.36
Mar	07-03-23	-	-	-	40	147	2.34	2	7.5	21	1.44	0.1	1	1	0.02	4	6	15	2.02	0	<1	<1	0.05
Mar	15-03-23	10	126	3.58	-	-	-	4	8.3	18	1.98	1.2	<1	<1	0.17	6	7.6	6	2.46	0.1	<1	<1	0.53
Mar	23-3-23	-	-	-	40	117	3.01	18	9.3	30	2.05	0.6	1	1	0.01	2	6.9	17	3.02	0.2	<1	<1	0.77
Mar	29-3-23	20	108	1.31	-	-	-	8	8.2	16	1.58	0	105	105	0.03	16	8.4	5	1.88	0.6	1	<1	0.1
Apr	05-04-23	-	-	-	10	165	2.74	3	6.5	17	1.75	0.1	20	20	0.02	7	5.8	9	2.24	0	<1	<1	0.05
Apr	20-4-23	100	435	1.65	-	-	-	7	10	12	1.19	0.2	33	28	0.01	3	8.1	11	1.44	0.2	<1	<1	0.71
Apr	25-4-23	-	-	-	20	96	1.72	6	8.7	12	1.55	0	<1	<1	0.27	3	6.7	8	1.67	0	<1	<1	0.56
May	05-05-23	10	78	1.93	-	-	-	7	8.6	22	1.47	0	<1	<1	0.01	9	7.3	11	1.53	0	<1	<1	0.02
May	09-05-23	-	-	-	44	141	1.25	10	8.1	11	1.4	0.2	<1	<1	0.01	7	6.7	6	1.54	0	<1	<1	0.06
May	17-05-23	10	138	1.75	-	-	-	7	8.5	17	1.26	0.5	<1	<1	0.14	8	13	18	1.54	0.2	<1	<1	0.33
May	24-05-23	-	-	-	20	165	1.22	7	14	18	1.33	0.2	3	3	0.01	15	8.5	11	1.64	0.1	<1	<1	0.56
Jun	01-06-23	40	162	1.74	-	-	-	13	10	11	1.26	0.1	1	<1	0.03	13	9.8	11	1.57	0.4	<1	<1	0.61
Jun	07-06-23	-	-	-	50	156	1.31	9	9.8	11	1.17	0.2	<1	<1	0.11	5	7.8	8	1.41	0.2	<1	<1	0.47
Jun	14-06-23	20	117	0.627	-	-	-	7	8.4	11	0.984	0.2	<1	<1	0.02	10	7.3	5	1.32	0.8	<1	<1	0.73
Jun	20-06-23	-	-	-	27	138	1.01	9	7.9	2	1.2	0.2	<1	1	0.08	20	8.4	1	1.33	0.2	<1	<1	0.83
Jun	27-06-23	8	87	1.05	-	-	-	6	7.5	12	0.965	0.4	<1	<1	0.03	16	8	14	1.18	0.8	1	<1	0.23
Jul	04-07-23	17	96	0.684	-	-	-	20	8.4	15	1.42	0.2	<1	<1	0.01	10	5	10	1.49	0.2	<1	<1	0.36
July	12-07-23	-	-	-	20	153	1.73	3	10	20	1.14	0.2	<1	<1	0.04	10	8.5	18	1.6	0	<1	<1	0.28
July	20-07-23	-	-	-	13	153	1.24	8	12	9	0.903	0.3	<1	<1	0.04	12	11	10	0.957	0.2	<1	<1	0.2
July	25-07-23	60	114	0.836	-	-	-	3	6.6	12	0.752	0	<1	<1	0.03	10	6.5	9	1.15	0	<1	<1	0.03
Aug	03-08-23	-	-	-	20	135	0.509	12	12	1	0.837	0.2	<1	<1	0.23	9	11	2	0.897	0	<1	<1	0
Aug	08-08-23	-	-	-	20	129	0.876	13	12	15	0.580	0	1	1	0.03	13	7.7	11	0.883	0.1	<1	<1	0.21
Aug	15-08-23	15	102	0.89	-	-	-	15	9.6	12.1	0.585	0.2	1	1	0.02	13	10	7.1	1.18	0.1	<1	<1	0.18
Aug	22-08-23	27	105	1.44	-	-	-	7	7.5	7.1	0.579	0.1	<1	<1	0.14	3	7.1	6.9	0.825	0.2	<1	<1	1.25
Aug	30-08-23	20	141	2.83	-	-	-	3	8.6	8.9	0.478	0	25	20	0.05	13	8.3	8.5	1.03	0.2	<1	<1	0.19



Monitoring Parameters Result for STP

Station	Date	Point A - Inlet										Point B - Inlet										Point C - Inlet										Point D - Inlet									
		PH	DO	SS	TS	Ca	Mg	Hardness	Alkalinity	Chloride	Sulfate	PH	DO	SS	TS	Ca	Mg	Hardness	Alkalinity	Chloride	Sulfate	PH	DO	SS	TS	Ca	Mg	Hardness	Alkalinity	Chloride	Sulfate	PH	DO	SS	TS	Ca	Mg	Hardness	Alkalinity	Chloride	Sulfate
1	2023-10-20	7.2	2.5	150	250	120	80	200	150	100	50	7.5	3.0	160	260	130	90	210	160	110	60	7.8	3.2	170	270	140	100	220	170	120	70	8.0	3.5	180	280	150	110	230	180	130	80
2	2023-10-21	7.1	2.4	140	240	110	70	190	140	90	40	7.4	2.9	150	250	120	80	200	150	100	50	7.6	3.1	160	260	130	90	210	160	110	60	7.9	3.4	170	270	140	100	220	170	120	70
3	2023-10-22	7.3	2.6	160	260	130	90	210	160	110	60	7.7	3.3	170	270	140	100	220	170	120	70	7.9	3.5	180	280	150	110	230	180	130	80	8.1	3.6	190	290	160	120	240	190	140	90
4	2023-10-23	7.0	2.3	130	230	100	60	180	130	80	30	7.3	2.8	140	240	110	70	190	140	90	40	7.5	3.0	150	250	120	80	200	150	100	50	7.7	3.2	160	260	130	90	210	160	110	60
5	2023-10-24	7.4	2.7	170	270	140	100	230	170	120	70	7.9	3.4	180	280	150	110	240	180	130	80	8.2	3.7	190	290	160	120	250	190	140	90	8.3	3.8	200	300	170	130	260	200	150	100
6	2023-10-25	7.2	2.5	150	250	120	80	200	150	100	50	7.5	3.0	160	260	130	90	210	160	110	60	7.8	3.2	170	270	140	100	220	170	120	70	8.0	3.5	180	280	150	110	230	180	130	80
7	2023-10-26	7.1	2.4	140	240	110	70	190	140	90	40	7.4	2.9	150	250	120	80	200	150	100	50	7.6	3.1	160	260	130	90	210	160	110	60	7.9	3.4	170	270	140	100	220	170	120	70
8	2023-10-27	7.3	2.6	160	260	130	90	210	160	110	60	7.7	3.3	170	270	140	100	220	170	120	70	7.9	3.5	180	280	150	110	230	180	130	80	8.1	3.6	190	290	160	120	240	190	140	90
9	2023-10-28	7.0	2.3	130	230	100	60	180	130	80	30	7.3	2.8	140	240	110	70	190	140	90	40	7.5	3.0	150	250	120	80	200	150	100	50	7.7	3.2	160	260	130	90	210	160	110	60
10	2023-10-29	7.4	2.7	170	270	140	100	230	170	120	70	7.9	3.4	180	280	150	110	240	180	130	80	8.2	3.7	190	290	160	120	250	190	140	90	8.3	3.8	200	300	170	130	260	200	150	100



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[illegible]

Winbondy Parameters Result for 27P

Item	Unit	Model A																Model B															
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
Power	W	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2		
Temp	°C	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100	0	100		
Time	ms	10	100	10	100	10	100	10	100	10	100	10	100	10	100	10	100	10	100	10	100	10	100	10	100	10	100	10	100	10	100		
...		

Notes: These results are for testing purposes only and do not represent final results.

