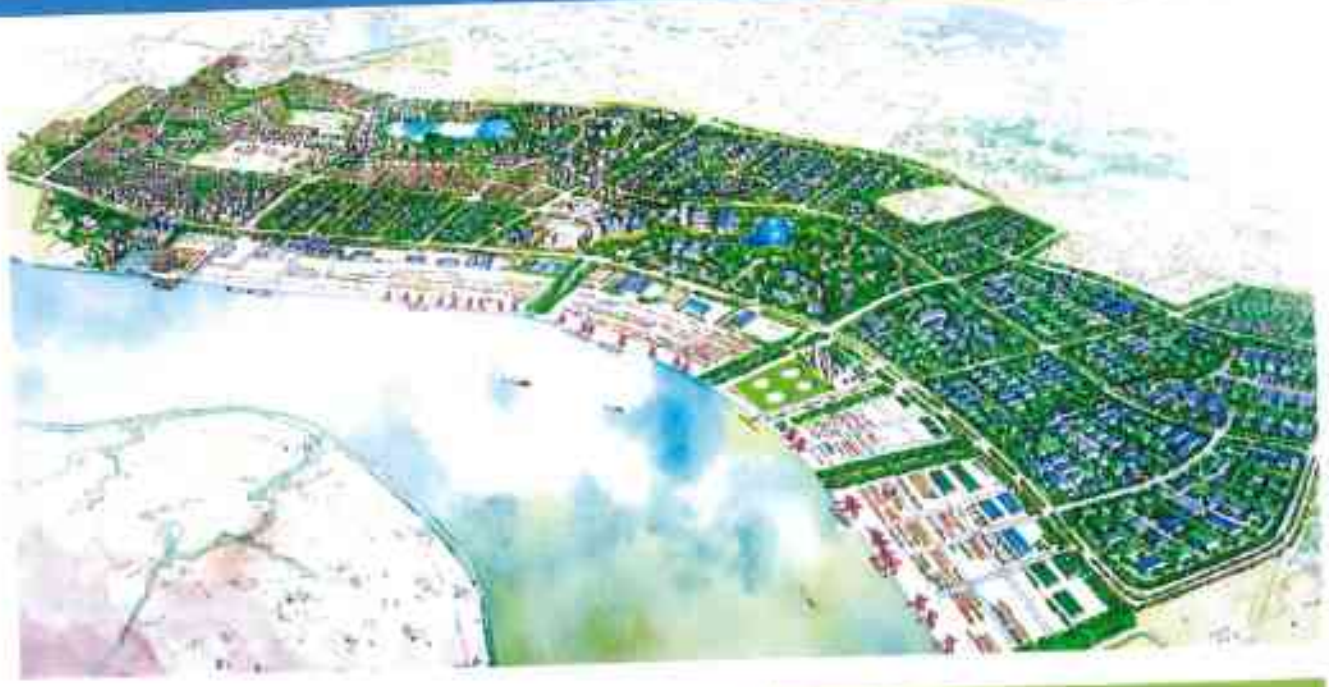
MJTD

Thilawa Special Economic Zone (Zone B) Development

Environmental Monitoring Report Phase-1 (Construction Phase)



Myanmar Japan Thilawa Development Limited.

December 2017

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Appendix

1. Executive Summary

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

The monitoring record from June 2017 to August 2017 according to the Environment Monitoring Plan is submitted in conformity with the provision of Chapter 10, 10.1 Table 10.1-2 and 10.2, Table 10.2-2 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 Pre-construction Phase	March, 2017
2	Environmental Monitoring Report	Phase-1 Construction Phase	June, 2017
3	Environmental Monitoring Report	Phase-1 Construction Phase	September, 2017

Report (No.4) is submitted this day attached with Construction Phase implementation schedule. Subsequent Construction Phase reports will be submitted on Quarterly.

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;

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

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Environment Monitoring Form

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

(1) General

1) Phase of the Project

- Please mark the current phase.

☐ Pre-Construction Phase ☑ Construction Phase ☐ Operation Phase

2) Obtainment of Environmental Permits

Name of permits	Expected issuance date	Actual issuance date	Concerned authority	Remarks (Conditions, etc.)
Approved letter for Environmental Impact Assessment (EIA) Report of Industrial Area, Thilawa Special Economic Zone (Zone-B)		29th December 2016	Thilawa SEZ Management Committee	

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 (September 2017)

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

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max)	Country's Standard	Target value to be applied*1	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
AQ-1	NO_2	mg/m³	0.071	0.164	0.2 mg/m³ (1 Hour)	0.2 mg/m³ (1 Hour)	-	One time / 3 months		
	SO_2	mg/m³	0.025*2	0.120	0.02 mg/m³ (24 Hours)	0.02 mg/m³ (24 Hours)	-			Refer to air quality report
	CO	mg/m³	0.083	0.928	-	10.26 mg/m³ (24 Hours)	-			
	$PM_{2.5}$	mg/m³	0.011	0.047	0.025 mg/m³ (24 Hours)	0.025 mg/m³ (24 Hours)	-			
	PM_{10}	mg/m³	0.016	0.092	0.05 mg/m³ (24 Hours)	0.05 mg/m³ (24 Hours)	-			

*1**Remarks:** Referred to the tentative target value of ambient air quality (EIA Report for industrial area, Table 2.4-1), Reference to the air quality monitoring report (September 2017)

*2**Remarks:** During monitoring periods, 7 days average value is excess than the standard. Regarding to monitoring results, concentration of SO_2 measured for 3 days exceeded than the target value. After detail analyzed the SO_2 exceed time for construction period and wind directions, prevailing wind direction are come from the other direction of construction site of Zone-B.

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 – August 2017

Measurement Point: Effluent of Wastewater (SW-2, SW-3 and SW-4 are attach 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 and SW-8 is mixing point of discharge water but in this monitoring time SW-7 and SW-8 location are almost same location. SW-9 is the downstream points after mixing 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	℃	31.8	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.2	6-9	6.0 - 9.0		Instrument Analysis Method	
	SS*3	mg/L	100	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.2	-	-		Instrument Analysis Method	
	BOD_5	mg/L	2.32	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	12.4	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*3	MPN/100ml	> 160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (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-3 (reference point)	Temperature	℃	32.5	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.2	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	110	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.6	-	-		Instrument Analysis Method	
	BOD_5	mg/L	10.36	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	7.1	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100ml	> 160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-4 (reference point)	Temperature	℃	33.1	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.4	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	138	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.6	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.86	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	8.1	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100ml	> 160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-7	Temperature	℃	34	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7	6-9	6.0 – 9.0		Instrument Analysis 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	SS*3	mg/L	148	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	5.3	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.77	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	5.9	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100ml	> 160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-8	Temperature	°C	32.5	< 3 (increase)	40		Instrument Analysis Method	
	pH	-	7.1	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	36	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.3	-	-	Once per 2 months	Instrument Analysis Method	
	BOD_5	mg/L	2.63	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	11.3	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100ml	> 160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-9	Temperature	°C	32.4	< 3 (increase)	40		Instrument Analysis Method	
	pH	-	7	6-9	6.0 – 9.0	Once per 2 months	Instrument Analysis Method	
	SS*3	mg/L	56	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.3	-	-		Instrument Analysis 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-9	BOD_5	mg/L	6.3	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	11.4	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*3	MPN/100ml	> 160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
GW-2 (reference point)	Temperature	°C	31.4	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.1	6-9	6.0 - 9.0		Instrument Analysis Method	
	SS	mg/L	10	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	5.5	-	-		Instrument Analysis Method	
	BOD_5	mg/L	4.25	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	< 0.7	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*3	MPN/100ml	92000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	

*1Remark: Reference to the Water and Wastewater Quality Monitoring Report (August 2017)

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

*3Remark: For the monitoring point of SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9, the result of SS is excess than the target value due to the three expected reasons; i) surface water run-off from bare land in Zone-B, ii) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ and iii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

*4Remark: For the monitoring point of SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9, the result of Total coliform is excess than the target value due to two expected reasons i)

natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds, and small animals in and along the discharged creek and ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from the surrounding area by tidal effect.

*3Remark: For the reference monitoring point of GW-2, the result of Total coliform is excess than the target value due to expected reason of infiltration of wastewater from toilet wastewater and/or animal waste.

2) (b) Water Quality – October 2017

Measurement Point: Effluent of Wastewater (SW-2, SW-3 and SW-4 are attach 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 and SW-8 is mixing point of discharge water but in this monitoring time SW-7 and SW-8 location are almost same location. SW-9 is the downstream points after mixing point. GW-2 is also as reference point for monitoring of existing tube well located in the Monastery Compound near Zone-B area)

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

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

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
SW-2 (reference point)	Temperature	°C	29.5	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.4	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	36	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	3.7	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.51	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	12.4	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*3	MPN/100ml	>160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	3.4	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (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-3 (reference point)	Temperature	°C	29.9	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.4	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	110	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	6.9	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.68	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	9.7	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100ml	160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	0.004	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-4 (reference point)	Temperature	°C	29.4	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.2	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	92	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	6.9	-	-		Instrument Analysis Method	
	BOD_5	mg/L	5.28	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	9.6	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100ml	160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-7	Temperature	°C	29.6	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	6.3	6-9	6.0 – 9.0		Instrument Analysis Method	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*3	Frequency	Method	Note (Reason of excess of the standard)
SW-7	SS*3	mg/L	152	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	5.5	-	-		Instrument Analysis Method	
	BOD_5	mg/L	2.42	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	4.9	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*3	MPN/100ml	>160000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	<3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	0.018	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-8	Temperature	°C	30	<3 (increase)	40		Instrument Analysis Method	
	pH	-	7.1	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	48	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	6.6	-	-	Once per 2 months	Instrument Analysis Method	
	BOD_5	mg/L	2.57	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	9.8	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*3	MPN/100ml	920	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	4	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-9	Temperature	°C	29.6	<3 (increase)	40		Instrument Analysis Method	
	pH	-	7.3	6-9	6.0 – 9.0	Once per	Instrument Analysis Method	
	SS*3	mg/L	98	50	30	2 months	APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	5.5	-	-		Instrument Analysis 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-9	BOD_5	mg/L	4.23	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	10	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100ml	920	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	3.64	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
GW-2 (reference point)	Temperature	°C	29.9	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.1	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L	8	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	6.85	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.03	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	< 0.7	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100ml	240	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	≤ 0.002	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	

*1Remark: Reference to the Water and Wastewater Quality Monitoring Report (October 2017)

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

*3Remark: For the monitoring point of SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9, the result of SS is excess than the target value due to the three expected reasons; i) surface water run-off from bare land in Zone-B, ii) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ and iii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

*4Remark: For the monitoring point of SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9, the result of Total coliform is excess than the target value due to two expected reasons i)

natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds, and small animals in and along the discharged creek and ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from the surrounding area by tidal effect.

3) Soil Contamination (only operation phase)

Situations environmental report from tenants

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

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

Contents of Issues on Soil Contamination	Countermeasures

4) Noise Level (September 2017)

Location	Item	Unit	Measured Value (Mean)	Measured Value (Max)	Country's Standard	Target value to be applied	Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
Residential Area NV-2	Leq (day)	dB(A)	51	55	Refer to NEQG Article 1.3	75	Refer the section 2.4 in EIA main report	One time / 3 months		
	Leq (evening)	dB(A)	53	53		60				
	Leq(night)	dB(A)	53	54		55				
Along the road (NV-1)	Leq (day)	dB(A)	61	65		75				
	Leq(night)	dB(A)	51	56		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 (September 2017)

Complaints from Residents

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

Contents of Complaints from Residents	Countermeasures

5) Solid Waste

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

- Are there any wastes if sludge in this monitoring period? ☑ Yes, ☐ No

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

Item	Date	Generated from	Unit	Value	Solid Waste Management Activities
Amount of sludge	21-Nov-2017	Construction Waste	Loads	1	Waste disposing to authorized waste collector (YCDC)
Amount of sludge	30-Nov-2017	Construction Waste	Loads	2	Waste disposing to authorized waste collector (YCDC)

6) (a)Ground Subsidence Hydrology

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
7-Sep-2017	89	m^3/ week	6.298	m	
14-Sep-2017	87	m^3/ week	6.298	m	
21-Sep-2017	113	m^3/ week	6.299	m	
28-Sep-2017	91	m^3/ week	6.299	m	

Remarks: Reference to Monthly Progress Report (September-2017)

6) (b)Ground Subsidence Hydrology

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
5-Oct-2017	75	m^3/ week	-	m	
12-Oct-2017	50	m^3/ week	6.298	m	
19-Oct-2017	72	m^3/ week	6.299	m	
26-Oct-2017	90	m^3/ week	6.298	m	

Remarks: Reference to Monthly Progress Report (October-2017)

6) (c)Ground Subsidence Hydrology

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
2-Nov-2017	85	m^3/ week	6.297	m	
9-Nov-2017	98	m^3/ week	6.298	m	
16-Nov-2017	97	m^3/ week	6.298	m	
23-Nov-2017	111	m^3/ week	6.299	m	
30-Nov-2017	102	m^3/ week	6.298	m	

Remarks: Reference to Monthly Progress Report (November-2017)

7) Offensive Odor (only operation phase)

Complaints from Residents

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

Contents of Complaints from Residents	Countermeasures

Situations environmental report from tenants

- Are there any serious issues regarding offensive odor in this monitoring period? ☐ Yes, ☑ No
  If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Issues on Soil Contamination	Countermeasures

8) Infectious disease, Working Environment, Accident

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

- Are there any incidents regarding infectious disease, Working Environment, Accident in this monitoring period? ☐ Yes, ☑ No
  If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Incidents	Countermeasures

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

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

Information from TSMC

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

Resentment Works		Progress in Narrative	Remarkable Issues
Projected Affected Persons	Land Acquisition and Relocation	Negotiations with PAHs from Area 2-1 and 2-2 East were conducted 9 times and 3 PAHs has been resettled to the relocation area. The land acquisition award has been declared on 22nd November for 88.02 Acre.	
	Income Restoration Program		
Common Assets	Relocation		

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

Contents of Grievance	Response/ Countermeasures

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)
10.October.2017	Arranged excursion trip	Participant – 50 youth people from Thanlyin Kyaunt Tan area
October,2017	Provide iron grid school fencing	Recipient- Middle school Location - Shwe Pyi Tha Yar village
	Regular scholarship program	11 students recipient from Thanlyin, Kyaut Tan area
25.October.2017	Kahtina robe offering ceremony together with Aye Mya Thida village residents	Participant – MJTD and village residents Location – Aye Mya Thida village
14.November.2017	Supporting long bench for the students	Location –Padagyi village Recipient – State school
21.November.2017	Supporting teaching aids and classroom facilities to the preschool	Location – Padagyi village and Myaing Thar Yar village Recipient - preschools

End of Document

Thilawa Special Economic Zone (Zone B)
Development Project –Phase 1

Appendix

Water and Waste Water Monitoring Report

August 2017

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1 CONSTRUCTION STAGE)

(Bi-Monthly Monitoring)

August 2017

Myanmar Koei International Ltd.

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

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CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone 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 seven sampling points are set for water quality survey, named SW-2, SW-3, SW-4, SW-7, SW-8, SW-9 and GW-2 have been monitored in Thilawa SEZ and its surrounding area in timely manner. Among the seven locations, SW-7 is main discharging point of Zone B during the construction stage. Moreover, GW-2 is monitored as a reference of existing tube well which located in the monastery compound of Phalan village. Location of sampling points for water quality monitoring is shown in Figure 1.1-1.

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

CHAPTER 2: WATER QUALITY MONITORING

2.1 Monitoring Items

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

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

Table 2.1-1 Monitoring Items for Water Quality

No.	Parameters	SW-2	SW-3	SW-4	SW-7	SW-8	SW-9	GW-2	Remarks
1	pH	○	○	○	○	○	○	○	On-site measurement
2	Water temperature	○	○	○	○	○	○	○	On-site measurement
3	DO	○	○	○	○	○	○	○	On-site measurement
4	BOD (5)	○	○	○	○	○	○	○	Laboratory analysis
5	COD (Cr)	○	○	○	○	○	○	○	Laboratory analysis
6	Suspended solids	○	○	○	○	○	○	○	Laboratory analysis
7	Total coliform	○	○	○	○	○	○	○	Laboratory analysis
8	Oil and grease	○	○	○	○	○	○	○	Laboratory analysis
9	Chromium	○	○	○	○	○	○	○	Laboratory analysis
10	Escherichia Coli (Self-monitoring)	○	○	○	○	○	○	○	Laboratory analysis
11	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' 20.70", E- 96° 17' 18.70" **Location** – Upstream of Shwe Pyauk Creek **Survey Item** – Surface water sampling and water flowrate measurement.
2	SW-3	**Coordinate**- N-16° 40' 5.50", E- 96° 16' 41.60" **Location** - Upstream of Shwe Pyauk Creek, after mixing point of Thilawa SEZ Zone A and Zone B. **Survey Item** – Surface water sampling.
3	SW-4	**Coordinate**- N-16° 39' 41.00", E- 96° 16' 26.50" **Location** - Downstream of Shwe Pyauk Creek **Survey Item** – Surface water sampling and water flowrate measurement.
4	SW-7	**Coordinate**- N-16° 40' 17.40", E- 96° 17' 18.40" **Location** – Discharge drain of Zone B construction site before connect to Shwe Pyauk Creek **Survey Item** – Discharge water sampling.
5	SW-8	**Coordinate**- N-16° 40' 14.90", E- 96° 17' 7.90" **Location** – Upstream of Shwe Pyauk Creek, mixing point of SW-2 and discharge water from construction site of Zone B. **Survey Item** – Surface water sampling.
6	SW-9	**Coordinate**- N-16° 40' 6.20", E- 96° 16' 42.80" **Location** – Upstream of Shwe Pyauk Creek **Survey Item** – Surface water sampling.
7	GW-2	**Coordinate**- N-16° 39' 25.30", E- 96° 17' 15.60" **Location** – In the monastery compound of Phalan village **Survey Item** – Ground water sampling.

Source: Myanmar Koei International Ltd.

SW-2 (Reference Point)

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

SW-3 (Reference Point)

SW-3 was collected at the Shwe Pyauk creek, after mixing point of Zone A and Zone B, which is flowing from east to west and then entering into the Yangon river. The distance is about 45 m downstream of SW-9. This sampling point is located at south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone B in the south, local industrial zone in the east and paddy field in the south and west respectively.

SW-4 (Reference Point)

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

SW-7 (Discharging Point)

SW-7 is main discharging point of Zone B during construction stage. This sampling point is located at the east of Zone B area and at the south of Dagon-Thilawa road. The surrounding area are Zone A in the northwest, local industrial zone in the east and paddy field in the west respectively.

SW-8 (Reference Point)

SW-8 is mixing point of discharge water from Zone B construction site and local industrial zone, upstream of Shwe Pyauk creek. This sampling point is located at south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone B in the south, local industrial zone in the east and paddy field in the south and west respectively.

SW-9 (Reference Point)

SW-9 was collected at the upstream of Shwe Pyauk creek which is flowing from east to west and then entering into the Yangon river. The distance is about 790 m downstream of SW-8. This sampling point is located at south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone B in the south, local industrial zone in the east and paddy field in the south and west respectively.

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 area are Thilawa SEZ Zone A in north, Phalan village in the south and fields in west and local industrial zone in northeast, and construction of Thilawa SEZ Zone B in east and northeast respectively.

2.3 Monitoring Method

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

Table 2.3-1 Analytic Method for Water Quality

No.	Parameter	Method
1	Temperature	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
2	pH	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
3	Dissolved oxygen (DO)	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
4	BOD (5)	APHA 5210 B (5 days BOD Test)
5	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)
6	Suspended solids (SS)	APHA 2540D (Dry at 103-105'C Method)
7	Total coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)
8	Oil and grease	APHA 5520B (Partition-Gravimetric Method)
9	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
10	Escherichia Coli	APHA 9221 F (Escherichia Coli Procedure Using Fluorogenic Substrate)
11	Flow Rate	Detection of Electromagnetic Elements (Real-time measurement by UC-200V Digital Current Meters)

Source: Myanmar Koei International Ltd.

2.4 Monitoring Period

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

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	22/8/2017 12:27
2	SW-3	22/8/2017 11:52
3	SW-4	22/8/2017 13:07
4	SW-7	22/8/2017 10:29
5	SW-8	22/8/2017 10:50
6	SW-9	22/8/2017 11:25
7	GW-2	22/8/2017 16:54

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

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

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

2.5 Monitoring Results

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

2.5.1 Results of Discharging points and Discharged Creek

As the comparison with the target value, the results of SS and total coliform were exceeded than the target value. As for the result of SS, results at the surface water monitoring points (SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9) exceeded the target value due to three expected reasons; i) surface water run-off from bare land in Zone B, ii) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ, and iii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.
As for the result of total coliform of surface water, results at the other surface water monitoring points (SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9) exceeded the target value due to two expected reasons; i) natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds, and small animals in and along the discharged creek and ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect. In addition, the result of E. Coli of surface water, all of results were under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9, but it is considered that there is no significant impact on human health.

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

No.	Parameters	Unit	SW-2	SW-3	SW-4	SW-7	SW-8	SW-9	Target Value (Reference Value for Self-Monitoring)
1	Temperature	℃	31.8	32.5	33.1	34.0	32.5	32.4	40.0
2	pH	-	7.2	7.2	7.4	7.0	7.1	7.0	6.0-9.0
3	Suspended solid (SS)	mg/L	100	110	138	148	36	56	50
4	Dissolved oxygen (DO)	mg/L	4.2	4.6	4.6	5.3	4.3	4.3	-
5	BOD (5)	mg/L	2.32	10.36	3.86	3.77	2.63	6.3	20.0
6	COD (Cr)	mg/L	12.4	7.1	8.1	5.9	11.3	11.4	70.0
7	Total coliform	MPN/ 100ml	> 160,000	> 160,000	> 160,000	> 160,000	> 160,000	> 160,000	400
8	Oil and grease	mg/L	< 3.1	< 3.1	< 3.1	< 3.1	< 3.1	< 3.1	10.00
9	Chromium	mg/L	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	≤0.002	0.500
10	Escherichia Coli	MPN/ 100 ml	8.1	24.0	26.0	6.1	15.0	5.6	(1,000)* (CFU/100ml)
11	Flow rate	m^3/s	0.36	-	0.56	-	-	-	-

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 monitoring point is shown in Table 2.5-2. As the comparison with the target value, the result of total coliform was exceeded the target value. The expected reason for exceeding the target value is infiltration of wastewater from toilet wastewater and / or animal waste. However, the result of E. Coli at GW-2 was under the reference value. Therefore, although the target value of total coliform was exceeded at monitoring point of GW-2, but it is considered that there is no significant impact on human health.

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	Temperature	°C	31.4	40.0
2	pH	-	7.1	6.0-9.0
3	Suspended solid (SS)	mg/L	10	30
4	Dissolved oxygen (DO)	mg/L	5.5	-
5	BOD (5)	mg/L	4.25	20.00
6	COD (Cr)	mg/L	< 0.7	70.0
7	Total coliform	MPN/ 100ml	92,000	4(0)
8	Oil and grease	mg/L	< 3.1	10.00
9	Chromium	mg/L	≤0.002	0.500
10	Escherichia Coli	MPN/ 100 ml** (GW)	13.0	(100)** (MPN/100ml)
11	Flow Rate	m^3/s	-	-

Note: Red color means the 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), parameter of SS and total coliform in surface water were exceeded the target value at SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9 and total coliform in ground water was exceeded the target value at GW-2 in this period for construction stage of Thilawa SEZ Zone B.

For SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9, there are some possible reasons for exceeding the target values of SS and total coliform due to delivered from upstream area such as natural origin and wastewater from the local industrial zone outside of Thilawa SEZ, surface water run-off from bare land in Zone B and delivered from surrounding area by tidal effect. For GW-2, there are possible reasons for exceeding the target value of total coliform due to infiltration of wastewater from toilet wastewater and / or animal waste. As mentioned in Section 2.5-1, the result of self-monitoring of E-Coli at SW-2, SW-3, SW-4, SW-7, SW-8, SW-9 and GW-2 were under the reference value. Therefore, although the target value of total coliform was exceeded at reference monitoring point, but it is considered that there is no significant impact on human health. The expected reasons for exceeding the target values of Total coliform are by natural origin (natural bacteria existed). However, it cannot reach to the conclusion of what is the reason to be exceeded the target values, thus the continuous monitoring and yearly trend analysis will be necessary based on the wet and dry season data.

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

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

End of the Document

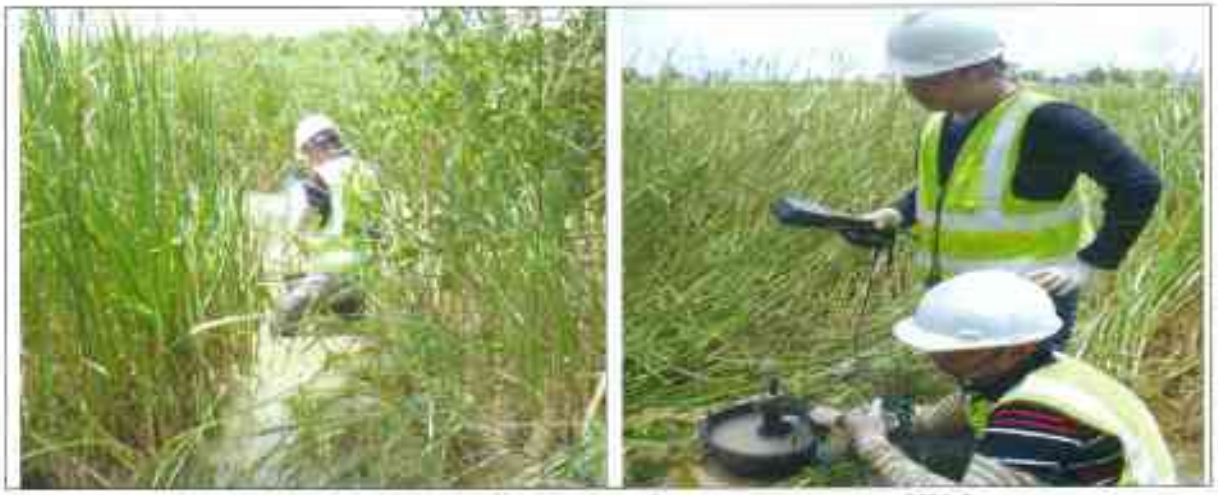
APPENDIX-1 FIELD SURVEY PHOTOS

FOR DISCHARGING POINT OF THILAWA SEZ ZONE B

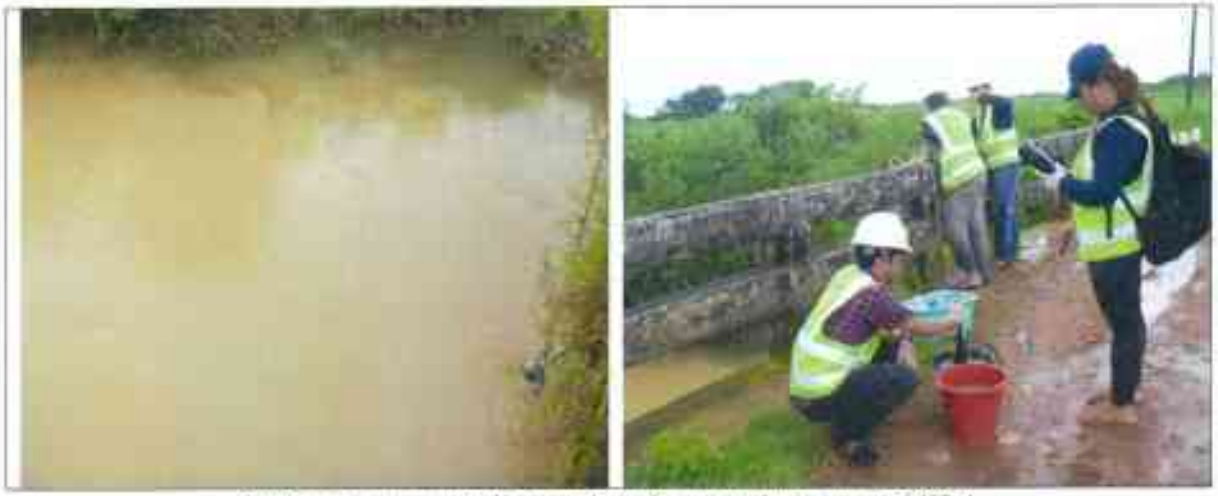
Surface water sampling and onsite measurement at SW-7

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

Surface water sampling and onsite measurement at SW-2



Surface water sampling and onsite measurement at SW-3



Surface water sampling and onsite measurement at SW-4

Surface water sampling and onsite measurement at SW-8

Surface water sampling and onsite measurement at SW-9

Ground water sampling and onsite measurement at GW-2

APPENDIX-2 LABORATORY RESULTS

FOR DISCHARGING POINT

DOWA

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

Report No. : GEM-LAB-201709019
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-7-0822 | Sampling Date : 22 August, 2017
Sample No. : W-1708221 | Sampling By : Customer
Waste Profile No. : - | Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	148.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.77	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	5.9	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
5	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8

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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. 11, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
[illegible]

Report No. : GEM-LAB-201709016
Revision No. : 1
Report Date : 8 September, 2017
Application No. : 0049-C001

Analysis Report

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

Sample Name : MKI-SW-2-0822 Sampling Date : 22 August, 2017
Sample No. : W-1708218 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	100.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	2.32	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	12.4	3.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.1	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.086	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	21.41	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002

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

LAB GEM

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. 61, Thilawa SEZ Zone A, [illegible]
Tel: [illegible]

Report No. : GEM-LAB-201709017
Revision No. : 1
Report Date : 6 September, 2017
Application No. : D049-C001

Analysis Report

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

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	110.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	10.38	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	7.1	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.3	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.188	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	15.63	3.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002

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

LAB
GEM

Analysed By :
Ni Ni Aye Lwin
Assistant Supervisor

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

DOWA

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

Report No. : GEM-LAB-2017090118
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

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

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	138.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.88	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	8.1	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.7	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.26	0.05
6	Total Coliform	APHA 9221B (Multiple Tube Fermentation Technique)	MPN/100ml	> 160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	11.98	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
9	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

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

LAB GEM

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Assistant supervisor

Approved By :
Tomoya Suzuki
Director

MJTD THILAWA DEVELOPMENT LIMITED MYANMAR

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. C1, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel: [illegible]

Report No. : GEM-LAB-201709022
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-8-0822 — Sampling Date : 22 August, 2017
Sample No. : W-1708224 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	36.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	2.83	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	11.3	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
5	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8

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

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Tel: [illegible]

Report No. : GEM-LAB-201709023
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-9-0822 — Sampling Date : 22 August, 2017
Sample No. : W-1708225 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	56.00	–
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.33	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	11.4	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
5	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8

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

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Lot No. 81, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2304191, 01-2304151-52

Report No. : GEM-LAB-201709020
Revision No. : 1
Report Date : 6 September, 2017
Application No. : 0049-C001

Analysis Report

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

Sample Name : MKI-CW 2-0822 — Sampling Date : 22 August, 2017
Sample No. : W-1708222 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	10.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.25	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	< 0.7	0.7
4	Oil and Grease	APHA 5520D (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
5	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	92000	1.8

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

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MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

FOR DISCHARGING POINT

DOWA

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

Report No. : GEM-LAB-201709008
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

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

Sample Name : MKI-SW-7-0822 — Sampling Date : 22 August, 2017
Sample No. : W-1708210 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	1.1	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

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MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

DOWA

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

Report No. : GEM-LAB-201709003
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-0001

Analysis Report

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

Sample Name : MKI-SW-2-0822
Sample No. : W-1708207
Waste Profile No. : -

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

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	8.1	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

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Director

MJTD

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

Report No. : GEM-LAB-201709006
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

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

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

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

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

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DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.

Report No. : GEM-LAB-20170900?
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0340-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /2B, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI SW 4-0822 Sampling Date : 22 August, 2017
Sample No. : M-1708209 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9211 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	28.0	1.8

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

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Director

MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GDM-LAB-201709011
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Hva Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description

Sample Name : MKI-SW-B-0822
Sample No. : M-1708213
Waste Profile No. : -
Sampling Date : 22 August, 2017
Sampling By : Customer
Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure using Fluorogenic Substrate	MPN/100ml	15.0	1.8

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

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GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-2017/09012
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-0001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-B-0812 Sampling Date : 22 August, 2017
Sample No. : W-1708214 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	5.4	1.8

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

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MYANMA YADANA THILAWA DEVELOPMENT LIMITED MJTD

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[illegible]
[illegible]

Report No. : GEM-LAB-201709006
Revision No. : 1
Report Date : 4 September, 2017
Application No. : 0049-C001

Analysis Report

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

Sample Name : MKI-GW-2-0822 — Sampling Date : 22 August, 2017
Sample No. : W-1708211 — Sampling By : Customer
Water Profile No. : - — Sample Received Date : 22 August, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	15.0	1.8

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

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MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

Thilawa Special Economic Zone (Zone B)
Development Project –Phase 1

Appendix

Water and Waste Water Monitoring Report

October 2017

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1 CONSTRUCTION STAGE)

(Bi-Monthly Monitoring)

October 2017

Myanmar Koei International Ltd.

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CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone 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 seven sampling points are set for water quality survey, named SW-2, SW-3, SW-4, SW-7, SW-8, SW-9 and GW-2 have been monitored in Thilawa SEZ and its surrounding area in timely manner. Among the seven locations, SW-7 is main discharging point of Zone B during the construction stage. Moreover, GW-2 is monitored as a reference of existing tube well which located in the monastery compound of Phalan village. Location of sampling points for water quality monitoring is shown in Figure 1.1-1.

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

CHAPTER 2: WATER QUALITY MONITORING

2.1 Monitoring Items

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

Water quality sampling was carried out at seven locations. Among the seven locations, water flow measurement was carried out at one location (SW-2) where can be measured by current meter. Monitoring items and sampling points are summarized in Table 2.1-1.

Table 2.1-1 Monitoring Items for Water Quality

No.	Parameters	SW-2	SW-3	SW-4	SW-7	SW-8	SW-9	GW-2	Remarks
1	pH	○	○	○	○	○	○	○	On-site measurement
2	Water temperature	○	○	○	○	○	○	○	On-site measurement
3	DO	○	○	○	○	○	○	○	On-site measurement
4	BOD (5)	○	○	○	○	○	○	○	Laboratory analysis
5	COD (Cr)	○	○	○	○	○	○	○	Laboratory analysis
6	Suspended solids	○	○	○	○	○	○	○	Laboratory analysis
7	Total coliform	○	○	○	○	○	○	○	Laboratory analysis
8	Oil and grease	○	○	○	○	○	○	○	Laboratory analysis
9	Chromium	○	○	○	○	○	○	○	Laboratory analysis
10	Escherichia Coli (Self-monitoring)	○	○	○	○	○	○	○	Laboratory analysis
11	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' 20.70", E- 96° 17' 18.70" **Location** - Upstream of Shwe Pyauk Creek **Survey Item** – Surface water sampling and water flowrate measurement.
2	SW-3	**Coordinate**- N-16° 40' 5.50", E- 96° 16' 41.60" **Location** - Upstream of Shwe Pyauk Creek, after mixing point of Thilawa SEZ Zone A and Zone B. **Survey Item** – Surface water sampling.
3	SW-4	**Coordinate**- N-16° 39' 41.52", E- 96° 16' 26.53" **Location** - Downstream of Shwe Pyauk Creek **Survey Item** – Surface water sampling.
4	SW-7	**Coordinate**- N-16° 40' 17.40", E- 96° 17' 18.40" **Location** - Discharge drain of Zone B construction site before connect to Shwe Pyauk Creek **Survey Item** – Discharge water sampling.
5	SW-8	**Coordinate**- N-16° 40' 14.90", E- 96° 17' 7.90" **Location** – Upstream of Shwe Pyauk Creek, mixing point of SW-2 and discharge water from construction site of Zone B. **Survey Item** – Surface water sampling.
6	SW-9	**Coordinate**- N-16° 40' 6.20", E- 96° 16' 42.80" **Location** – Upstream of Shwe Pyauk Creek. **Survey Item** – Surface water sampling.
7	GW-2	**Coordinate**- N-16° 39' 25.30", E- 96° 17' 15.60" **Location** – In the monastery compound of Phalan village **Survey Item** – Ground water sampling.

Source: Myanmar Koei International Ltd.

SW-2 (Reference Point)

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

SW-3 (Reference Point)

SW-3 was collected at the Shwe Pyauk creek, after mixing point of Zone A and Zone B, which is flowing from east to west and then entering into the Yangon River. The distance is about 45 m downstream of SW-9. This sampling point is located at south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone B in the south, local industrial zone in the east and paddy field in the south and west respectively.

SW-4 (Reference Point)

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

SW-7 (Discharging Point)

SW-7 is main discharging point of Zone B during construction stage. This sampling point is located at the east of Zone B area and at the south of Dagon-Thilawa road. The surrounding area are Zone A in the northwest, local industrial zone in the east and paddy field in the west respectively.

SW-8 (Reference Point)

SW-8 is mixing point of discharge water from Zone B construction site and local industrial zone, upstream of Shwe Pyauk creek. This sampling point is located at south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone B in the south, local industrial zone in the east and paddy field in the south and west respectively.

SW-9 (Reference Point)

SW-9 was collected at the upstream of Shwe Pyauk creek which is flowing from east to west and then entering into the Yangon River. The distance is about 790 m downstream of SW-8. This sampling point is located at south of Zone A area and Dagon-Thilawa road. The surrounding area are Zone B in the south, local industrial zone in the east and paddy field in the south and west respectively.

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 area are Thilawa SEZ Zone A in north, Phalan village in the south and fields in west and local industrial zone in northeast, and construction of Thilawa SEZ Zone B in east and northeast respectively.

2.3 Monitoring Method

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

Table 2.3-1 Analytic Method for Water Quality

No.	Parameter	Method
1	Temperature	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
2	pH	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
3	Dissolved oxygen (DO)	Instrument Analysis Method (Horiba, U-52, Multi Water Quality Checker)
4	BOD (5)	APHA 5210 B (5 days BOD Test)
5	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)
6	Suspended solids (SS)	APHA 2540D (Dry at 103-105℃ Method)
7	Total coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)
8	Oil and grease	APHA 5520B (Partition-Gravimetric Method)
9	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)
10	Escherichia Coli	APHA 9221 F (Escherichia Coli Procedure Using Fluorogenic Substrate)
11	Flow Rate	Detection of Electromagnetic Elements (Real-time measurement by UC-200V Digital Current Meters)

Source: Myanmar Koei International Ltd.

2.4 Monitoring Period

Water quality and water flow rate monitoring were conducted on 24th October 2017 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar on 24th October 2017 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	24/10/2017 09:03
2	SW-3	24/10/2017 11:05
3	SW-4	24/10/2017 11:50
4	SW-7	24/10/2017 09:38
5	SW-8	24/10/2017 10:02
6	SW-9	24/10/2017 10:30
7	GW-2	24/10/2017 12:20

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
24/10/2017	01:48	1.02	Low Tide
	06:35	5.87	High Tide
	14:22	0.93	Low Tide
	18:57	5.45	High Tide

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

2.5 Monitoring Results

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

2.5.1 Results of Discharging points and Discharged Creek

As the comparison with the target value, the results of SS and total coliform were exceeded than the target value. As for the result of SS, results at the surface water monitoring points (SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9) exceeded the target value due to three expected reasons; i) surface water run-off from bare land in Zone B, ii) delivered from upstream area such as natural origin and wastewater from local industrial zone outside of Thilawa SEZ, and iii) influence by water from the downstream of monitoring points due to flow back by tidal fluctuation.

As for the result of total coliform of surface water, results at the other surface water monitoring points (SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9) exceeded the target value due to two expected reasons; i) natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds, and small animals in and along the discharged creek and ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) delivered from surrounding area by tidal effect. In addition, the result of E-Coli of surface water, all of results were under the reference value. Therefore, the target value of total coliform was exceeded at monitoring point of SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9, but it is considered that there is no significant impact on human health.

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

No.	Parameters	Unit	SW-2	SW-3	SW-4	SW-7	SW-8	SW-9	Target Value (Reference Value for Self-Monitoring)
1	Temperature	°C	29.5	29.9	29.6	29.6	30.0	29.6	40.0
2	pH	-	7.4	7.4	7.2	6.3	7.1	7.3	6.0-9.0
3	Suspended solid (SS)	mg/L	76	110	92	152	48	98	30
4	Dissolved oxygen (DO)	mg/L	3.7	6.9	6.9	5.5	6.6	5.5	-
5	BOD (5)	mg/L	3.51	3.68	5.28	2.42	2.57	4.23	20.00
6	COD (Cr)	mg/L	12.4	9.7	9.6	4.9	9.8	10	70.0
7	Total coliform	MPN/ 100ml	>160,000	160,000	160,000	>160,000	920	920	400
8	Oil and grease	mg/L	3.40	< 3.10	< 3.10	< 3.10	4.00	3.64	10.00
9	Chromium	mg/L	≤0.002	0.004	≤0.002	0.018	≤0.002	≤0.002	0.500
10	Escherichia Coli	MPN/100 ml* (SW)	< 1.8	1.8	< 1.8	< 1.8	1.8	1.8	(1,000)* (CFU/100 ml)
11	Flow rate	m^3/s	0.66	-	-	-	-	-	-

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 of self-monitoring for surface water monitoring. However, due to limitation of capacity for analytical laboratory in Myanmar, the method to analyze the "Colony Forming Unit (CFU)" is not available.

in Myanmar. Therefore, the results of "Most Probable Number (MPN)" are assumed similar to CFU values and compared with reference values. Once the method to analyze the CFU will be available in Myanmar, the analytical method will be changed.
Source: Myanmar Koei International Ltd.

2.5.2 Result of Reference Tube Well

Result of water quality monitoring at reference monitoring point is shown in Table 2.5-2. All parameters of result are below the target value.

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

No.	Parameters	Unit	GW-2	Target Value (Reference Value for Self-Monitoring)
1	Temperature	°C	29.9	40.0
2	pH	-	7.1	6.0-9.0
3	Suspended solid (SS)	mg/L	8	50
4	Dissolved oxygen (DO)	mg/L	6.85	-
5	BOD (5)	mg/L	1.03	20.00
6	COD (Cr)	mg/L	< 0.7	70.0
7	Total coliform	MPN/ 100ml	240	400
8	Oil and grease	mg/L	< 3.10	10.00
9	Chromium	mg/L	≤ 0.00 2	0.500
10	Escherichia Coli	MPN/100 ml** (GW)	< 1.8	(100)**(MPN/100ml)
11	Flow Rate	m³/s	-	-

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

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As described in Chapter 2 (Section 2.5), parameter of SS and total coliform in surface water were exceeded the target value at SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9 in this period for construction stage of Thilawa SEZ Zone B.

For SW-2, SW-3, SW-4, SW-7, SW-8 and SW-9, there are some possible reasons for exceeding the target values of SS and total coliform due to delivered from upstream area such as natural origin and wastewater from the local industrial zone outside of Thilawa SEZ, surface water run-off from bare land in Zone B and delivered from surrounding area by tidal effect. As mentioned in Section 2.5-1, the result of self-monitoring of E-Coli at SW-2, SW-3, SW-4, SW-7, SW-8, SW-9 were under the reference value. Therefore, although the target value of total coliform was exceeded at reference monitoring point, but it is considered that there is no significant impact on human health. The expected reasons for exceeding the target values of Total coliform are by natural origin (natural bacteria existed). However, it cannot reach to the conclusion of what is the reason to be exceeded the target values, thus the continuous monitoring and yearly trend analysis will be necessary based on the wet and dry season data.

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

- To monitor Escherichia coli (E. coli) level to identify health impact by coliform bacteria; and

- To examine the possibility of the overflow water from construction sites.

End of the Document

APPENDIX-1 FIELD SURVEY PHOTOS

FOR DISCHARGING POINT OF THILAWA SEZ ZONE B

Surface water sampling and onsite measurement at SW-7

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

Surface water sampling and onsite measurement at SW-2

Surface water sampling and onsite measurement at SW-3

Surface water sampling and onsite measurement at SW-4

Surface water sampling and onsite measurement at SW-8


Surface water sampling and onsite measurement at SW-9


Ground water sampling and onsite measurement at GW-2

APPENDIX-2 LABORATORY RESULTS

FOR DISCHARGING POINT

DOWA

[illegible]

Report No. : GEM-LAB 201711063
Revision No. : 1
Report Date : 9 November, 2017
Application No. : 0049 C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.14 /28, Mya Thudar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description :
Sample Name : MKI-SW / 1024 — Sampling Date : 24 October, 2017
Sample No. : IP 1710159 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 24 October, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105 C Method)	mg/l	152.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	2.40	0.50
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	4.9	2.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
5	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.018	0.002
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 1600000	1.8

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

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GEM

Analysed By :
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Assistant supervisor

Approved By :
Tomoya Suzuki
Director

MYANMA JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

DOWA

Report No : GEM LAB/201711080
Revision No : 1
Report Date : 9 November, 2017
Application No : 0049-C001

Analysis Report

Client Name : Myanmar Kibe International LTD (MKI)
Address : NS-1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI EW-1-1024 — Sampling Date : 24 October, 2017
Sample No : W-1710155 — Sampling By : Customer
Waste Profile No : - — Sample Received Date : 24 October, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105 C Method)	mg/l	36.00	-
2	BOD (3)	APHA 5210 B (5 Days BOD Test)	mg/l	3.51	0.05
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	12.4	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	0.7	0.5
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.122	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	> 160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	21.28	0.02
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
9	Oil and Grease	APHA 5520B (Partition Gravimetric Method)	mg/l	3.42	1.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002

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

LAB GEM

Analysed By
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Assistant supervisor

Approved By
Tomoya Suzuki
Director

MJTD

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

Report No. : GEM-LAB-201711061
Revision No. : 1
Report Date : 8 November, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.14 /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-1-1024 | Sampling Date : 24 October, 2017
Sample No. : W-1710157 | Sampling By : Customer
Waste Profile No. : - | Sample Received Date : 24 October, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	110.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.66	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	9.7	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	2.5	0.5
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.218	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	100000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	15.41	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.004	0.002

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

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Analysed By :
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Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

Report No. : GEM-LAB-201711082
Revision No. : 1
Report Date : 9 November, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /29, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI SW-4-1024 Sampling Date : 24 October, 2017
Sample No. : W-1710138 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 24 October, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	92.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.28	2.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	9.6	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.2	0.0
5	Total Phosphorous	APHA 4500-P.E (Ascorbic Acid Method)	mg/l	0.182	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	9.36	0.05
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
10	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002

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

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MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

Report No. : GEM-LAB-2017111065
Revision No. : 1
Report Date : 6 November, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.(A-/28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description :
Sample Name : MKI SN-B-1214 — Sampling Date : 24 October, 2017
Sample No : W-1710161 — Sampling By : Customer
Waste Profile No : - — Sample Received Date : 24 October, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103 -105°C Method)	mg/l	48.00	
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.57	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	9.8	3.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	4.80	3.1
5	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
6	Total Coliform	APHA 9221E (Standard Total Coliform Fermentation Technique)	MPN/100ml	920	1.8

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

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Approved By :
Tomoya Suzuki
Director

MYANMA MJTD THILAWA DEVELOPMENT LIMITED

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

Report No : GEM-LAB-201711067
Revision No : 1
Report Date : 9 November, 2017
Application No : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /25, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-9-1024 Sampling Date : 24 October, 2017
Sample No : W-1710163 Sampling By : Customer
Waste Profile No : - Sample Received Date : 24 October, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	98.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	4.23	0.50
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	10	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	3.64	1.1
5	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	920	1.8

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

Analysed By :
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Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

Report No. : GEM-LAB-201711064
Revision No. : 1
Report Date : 9 November, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-DW-2-1024 Sampling Date : 24 October, 2017
Sample No. : W-1710150 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 24 October, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	8.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	1.01	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	< 5.7	5.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
5	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	< 0.002	0.002
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	240	1.8

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

Analysed By :
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Approved By :
Tomoya Suzuki
Director

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

FOR DISCHARGING POINT

DOWA

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

Report No. : GEM-LAB-2017-1029
Revision No. : 1
Report Date : 8 November, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Rosi International LTD (MKT)
Address : No. (A-/28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : WKT-SW-7-1024
Sample No. : M-1710170
Waste Profile No. : -
Sampling Date : 24 October, 2017
Sampling By : Customer
Sample Received Date : 24 October, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	[illegible]	MPN/100ml	< 1.8	1.8

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

Analysed By :
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GEM

Approved By :
Tomoya Suzuki
Director

MYANMA THILAWA DEVELOPMENT LIMITED MJTD

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

DOWA

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

Report No. : GEM-LAB-201711022
Revision No. : 1
Report Date : 8 November, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koe International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description :

Sample Name : MKI-SW-2-1024   Sampling Date : 24 October, 2017
Sample No. : W-1710157   Sampling By : Customer
Waste Profile No. : -   Sample Received Date : 24 October, 2017

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

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

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Approved By :
Tomoya Suzuki
Director

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GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-2017111023
Revision No. : 1
Report Date : 8 November, 2017
Application No. : 11049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /2E, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-3-1024
Sample No. : W-1710158
Waste Profile No. : -
Sampling Date : 24 October, 2017
Sampling By : Customer
Sample Received Date : 24 October, 2017

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

Remark : LOQ : Limit of Quantitation
APHA : American Public Health Association (1998), the American Water Works Association (AWWA), and the Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 22nd edition

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Tomoya Suzuki
Director

MYANMA JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

Report No. : GEM-LAB-201711024
Revision No. : 1
Report Date : 6 November, 2017
Application No. : 0049-C001

Analysis Report

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

Sample Name	: MKI-SW-4-1024	Sampling Date	: 24 October, 2017
Sample No.	: W-1710109	Sampling By	: Customer
Waste Profile No.	: -	Sample Received Date	: 24 October, 2017

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

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

Analysed By :	Approved By :
Ni Ni Aye Lwin	Tomoya Suzuki
Assistant Supervisor	Director

LAB GEM

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[illegible]

Report No. : GEM-LAB-201711027
Revision No. : 1
Report Date : 8 November, 2017
Application No. : 0049-0001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.18-J26, Myo Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-8-1024
Sample No. : W-1710173
Waste Profile No. : -
Sampling Date : 24 October, 2017
Sampling By : Customer
Sample Received Date : 24 October, 2017

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

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

Analysed By :
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Assistant supervisor

Approved By :
Tomoya Suzuki
Director

DOWA

GEM (DOWA ECOSYSTEM MYANMAR) CO., LTD.

Report No. : GEM-LAB-2017110129
Revision No. : 1
Report Date : 8 November, 2017
Application No. : 0040-C001

Analysis Report

Client Name : Myanmar Kaw International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description

Sample Name : MKI GW-9-1324 — Sampling Date : 24 October, 2017
Sample No. : W-1710174 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 24 October, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Probable Using Fluorogenic Substrate	MPN/100ml	1.9	1.8

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

Analysed By :
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GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. C2, Thilawa SEZ Zone A, Yangon Region, The Union of Myanmar
[illegible]

Report No. : GEM-LAB-201711026
Revision No. : 1
Report Date : 8 November, 2017
Application No. : 0049-E001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /29, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-GW-2-1024
Sample No. : W-1710171
Waste Profile No. : -

Sampling Date : 24 October, 2017
Sampling By : Customer
Sample Received Date : 24 October, 2017

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

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

Analysed By :
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Assistant supervisor

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Approved By :
Tomoya Suzuki
Director

MYAN JAPAN THILAWA DEVELOPMENT
MJTD

Thilawa Special Economic Zone (Zone B)
Development Project –Phase 1

Appendix

Air Quality Monitoring Report

September 2017

AIR QUALITY MONITORING

REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1 CONSTRUCTION STAGE)

(QUARTERLY MONITORING)

September 2017

Myanmar Koei International Ltd.

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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

Thilawa Special Economic Zone (TSEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular environmental monitoring in the industrial area of Zone 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 construction of industrial area in and around Thilawa SEZ Zone B, Air quality had been monitored from 20th September 2017 – 27th September 2017 as follows:

Table 1.2-1 Outlines of Air Quality Monitoring Plan

Monitoring Date	Monitoring Item	Parameters	Number of Point	Duration	Monitoring Methodology
From 20th September– 27th September, 2017	Air Quality	CO, NO_2, $PM_{2.5}$ PM_{10} and SO_2	1	7 Days	On site measurement by Haz-Scanner Environmental Perimeter Air Station (EPAS)

CHAPTER 2: AIR QUALITY MONITORING

2.1 Monitoring Item

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

2.2 Monitoring Location

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

Figure 2.2-1 Location of Air Quality Monitoring Point

2.3 Monitoring Period

Air quality monitoring was conducted seven consecutive days from 20th September – 27th September, 2017.

2.4 Monitoring Method

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

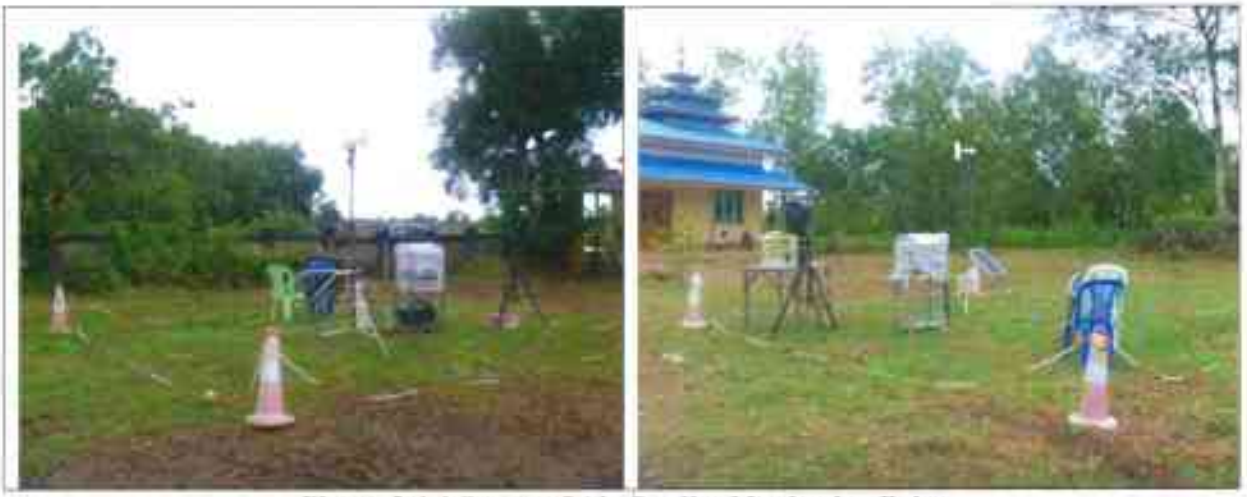

Figure 2.4-1 Status of Air Quality Monitoring Point

2.5 Monitoring Results

The daily average value of air quality monitoring results of CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2 are described in Table 2.5-1. Construction activities of Thilawa SEZ Zone B are described in Table 2.5-2. Comparing with the target value of CO, NO_2, $PM_{2.5}$, PM_{10} and SO_2 prescribed in EIA report for Thilawa SEZ development project Zone B, concentration of CO, NO_2, $PM_{2.5}$, and PM_{10} were lower than the target value, while concentration of SO_2 measured for three days exceeded than the target value.

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

Date	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2
	ppm	ppm	mg/m^3	mg/m^3	ppm
20 – 21 Sep, 2017	0.097 (0.111 mg/m^3)	0.039 (0.073 mg/m^3)	0.016	0.022	0.014 (0.037 mg/m^3)
21 – 22 Sep, 2017	0.063 (0.072 mg/m^3)	0.039 (0.073 mg/m^3)	0.018	0.026	0.010 (0.026 mg/m^3)
22 – 23 Sep, 2017	0.034 (0.039 mg/m^3)	0.037 (0.070 mg/m^3)	0.011	0.016	0.008 (0.021 mg/m^3)
23 – 24 Sep, 2017	0.038 (0.044 mg/m^3)	0.040 (0.075 mg/m^3)	0.009	0.010	0.008 (0.021 mg/m^3)
24 – 25 Sep, 2017	0.036 (0.041 mg/m^3)	0.035 (0.066 mg/m^3)	0.010	0.013	0.007 (0.018 mg/m^3)
25 – 26 Sep, 2017	0.038 (0.044 mg/m^3)	0.033 (0.062 mg/m^3)	0.008	0.009	0.007 (0.018 mg/m^3)
26 – 27 Sep, 2017	0.204 (0.234 mg/m^3)	0.041 (0.077 mg/m^3)	0.007	0.010	0.014 (0.037 mg/m^3)
7 Days Average Value	0.073 (0.083 mg/m^3)	0.038 (0.071 mg/m^3)	0.011	0.016	0.010 (0.025 mg/m^3)
Target Value	9.000 (10.26 mg/m^3) *1	0.050 (0.1 mg/m^3) *1	0.025	0.050	0.008 (0.02 mg/m^3)

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

Table 2.5-2 Construction Activities of Thilawa SEZ Zone B

Date	Time	Location	Construction Activities
20 Sep, 2017	8:30-12:00	Near monastery	Pipeline excavation, backfilling, removing soft soil, dewatering
	13:00-18:00	Near monastery	Pipeline excavation, backfilling, removing soft soil, dewatering
21 Sep, 2017	8:30-12:00	Near monastery	Excavation, compacting, access pipe culvert installation, levelling
	13:00-18:00	Near monastery	Excavation, compacting, access pipe culvert installation, levelling
22 Sep, 2017	8:30-12:00	Near monastery	Access road dressing work, soft soil removing work, sand filling, back filling
	13:00-18:00	Near monastery	Access road dressing work, soft soil removing work, sand filling, back filling
23 Sep, 2017	8:30-12:00	Near monastery	Lean concrete, casting, soil levelling, sand delivery, compacting, soil cutting
	13:00-18:00	Near monastery	Lean concrete, casting, soil levelling, sand delivery, compacting, soil cutting
24 Sep, 2017	8:30-12:00	Near monastery	soil levelling and cutting, backfilling, formwork shifting
	13:00-18:00	Near monastery	soil levelling and cutting, backfilling
25 Sep, 2017	8:30-12:00	Near monastery	soft soil removing, backfilling
	13:00-18:00	Near monastery	soft soil removing, backfilling
26 Sep, 2017	8:30-12:00	Near monastery	Road reparing and crushing stone laying, RBC cleaning, compacting
	13:00-18:00	Near monastery	Road reparing and crushing stone laying, RBC cleaning, compacting
27 Sep, 2017	8:30-12:00	Near monastery	Backfilling, base slab cleaning, soft soil removing, backfilling, rebar carrying
	13:00-18:00	Near monastery	Backfilling, base slab cleaning, soft soil removing, backfilling, rebar carrying

Table 2.5-3 SO_2 Results (During Construction Period)
(8:30-12:00 and 13:00 to 18:00)

Day	SO_2
	ppm
Day 1	0.009 (0.024 mg/m^3)
Day 2	0.004 (0.010 mg/m^3)
Day 3	0.006 (0.016 mg/m^3)
Day 4	0.006 (0.016 mg/m^3)
Day 5	0.003 (0.008 mg/m^3)
Day 6	0.005 (0.013 mg/m^3)
Day 7	0.012 (0.031 mg/m^3)
7 days Average value	**0.006** (0.016 mg/m^3)
Target Value	**0.008** (0.02 mg/m^3)

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

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

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. The SO_2 results during construction period for Day 1 and Day 7, 5 hours results were exceeded for Day 1 and 3 hours results were exceeded for Day 7. The SO_2 exceeded results, exceeded time and wind direction of Day 1 and Day 7 during construction period are shown in Table 2.5-4 and Table 2.5-5. After detail analyzed the SO_2 exceeded time for construction period and wind directions, prevailing wind direction for Day 1 and Day 7 are come from other direction of construction site of Zone B. Therefore, SO_2 exceeded levels during construction period on Day 1 and Day 7 are not relevant to construction site of Zone B and not impact from the construction activities of Zone B to the surrounding environment.

Table 2.5-4 SO_2 Results 5 Hours Exceeded for Day 1

SO_2 Exceeded Time	10:00-10:59	14:00-14:59	15:00-15:59	16:00-16:59	17:00-17:59
SO_2 Result (ppm)	0.009	0.011	0.009	0.021	0.011
Wind Direction	SSW	SW	ESE	SE	W

Table 2.5-5 SO_2 Results 3 Hours Exceeded for Day 7

SO_2 Exceeded Time	10:00-10:59	8:00-8:59	9:00-9:59
SO_2 Result (ppm)	0.011	0.042	0.036
Wind Direction	SE	S	SSE

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

The result of air quality of CO, NO_2, $PM_{2.5}$, PM_{10} in each day are not exceeded the target value, and SO_2 level are exceeded in three days but one day is not exceeded during construction time. Two days are exceeded during construction time but the wind direction is not come from the construction site. Therefore, this may not impact from the Zone B construction activities to the surrounding environment.

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

APPENDIX - HOURLY AIR RESULT

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		ppm	ppm	mg/m³	mg/m³	ppm	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
20 Sep, 2017	10:00 – 10:59	0.035	0.029	0.006	0.014	0.009	0.43	196	SSW
20 Sep, 2017	11:00 – 11:59	0.002	0.039	0.015	0.014	0.002	0.42	199	SSW
20 Sep, 2017	12:00 – 12:59	0.010	0.028	0.002	0.002	0.007	0.60	179	S
20 Sep, 2017	13:00 – 13:59	0.016	0.033	0.028	0.016	0.008	0.68	173	S
20 Sep, 2017	14:00 – 14:59	0.087	0.044	0.014	0.006	0.011	0.57	208	SW
20 Sep, 2017	15:00 – 15:59	0.114	0.032	0.005	0.003	0.009	0.48	104	ESE
20 Sep, 2017	16:00 – 16:59	0.125	0.048	0.003	0.002	0.021	0.25	123	SE
20 Sep, 2017	17:00 – 17:59	0.102	0.039	0.014	0.024	0.011	0.28	256	W
20 Sep, 2017	18:00 – 18:59	0.160	0.044	0.018	0.021	0.016	0.18	202	SSW
20 Sep, 2017	19:00 – 19:59	0.184	0.038	0.012	0.015	0.021	0.06	225	SW
20 Sep, 2017	20:00 – 20:59	0.382	0.042	0.012	0.016	0.023	0.02	200	SSW
20 Sep, 2017	21:00 – 21:59	0.224	0.044	0.016	0.022	0.020	0.03	224	SW
20 Sep, 2017	22:00 – 22:59	0.096	0.045	0.011	0.018	0.015	0.07	124	SE
20 Sep, 2017	23:00 – 23:59	0.035	0.037	0.018	0.041	0.013	0.03	142	SSE
21 Sep, 2017	0:00 – 0:59	0.008	0.040	0.018	0.033	0.011	0.08	148	SSE
21 Sep, 2017	1:00 – 1:59	0.026	0.038	0.003	0.008	0.021	0.03	200	SSW
21 Sep, 2017	2:00 – 2:59	0.000	0.032	0.019	0.036	0.008	0.00	330	NNW
21 Sep, 2017	3:00 – 3:59	0.023	0.037	0.014	0.033	0.016	0.00	330	NNW
21 Sep, 2017	4:00 – 4:59	0.025	0.041	0.011	0.025	0.015	0.00	330	NNW
21 Sep, 2017	5:00 – 5:59	0.114	0.039	0.020	0.041	0.021	0.02	330	NNW
21 Sep, 2017	6:00 – 6:59	0.309	0.041	0.033	0.061	0.025	0.00	330	NNW
21 Sep, 2017	7:00 – 7:59	0.234	0.039	0.047	0.092	0.020	0.12	78	E
21 Sep, 2017	8:00 – 8:59	0.011	0.038	0.035	0.062	0.005	0.25	122	SE
21 Sep, 2017	9:00 – 9:59	0.014	0.038	0.015	0.034	0.003	0.28	167	S

Max	0.382 (0.437 mg/m³)	0.048 (0.090 mg/m³)	0.047	0.092	0.025 (0.066 mg/m³)
Avg	0.097 (0.111 mg/m³)	0.039 (0.073 mg/m³)	0.016	0.027	0.014 (0.037 mg/m³)
Min	0.000 (0.000 mg/m³)	0.028 (0.053 mg/m³)	0.002	0.002	0.002 (0.005 mg/m³)

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		ppm	ppm	mg/m³	mg/m³	ppm	kph	Deg	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
21 Sep, 2017	10:00 – 10:59	0.008	0.022	0.004	0.012	0.007	0.16	203	SW
21 Sep, 2017	11:00 – 11:59	0.002	0.033	0.004	0.004	0.012	0.58	52	NE
21 Sep, 2017	12:00 – 12:59	0.003	0.037	0.026	0.014	0.005	0.33	119	SE
21 Sep, 2017	13:00 – 13:59	0.015	0.045	0.033	0.024	0.000	0.25	211	SW
21 Sep, 2017	14:00 – 14:59	0.044	0.054	0.030	0.032	0.000	0.20	285	WNW
21 Sep, 2017	15:00 – 15:59	0.055	0.046	0.027	0.024	0.000	0.38	258	W
21 Sep, 2017	16:00 – 16:59	0.031	0.037	0.028	0.027	0.006	0.40	262	W
21 Sep, 2017	17:00 – 17:59	0.099	0.041	0.038	0.020	0.002	0.40	267	W
21 Sep, 2017	18:00 – 18:59	0.228	0.046	0.011	0.010	0.009	0.25	269	W
21 Sep, 2017	19:00 – 19:59	0.080	0.048	0.004	0.004	0.007	0.02	282	WNW
21 Sep, 2017	20:00 – 20:59	0.017	0.047	0.005	0.008	0.005	0.07	213	SW
21 Sep, 2017	21:00 – 21:59	0.206	0.038	0.028	0.037	0.022	0.20	232	WSW
21 Sep, 2017	22:00 – 22:59	0.061	0.044	0.024	0.039	0.018	0.15	267	W
21 Sep, 2017	23:00 – 23:59	0.025	0.039	0.017	0.030	0.018	0.20	236	WSW
22 Sep, 2017	0:00 – 0:59	0.031	0.040	0.013	0.019	0.012	0.35	246	WSW
22 Sep, 2017	1:00 – 1:59	0.036	0.037	0.003	0.004	0.017	0.03	205	SW
22 Sep, 2017	2:00 – 2:59	0.033	0.037	0.009	0.016	0.025	0.00	228	WSW
22 Sep, 2017	3:00 – 3:59	0.041	0.035	0.009	0.020	0.013	0.00	251	W
22 Sep, 2017	4:00 – 4:59	0.030	0.035	0.006	0.018	0.015	0.00	228	WSW
22 Sep, 2017	5:00 – 5:59	0.053	0.035	0.015	0.044	0.014	0.00	236	WSW
22 Sep, 2017	6:00 – 6:59	0.090	0.035	0.021	0.063	0.015	0.00	237	WSW
22 Sep, 2017	7:00 – 7:59	0.307	0.036	0.029	0.061	0.026	0.30	73	E
22 Sep, 2017	8:00 – 8:59	0.019	0.031	0.024	0.046	0.004	0.40	58	ENE
22 Sep, 2017	9:00 – 9:59	0.000	0.029	0.017	0.036	0.004	0.17	180	S

Max	0.307 (0.352 mg/m³)	0.054 (0.102 mg/m³)	0.038	0.063	0.026 (0.068 mg/m³)
Avg	0.063 (0.072 mg/m³)	0.039 (0.073 mg/m³)	0.018	0.026	0.010 (0.026 mg/m³)
Min	0.000 (0.000 mg/m³)	0.022 (0.041 mg/m³)	0.003	0.004	0.000 (0.000 mg/m³)

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		ppm	ppm	mg/m³	mg/m³	ppm	kph	Deg	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
22 Sep, 2017	10:00 – 10:59	0.012	0.028	0.029	0.017	0.002	0.48	220	SW
22 Sep, 2017	11:00 – 11:59	0.000	0.017	0.007	0.010	0.001	0.55	209	SW
22 Sep, 2017	12:00 – 12:59	0.004	0.030	0.017	0.011	0.003	0.75	222	SW
22 Sep, 2017	13:00 – 13:59	0.022	0.037	0.021	0.010	0.002	1.07	101	ESE
22 Sep, 2017	14:00 – 14:59	0.090	0.041	0.010	0.008	0.006	0.72	202	SSW
22 Sep, 2017	15:00 – 15:59	0.067	0.041	0.005	0.010	0.010	0.83	171	S
22 Sep, 2017	16:00 – 16:59	0.001	0.036	0.019	0.033	0.011	0.70	193	SSW
22 Sep, 2017	17:00 – 17:59	0.039	0.045	0.019	0.019	0.006	0.67	259	W
22 Sep, 2017	18:00 – 18:59	0.083	0.037	0.014	0.008	0.007	0.52	252	W
22 Sep, 2017	19:00 – 19:59	0.087	0.042	0.005	0.002	0.011	0.93	257	W
22 Sep, 2017	20:00 – 20:59	0.016	0.037	0.006	0.014	0.004	0.32	286	W
22 Sep, 2017	21:00 – 21:59	0.092	0.039	0.008	0.014	0.011	0.23	260	W
22 Sep, 2017	22:00 – 22:59	0.033	0.036	0.006	0.013	0.009	0.33	256	W
22 Sep, 2017	23:00 – 23:59	0.042	0.038	0.006	0.011	0.012	0.22	259	W
23 Sep, 2017	0:00 – 0:59	0.024	0.040	0.007	0.012	0.016	0.03	220	SW
23 Sep, 2017	1:00 – 1:59	0.020	0.036	0.008	0.012	0.014	0.00	192	SSW
23 Sep, 2017	2:00 – 2:59	0.038	0.039	0.010	0.019	0.013	0.00	133	SE
23 Sep, 2017	3:00 – 3:59	0.027	0.032	0.004	0.005	0.010	0.02	51	ENE
23 Sep, 2017	4:00 – 4:59	0.027	0.041	0.011	0.020	0.010	0.12	33	NE
23 Sep, 2017	5:00 – 5:59	0.007	0.040	0.013	0.030	0.017	0.18	42	NE
23 Sep, 2017	6:00 – 6:59	0.019	0.042	0.014	0.033	0.006	0.13	54	ENE
23 Sep, 2017	7:00 – 7:59	0.031	0.039	0.013	0.026	0.005	0.22	43	NE
23 Sep, 2017	8:00 – 8:59	0.012	0.042	0.011	0.026	0.010	0.40	46	ENE
23 Sep, 2017	9:00 – 9:59	0.006	0.035	0.007	0.019	0.004	0.50	59	ENE

Max	0.092 (0.105 mg/m³)	0.045 (0.085 mg/m³)	0.029	0.035	0.017 (0.044 mg/m³)
Avg	0.034 (0.039 mg/m³)	0.037 (0.070 mg/m³)	0.011	0.016	0.008 (0.021 mg/m³)
Min	0.000 (0.000 mg/m³)	0.017 (0.032 mg/m³)	0.004	0.002	0.001 (0.003 mg/m³)

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		ppm	ppm	mg/m^3	mg/m^3	ppm	kph	Deg	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
23 Sep, 2017	10:00 – 10:59	0.000	0.024	0.005	0.003	0.001	0.67	77	E
23 Sep, 2017	11:00 – 11:59	0.000	0.026	0.002	0.001	0.009	0.68	97	ESE
23 Sep, 2017	12:00 – 12:59	0.001	0.026	0.008	0.002	0.014	0.92	117	SE
23 Sep, 2017	13:00 – 13:59	0.005	0.036	0.006	0.001	0.011	0.87	119	SE
23 Sep, 2017	14:00 – 14:59	0.032	0.033	0.027	0.017	0.007	1.13	133	SE
23 Sep, 2017	15:00 – 15:59	0.045	0.046	0.017	0.007	0.002	1.23	150	SSE
23 Sep, 2017	16:00 – 16:59	0.025	0.044	0.014	0.006	0.000	1.10	149	SSE
23 Sep, 2017	17:00 – 17:59	0.060	0.050	0.011	0.003	0.002	0.75	144	SSE
23 Sep, 2017	18:00 – 18:59	0.082	0.046	0.010	0.006	0.008	0.23	182	SSW
23 Sep, 2017	19:00 – 19:59	0.073	0.052	0.007	0.005	0.007	0.12	224	SW
23 Sep, 2017	20:00 – 20:59	0.012	0.050	0.003	0.003	0.003	0.18	241	WSW
23 Sep, 2017	21:00 – 21:59	0.032	0.043	0.007	0.004	0.009	0.05	203	SW
23 Sep, 2017	22:00 – 22:59	0.003	0.046	0.002	0.004	0.002	0.00	260	W
23 Sep, 2017	23:00 – 23:59	0.100	0.044	0.005	0.016	0.017	0.00	279	WNW
24 Sep, 2017	0:00 – 0:59	0.041	0.040	0.008	0.017	0.014	0.17	234	WSW
24 Sep, 2017	1:00 – 1:59	0.009	0.041	0.013	0.020	0.006	0.27	265	W
24 Sep, 2017	2:00 – 2:59	0.007	0.040	0.007	0.009	0.008	0.07	276	WNW
24 Sep, 2017	3:00 – 3:59	0.013	0.037	0.007	0.012	0.004	0.08	265	W
24 Sep, 2017	4:00 – 4:59	0.027	0.041	0.007	0.012	0.003	0.00	279	WNW
24 Sep, 2017	5:00 – 5:59	0.034	0.043	0.006	0.011	0.009	0.23	104	ESE
24 Sep, 2017	6:00 – 6:59	0.057	0.043	0.013	0.023	0.015	0.18	21	NNE
24 Sep, 2017	7:00 – 7:59	0.031	0.035	0.020	0.024	0.009	0.22	114	SE
24 Sep, 2017	8:00 – 8:59	0.187	0.037	0.015	0.013	0.018	0.32	37	NE
24 Sep, 2017	9:00 – 9:59	0.038	0.045	0.006	0.014	0.004	0.30	172	S

Max	0.187 (0.214 mg/m^3)	0.052 (0.098 mg/m^3)	0.027	0.024	0.018 (0.047 mg/m^3)
Avg	0.038 (0.044 mg/m^3)	0.040 (0.075 mg/m^3)	0.009	0.010	0.008 (0.021 mg/m^3)
Min	0.000 (0.000 mg/m^3)	0.024 (0.045 mg/m^3)	0.002	0.001	0.000 (0.000 mg/m^3)

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		ppm	ppm	mg/m^3	mg/m^3	ppm	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
24 Sep, 2017	10:00 – 10:59	0.000	0.033	0.002	0.008	0.001	0.38	41	NE
24 Sep, 2017	11:00 – 11:59	0.002	0.010	0.022	0.003	0.002	0.60	91	ESE
24 Sep, 2017	12:00 – 12:59	0.004	0.016	0.025	0.004	0.000	0.42	154	SSE
24 Sep, 2017	13:00 – 13:59	0.001	0.017	0.004	0.004	0.001	1.03	167	S
24 Sep, 2017	14:00 – 14:59	0.012	0.038	0.023	0.015	0.003	0.77	183	SSW
24 Sep, 2017	15:00 – 15:59	0.060	0.038	0.003	0.002	0.007	0.80	235	WSW
24 Sep, 2017	16:00 – 16:59	0.018	0.026	0.003	0.004	0.001	1.15	249	W
24 Sep, 2017	17:00 – 17:59	0.010	0.041	0.005	0.001	0.001	0.73	249	W
24 Sep, 2017	18:00 – 18:59	0.061	0.043	0.013	0.012	0.004	0.20	250	W
24 Sep, 2017	19:00 – 19:59	0.109	0.046	0.003	0.001	0.010	0.08	209	SW
24 Sep, 2017	20:00 – 20:59	0.012	0.042	0.005	0.005	0.006	0.25	248	W
24 Sep, 2017	21:00 – 21:59	0.044	0.040	0.004	0.007	0.009	0.00	224	SW
24 Sep, 2017	22:00 – 22:59	0.034	0.039	0.008	0.015	0.011	0.00	267	W
24 Sep, 2017	23:00 – 23:59	0.079	0.038	0.009	0.017	0.012	0.00	267	W
25 Sep, 2017	0:00 – 0:59	0.078	0.037	0.011	0.019	0.012	0.00	102	ESE
25 Sep, 2017	1:00 – 1:59	0.003	0.036	0.009	0.013	0.010	0.03	85	E
25 Sep, 2017	2:00 – 2:59	0.013	0.034	0.009	0.024	0.008	0.07	21	NNE
25 Sep, 2017	3:00 – 3:59	0.034	0.033	0.008	0.019	0.007	0.00	2	NNE
25 Sep, 2017	4:00 – 4:59	0.010	0.033	0.012	0.022	0.013	0.03	26	NE
25 Sep, 2017	5:00 – 5:59	0.008	0.038	0.011	0.014	0.008	0.00	28	NE
25 Sep, 2017	6:00 – 6:59	0.068	0.035	0.015	0.025	0.018	0.13	150	SSE
25 Sep, 2017	7:00 – 7:59	0.088	0.041	0.015	0.022	0.008	0.17	49	ENE
25 Sep, 2017	8:00 – 8:59	0.079	0.034	0.015	0.026	0.006	0.32	44	NE
25 Sep, 2017	9:00 – 9:59	0.043	0.040	0.009	0.022	0.005	0.40	47	ENE

Max	0.109 (0.125 mg/m^3)	0.046 (0.087 mg/m^3)	0.025	0.026	0.018 (0.047 mg/m^3)
Avg	0.036 (0.041 mg/m^3)	0.035 (0.066 mg/m^3)	0.010	0.013	0.007 (0.018 mg/m^3)
Min	0.000 (0.000 mg/m^3)	0.010 (0.019 mg/m^3)	0.002	0.001	0.000 (0.000 mg/m^3)

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		ppm	ppm	mg/m^3	mg/m^3	ppm	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
25 Sep, 2017	10:00 – 10:59	0.040	0.036	0.003	0.010	0.008	0.50	38	NE
25 Sep, 2017	11:00 – 11:59	0.003	0.012	0.006	0.007	0.003	0.37	37	NE
25 Sep, 2017	12:00 – 12:59	0.001	0.018	0.024	0.009	0.000	0.95	103	ESE
25 Sep, 2017	13:00 – 13:59	0.016	0.014	0.007	0.003	0.004	1.03	152	SSE
25 Sep, 2017	14:00 – 14:59	0.009	0.012	0.013	0.009	0.002	0.93	176	S
25 Sep, 2017	15:00 – 15:59	0.007	0.021	0.008	0.007	0.001	0.87	134	SE
25 Sep, 2017	16:00 – 16:59	0.016	0.041	0.005	0.001	0.001	0.87	146	SSE
25 Sep, 2017	17:00 – 17:59	0.020	0.031	0.006	0.003	0.001	1.12	139	SSE
25 Sep, 2017	18:00 – 18:59	0.103	0.037	0.007	0.005	0.006	0.25	157	SSE
25 Sep, 2017	19:00 – 19:59	0.095	0.041	0.003	0.002	0.013	0.22	183	SSW
25 Sep, 2017	20:00 – 20:59	0.007	0.041	0.006	0.004	0.009	0.40	172	S
25 Sep, 2017	21:00 – 21:59	0.005	0.043	0.003	0.007	0.003	0.22	144	SSE
25 Sep, 2017	22:00 – 22:59	0.010	0.040	0.005	0.009	0.001	0.42	124	SE
25 Sep, 2017	23:00 – 23:59	0.019	0.038	0.005	0.006	0.002	0.55	116	SE
26 Sep, 2017	0:00 – 0:59	0.009	0.038	0.007	0.010	0.005	0.25	109	ESE
26 Sep, 2017	1:00 – 1:59	0.013	0.039	0.006	0.009	0.008	0.07	127	SE
26 Sep, 2017	2:00 – 2:59	0.018	0.039	0.004	0.005	0.009	0.00	144	SSE
26 Sep, 2017	3:00 – 3:59	0.013	0.041	0.007	0.016	0.012	0.00	43	NE
26 Sep, 2017	4:00 – 4:59	0.020	0.038	0.006	0.010	0.012	0.12	222	SW
26 Sep, 2017	5:00 – 5:59	0.173	0.037	0.003	0.003	0.020	0.07	35	NE
26 Sep, 2017	6:00 – 6:59	0.068	0.036	0.013	0.021	0.003	0.02	17	NNE
26 Sep, 2017	7:00 – 7:59	0.089	0.035	0.019	0.028	0.013	0.35	100	ESE
26 Sep, 2017	8:00 – 8:59	0.161	0.035	0.017	0.026	0.021	0.28	79	E
26 Sep, 2017	9:00 – 9:59	0.008	0.030	0.008	0.020	0.006	1.02	116	SE

Max	0.173 (0.198 mg/m^3)	0.043 (0.081 mg/m^3)	0.024	0.028	0.021 (0.055 mg/m^3)
Avg	0.038 (0.044 mg/m^3)	0.033 (0.062 mg/m^3)	0.008	0.009	0.007 (0.018 mg/m^3)
Min	0.001 (0.001 mg/m^3)	0.012 (0.023 mg/m^3)	0.003	0.001	0.000 (0.000 mg/m^3)

Date	Time	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2	Wind Speed	Wind Direction	
		ppm	ppm	mg/m^3	mg/m^3	ppm	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
26 Sep, 2017	10:00 – 10:59	0.010	0.026	0.004	0.014	0.011	1.45	127	SE
26 Sep, 2017	11:00 – 11:59	0.005	0.032	0.006	0.006	0.005	1.50	117	SE
26 Sep, 2017	12:00 – 12:59	0.002	0.044	0.004	0.003	0.002	1.72	121	SE
26 Sep, 2017	13:00 – 13:59	0.015	0.030	0.004	0.002	0.003	1.80	122	SE
26 Sep, 2017	14:00 – 14:59	0.022	0.028	0.007	0.005	0.005	1.80	126	SE
26 Sep, 2017	15:00 – 15:59	0.012	0.031	0.009	0.009	0.003	2.10	131	SE
26 Sep, 2017	16:00 – 16:59	0.012	0.029	0.014	0.014	0.003	1.62	137	SSE
26 Sep, 2017	17:00 – 17:59	0.050	0.038	0.009	0.007	0.004	1.42	127	SE
26 Sep, 2017	18:00 – 18:59	0.048	0.040	0.004	0.002	0.005	1.12	124	SE
26 Sep, 2017	19:00 – 19:59	0.004	0.040	0.003	0.001	0.001	1.23	125	SE
26 Sep, 2017	20:00 – 20:59	0.003	0.040	0.004	0.003	0.001	0.87	120	SE
26 Sep, 2017	21:00 – 21:59	0.019	0.044	0.004	0.003	0.006	0.37	124	SE
26 Sep, 2017	22:00 – 22:59	0.014	0.040	0.003	0.003	0.005	0.52	189	SSW
26 Sep, 2017	23:00 – 23:59	0.004	0.039	0.003	0.002	0.004	0.03	101	ESE
27 Sep, 2017	0:00 – 0:59	0.035	0.040	0.007	0.012	0.004	0.07	43	NE
27 Sep, 2017	1:00 – 1:59	0.025	0.046	0.007	0.013	0.011	0.18	176	S
27 Sep, 2017	2:00 – 2:59	0.692	0.044	0.005	0.006	0.033	0.00	62	ENE
27 Sep, 2017	3:00 – 3:59	0.586	0.087	0.010	0.008	0.046	0.12	40	NE
27 Sep, 2017	4:00 – 4:59	0.595	0.046	0.004	0.002	0.027	0.43	100	ESE
27 Sep, 2017	5:00 – 5:59	0.319	0.043	0.004	0.002	0.017	0.02	31	NE
27 Sep, 2017	6:00 – 6:59	0.521	0.047	0.015	0.013	0.037	0.00	69	E
27 Sep, 2017	7:00 – 7:59	0.627	0.043	0.017	0.019	0.029	0.22	99	ESE
27 Sep, 2017	8:00 – 8:59	0.810	0.048	0.013	0.037	0.042	0.60	159	S
27 Sep, 2017	9:00 – 9:59	0.462	0.047	0.017	0.050	0.036	0.65	152	SSE

Max	0.810 (0.928 mg/m^3)	0.087 (0.164 mg/m^3)	0.017	0.050	0.046 (0.120 mg/m^3)
Avg	0.204 (0.234 mg/m^3)	0.041 (0.077 mg/m^3)	0.007	0.010	0.014 (0.037 mg/m^3)
Min	0.002 (0.002 mg/m^3)	0.026 (0.049 mg/m^3)	0.003	0.001	0.001 (0.003 mg/m^3)

Thilawa Special Economic Zone (Zone B)
Development Project –Phase 1

Appendix

Noise and Vibration Monitoring Report

September 2017

NOISE AND VIBRATION

MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1 CONSTRUCTION STAGE)

(QUARTERLY MONITORING)

September 2017

Myanmar Koei International Ltd.

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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

Thilawa Special Economic Zone (TSEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular environmental monitoring in the industrial area of Zone 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 construction of industrial area in and around Thilawa SEZ Zone B, noise and vibration levels had been monitored from 18th September 2017 – 20th September 2017 as follows;

Table 1.2-1 Outlines of Noise and Vibration Level Monitoring

Monitoring Date	Monitoring Item	Parameters	Number of Points	Duration	Monitoring Methodology
From 18th September – 19th September, 2017	Noise Level	L_{Aeq}(dB)	1 (NV-2)	24 hours	On-site measurement by "Rion NL-42 sound level meter"
From 19th September – 20th September, 2017	Noise Level	L_{Aeq}(dB)	1 (NV-1)	24 hours	On-site measurement by "Rion NL-42 sound level meter"
From 18th September – 19th September, 2017	Vibration Level	L_{v10} (dB)	1 (NV-2)	24 hours	On-site measurement by "Vibration Level Meter- VM-53A"
From 19th September – 20th September, 2017	Vibration Level	L_{v10} (dB)	1 (NV-1)	24 hours	On-site measurement by "Vibration Level Meter- VM-53A"

CHAPTER 2: NOISE AND VIBRATION LEVEL MONITORING

2.1 Monitoring Item

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

Table 2.1-1 Monitoring Parameters for Noise and Vibration Level

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

2.2 Monitoring Location

Noise and vibration levels were measured at the northeast corner of the Thilawa SEZ Zone B, monitoring point (NV-1); N: 16°40'17.90", E: 96°17'18.20" for traffic noise concerned and at the south of the Thilawa SEZ Zone B, sampling point (NV-2); N: 16°39'24.90", E: 96°17'16.70", inside the monastery compound of Phalan village. The location of the noise and vibration monitoring points are shown in Figure 2.2-1.

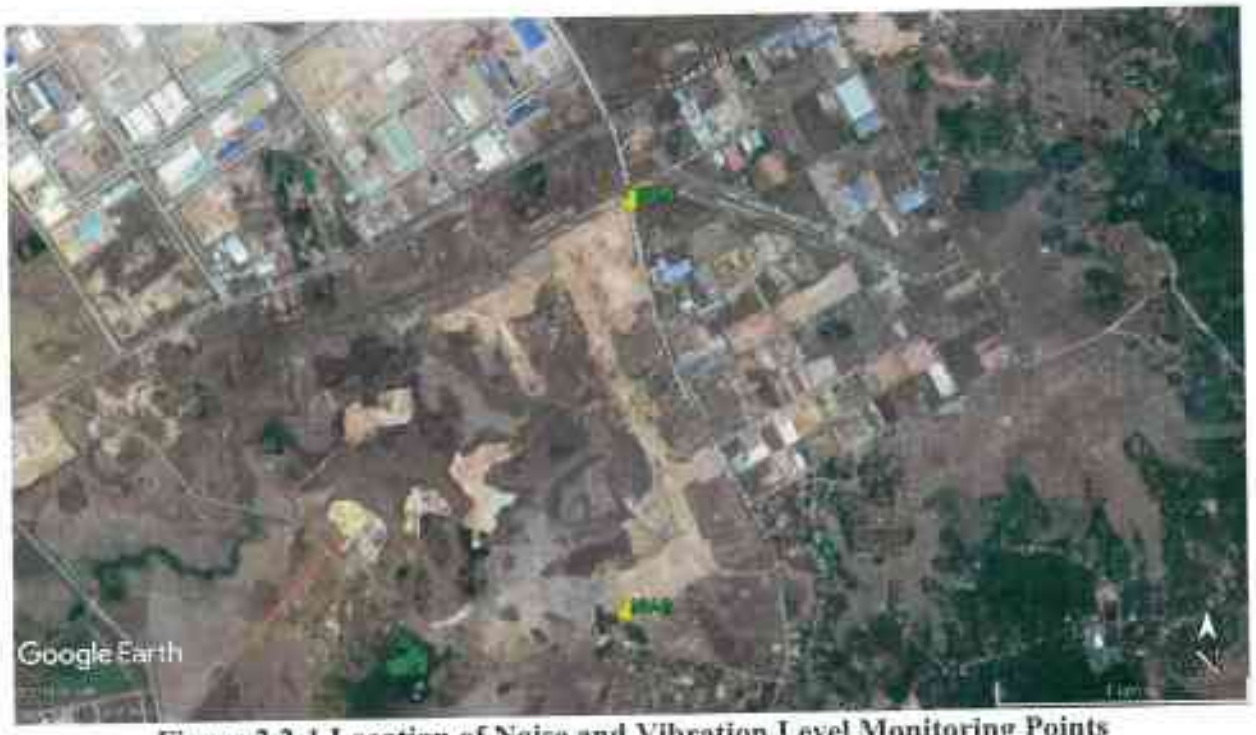

Figure 2.2-1 Location of Noise and Vibration Level Monitoring Points

NV-1

NV-1 is located in front of temporary gate of construction 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 and paddy field in the west respectively. Possible sources of noise and vibration is generated from construction activities and road traffic.

NV-2

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

2.3 Monitoring Method

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

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

Table 2.4-1 Results of Noise Levels (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)
19th September – 20th September, 2017	61	51
Target Value	75	70

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

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

Date	(Residential area & monastery located less than 150m from the construction site) 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)
18th September – 19th September, 2017	51	53	53
Target Value	75	60	55

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

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

Date	Time	(L_{Aeq}, dB)	(L_{Aeq}, dB) Each Category	(L_{Aeq}, dB) Target Value	Remark
19th September – 20th September, 2017	6:00-7:00	59	61	75	No Construction Activity
	7:00-8:00	61			
	8:00-9:00	59			Construction Activity: Access road dressing work, Pipe re-excavation, access road making work, back filling, levelling, excavation
	9:00-10:00	60			
	10:00-11:00	61			
	11:00-12:00	61			
	12:00-13:00	60			No Construction Activity
	13:00-14:00	61			Construction Activity: Access road dressing work
	14:00-15:00	62			
	15:00-16:00	62			
	16:00-17:00	65			
	17:00-18:00	62			
	18:00-19:00	58			No Construction Activity
	19:00-20:00	58			
	20:00-21:00	57			
	21:00-22:00	54			
	22:00-23:00	50	51	70	
	23:00-24:00	48			
	24:00-1:00	30			
	1:00-2:00	45			
	2:00-3:00	47			
	3:00-4:00	56			
	4:00-5:00	50			
	5:00-6:00	54			

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

Date	Time	(L_{Aeq}, dB)	(L_{Aeq}, dB) Each Category	(L_{Aeq}, dB) Target Value	Remark
18th September – 19th September, 2017	7:00-8:00	50	51	75	No Construction Activity
	8:00-9:00	49			Construction Activity: Excavation, levelling, backfilling, soft soil removing, crushing stone carrying, Excavation, backfilling, access road dressing work
	9:00-10:00	49			
	10:00-11:00	49			
	11:00-12:00	48			
	12:00-13:00	48			No Construction Activity
	13:00-14:00	49			Construction Activity: Excavation, levelling, backfilling, soft soil removing, crushing stone carrying
	14:00-15:00	55			
	15:00-16:00	55			
	16:00-17:00	53			
	17:00-18:00	55			
	18:00-19:00	52			No Construction Activity
	19:00-20:00	53	53	60	
	20:00-21:00	53			
	21:00-22:00	53			
	22:00-23:00	52	53	55	
	23:00-24:00	52			
	24:00-1:00	52			
	1:00-2:00	52			
	2:00-3:00	52			
	3:00-4:00	54			
	4:00-5:00	53			
	5:00-6:00	54			
	6:00-7:00	50			

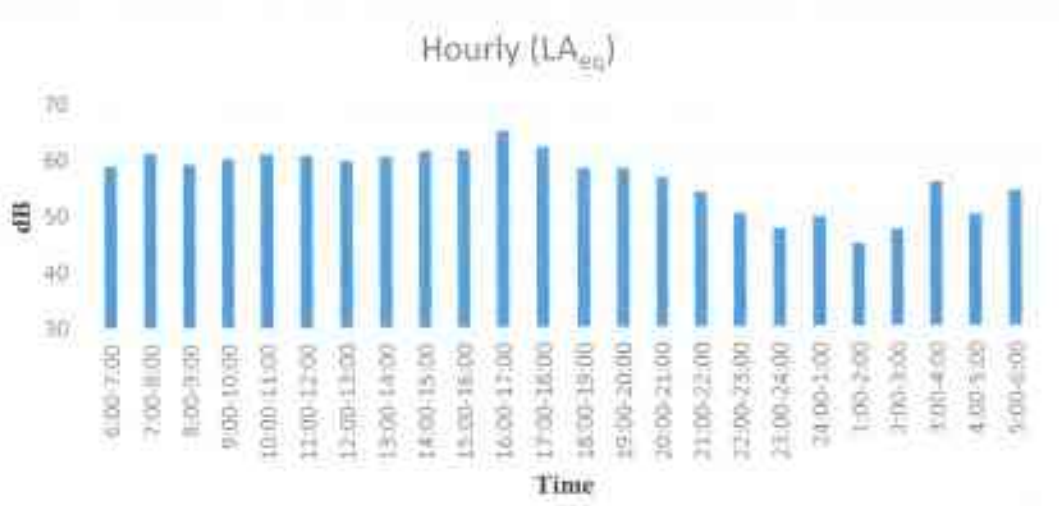

Figure 2.4-1 Results of Noise Levels (LA_{eq}) Monitoring at NV-1

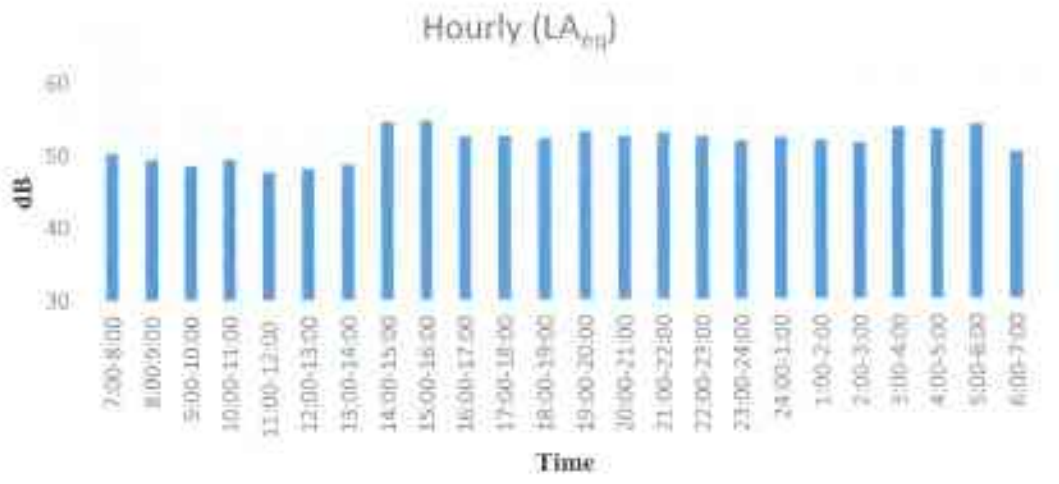

Figure 2.4-2 Results of Noise Levels (LA_{eq}) Monitoring at NV-2

Vibration Monitoring Results

The results of vibration level are shown in Table 2.4-5 and Table 2.4-6. By comparing with the target vibration level in construction 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

Location	Date	(Residential and commercial and industrial areas) Equivalent Vibration Level (L_{V10}, dB)		
		Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
NV-1	19th September – 20th September, 2017	41	40	31
Target Value		70	70	65

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

Table 2.4-6 Results of Vibration Levels (L_{V10}) Monitoring at NV-2

Location	Date	(Monastery and residential area) Equivalent Vibration Level (L_{V10}, dB)		
		Day Time (7:00 AM – 7:00 PM)	Evening Time (7:00 PM – 10:00 PM)	Night Time (10:00 PM – 7:00 AM)
NV-2	18th September – 19th September, 2017	27	27	16
Target Value		65	65	60

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

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

Date	19th - 20th Sept 2017	(L_{V10}, dB) Each Category	(L_{V10}, dB) Target Value	Remark
Time	L_{V10} (NV-1)			
7:00-8:00	38	41	70	No construction activity
8:00-9:00	40			Construction Activity: Access road dressing work, Pipe re-excavation, access road making work, back filling, levelling, excavation
9:00-10:00	41			
10:00-11:00	42			
11:00-12:00	40			
12:00-13:00	38			No construction activity
13:00-14:00	41			Construction Activity: Access road dressing work
14:00-15:00	41			
15:00-16:00	41			
16:00-17:00	42			
17:00-18:00	43			
18:00-19:00	41			No construction activity
19:00-20:00	41	40	70	
20:00-21:00	41			
21:00-22:00	37			
22:00-23:00	26	31	65	
23:00-24:00	22			
24:00-1:00	19			
1:00-2:00	19			
2:00-3:00	27			
3:00-4:00	24			
4:00-5:00	28			
5:00-6:00	30			
6:00-7:00	39			

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

Date	18th – 19th Sept 2017	(L_{v10}, dB) Each Category	(L_{v10}, dB) Target Value	Remark
Time	L_{v10}(NV-2)			
7:00-8:00	21	27	65	No construction activity
8:00-9:00	29			Construction Activity: Excavation, levelling, backfilling, soft soil removing, crushing stone carrying, Excavation, backfilling, access road dressing work
9:00-10:00	22			
10:00-11:00	25			
11:00-12:00	19			
12:00-13:00	18			No construction activity
13:00-14:00	23			Construction Activity: Excavation, levelling, backfilling, soft soil removing, crushing stone carrying
14:00-15:00	27			
15:00-16:00	29			
16:00-17:00	34			
17:00-18:00	29			
18:00-19:00	22			No construction activity
19:00-20:00	32	27	65	
20:00-21:00	15			
21:00-22:00	16			
22:00-23:00	17	16	60	
23:00-24:00	15			
24:00-1:00	15			
1:00-2:00	15			
2:00-3:00	15			
3:00-4:00	14			
4:00-5:00	16			
5:00-6:00	16			
6:00-7:00	18			

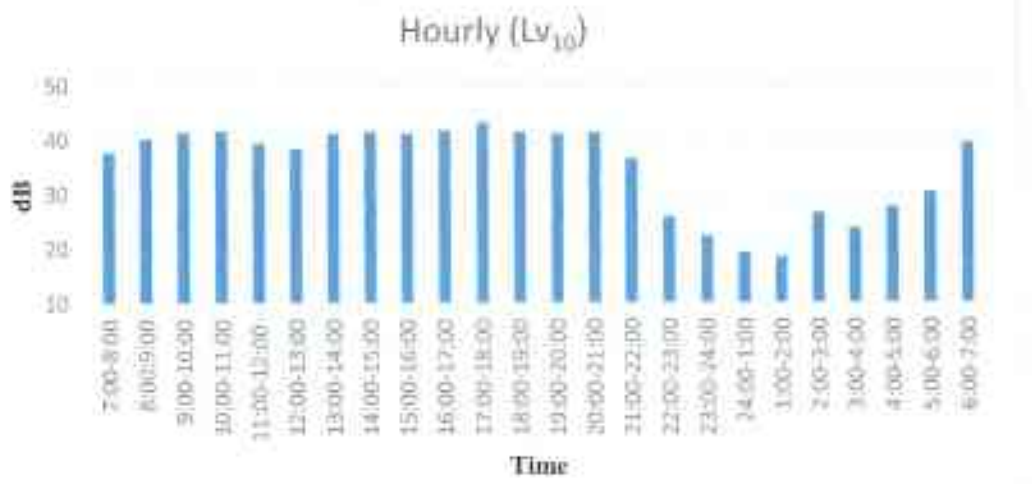

Figure 2.4-3 Results of Vibration Levels (L_{v10}) Monitoring at NV-1

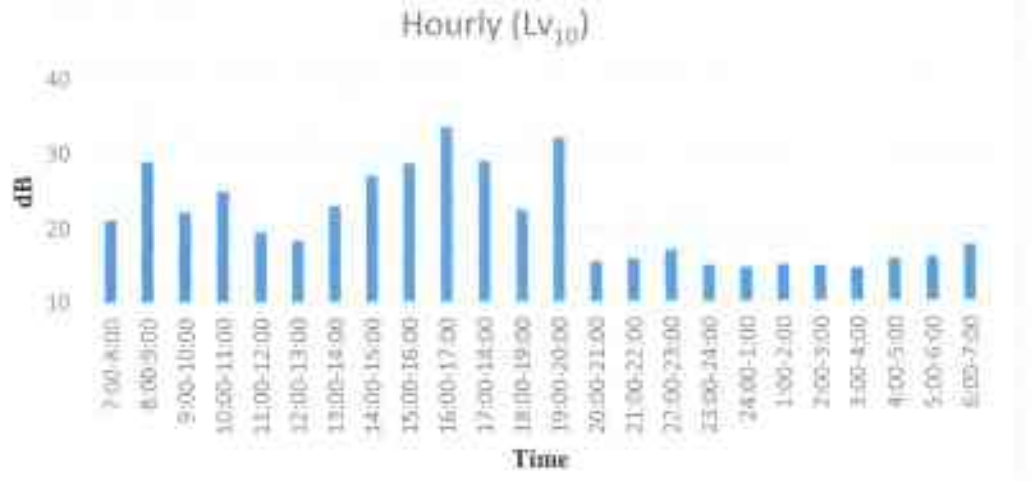

Figure 2.4-4 Results of Vibration Levels (L_{v10}) Monitoring at NV-2

CHAPTER 3: CONCLUSION AND RECOMMENDATION

By comparing with the target noise and vibration level in construction stage in EIA report for Thilawa SEZ development project Zone B, all results were under the target values at NV-1 and NV-2. The results of vibration level for NV-1 and NV-2 are approximately half of the target levels. Thus, there is no negative impact on noise and vibration from construction 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)
Development Project –Phase 1

Appendix

Traffic Volume Monitoring Report

September 2017

TRAFFIC VOLUME MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1 CONSTRUCTION STAGE)

(QUARTERLY MONITORING)

September 2017

Myanmar Koei International Ltd.

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CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

Thilawa Special Economic Zone (TSEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular environmental monitoring in the industrial area of Zone 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 construction of industrial area in and around Thilawa SEZ Zone B, Traffic volume had been monitored from 19th September 2017 – 20th September 2017 as follows;

Table 1.2-1 Outlines of Traffic Volume Monitoring

Monitoring Date	Monitoring Item	Parameters	Number of Points	Duration	Monitoring Methodology
From 19th September- 20th September, 2017	Traffic Volume	-	1 (TV-1)	24 hours	Manual Count

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)

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	Four-wheeled heavy vehicle	  	Medium bus, Express, Big bus, Medium truck, Heavy truck
4	Others		Tractor

2.2 Monitoring Location

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

Figure 2.2-1 Location of Traffic Volume Monitoring Point

TV-1

TV-1 is located in front of main gate of construction 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 and paddy field in the west respectively.

2.3 Monitoring Method

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

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

2.4 Monitoring Results

The traffic volume monitoring results are summarized in Table 2.4-1. Hourly quantities of each type of vehicle were recorded. The table 2.4-1 shows that the number of 2-wheel vehicles are distinctly higher utilized in weekdays. The number of 4-wheel heavy vehicles are slightly lower than the number of 4-wheel light vehicles for each direction.

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

Survey Point	Direction	Date	Weekday	2-wheel Vehicles	4-wheel Light Vehicles	4-wheel Heavy Vehicles	Others	Total
TV-1	Phalan village to Dagon-Thilawa road	19th September-20th September 2017	Tuesday & Wednesday	1,254	509	393	17	2,173
	Dagon-Thilawa road to Phalan village			1,195	486	372	19	2,072

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

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

From	To	Classification				Total
		Type of vehicles				
		Two-wheeled vehicle	Four-wheeled light vehicle	Four-wheeled heavy vehicle	Others	
11:00	12:00	58	28	19	1	106
12:00	13:00	66	37	16	1	120
13:00	14:00	69	51	36	3	159
14:00	15:00	40	35	40	1	116
15:00	16:00	55	40	33	1	129
16:00	17:00	52	50	33	2	137
17:00	18:00	110	45	21	0	176
18:00	19:00	51	27	23	3	104
19:00	20:00	21	17	21	0	59
20:00	21:00	14	12	18	0	44
21:00	22:00	13	7	8	0	28
22:00	23:00	5	4	1	0	10
23:00	00:00	1	0	0	0	1
00:00	1:00	0	0	0	0	0
1:00	2:00	2	3	0	0	5
2:00	3:00	1	2	1	0	4
3:00	4:00	1	1	2	0	4
4:00	5:00	8	1	2	1	12
5:00	6:00	18	8	3	0	30
6:00	7:00	108	27	17	1	153
7:00	8:00	263	59	17	1	340
8:00	9:00	87	30	15	1	133
9:00	10:00	93	25	30	1	159
10:00	11:00	88	50	37	0	164
Total		1,254	509	393	17	2,173

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

From	To	Classification				Total
		Type of vehicles				
		Two-wheeled vehicle	Four-wheeled light vehicle	Four-wheeled heavy vehicle	Others	
11:00	12:00	64	31	29	3	127
12:00	13:00	67	34	9	2	112
13:00	14:00	58	59	17	0	134
14:00	15:00	65	28	29	0	122
15:00	16:00	58	35	32	3	128
16:00	17:00	75	53	33	0	143
17:00	18:00	202	50	38	5	295
18:00	19:00	80	25	23	2	130
19:00	20:00	36	17	15	0	68
20:00	21:00	19	13	19	0	52
21:00	22:00	16	4	14	0	34
22:00	23:00	14	9	1	1	24
23:00	00:00	4	1	0	0	5
00:00	1:00	2	2	0	0	4
1:00	2:00	1	2	1	0	4
2:00	3:00	1	1	1	0	3
3:00	4:00	1	1	3	0	5
4:00	5:00	2	3	1	1	7
5:00	6:00	17	6	5	0	28
6:00	7:00	45	17	8	0	70
7:00	8:00	147	35	14	0	196
8:00	9:00	85	32	16	1	134
9:00	10:00	63	23	24	0	110
10:00	11:00	74	42	30	1	147
Total		1,195	486	372	19	2,072

CHAPTER 3: CONCLUSION AND RECOMMENDATION

The results of the traffic volume show that the number of 2-wheel vehicles are distinctly higher utilized in this monitoring period. The number of 4-wheel heavy vehicles are slightly lower than the number of 4-wheel light vehicles for each direction. It seems that commuting vehicles are much utilized during this monitoring period as compare with construction related vehicles (4-wheel heavy vehicles).

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

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