MJTD

Thilawa Special Economic Zone (Zone B) Development

Environmental Monitoring Report Phase-1 & 2 (Construction Phase)

Myanmar Japan Thilawa Development Limited.

March 2018

CONTENTS

Appendix

1. Executive Summary

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

The monitoring record from December 2017 to February 2018 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
4	Environmental Monitoring Report	Phase-1 Construction Phase	December, 2017

Report (No.5) 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		

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

Neither accidents nor incidents happen during this monitoring period.

e) **Monitoring data on environmental parameters and conditions as committed in the EMP or otherwise required.**

Please refer to the attached Environmental Monitoring Form.

3. Construction Progress

Thilawa SEZ Zone B Development Project construction activities is submitted enclosed with monthly progress reports from contractor in Appendix A to C.

A. Monthly Progress Report for December, 2017

B. Monthly Progress Report for January, 2018

C. Monthly Progress Report for February, 2018

4. Monitoring Result

Environmental Monitoring Plan report for construction phase implemented according to the following table, reference on Table 10.2-2, Chapter 10, EIA for Industrial Area of Zone-B.

Monitoring Plan (Construction Phase)

Category	Item	Location	Frequency	Remark
Air Quality	NO_2, SO_2, CO, $PM_{2.5}$, PM_{10}	Construction site (1 point)	Once/ 3month	December 2017, Air Quality Monitoring Report
Water Quality	Water temperature, pH, SS, DO, BOD_5, COD, coliforms, oil and grease, chromium	· Over flow of construction site to the creek (at least 3 sampling points/ mixing point: i) discharge water, ii) upstream water and iii) downstream water · Well near the construction site (1 point)	Once/ 2 month	December 2017 and February 2018 Water and Wastewater Quality Monitoring Report
Waste	Amount and kind of solid waste	Construction site	Once/ 3 month	Monthly Progress Reports (December 2017, January, February 2018)
Noise and Vibration	· Noise and vibration level · Traffic Count	Preservation area such as residence around the proposed construction site (at least 1 point)	Once/ 3 month (peak period)	Noise and Vibration Monitoring Report December 2017
		Preservation site such as residence along the route for on-site vehicles (1 point for noise and vibration and 2 points for traffic count)		Traffic Count Monitoring Report December 2017
Ground Subsidence	· Ground water level · Ground elevation level · Consumption of ground water amount	Representative (1 point)	Every week	Monthly Progress Report (December 2017, January, February 2018)
Hydrology				

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Category	Item	Location	Frequency	Remark
Risk for infectious disease such as AIDS/HIV	Status of measures of infectious disease	Construction site	Once/month	Monthly Progress Reports (December 2017, January, February 2018)
Working conditions (including occupational safety)	Prehension of condition of occupational safety and health Prehension of infectious disease	Construction site	Once/ month	
Accident	Existence of accident	Construction site	As occasion arise	

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

Thilawa Special Economic Zone (Zone B)
Development Project –Phase 1 & 2

Environment Monitoring Form

Environment Monitoring Form

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

(1) General

1) Phase of the Project

- Please mark the current phase.

☐ Pre-Construction Phase ☑ Construction Phase ☐ Operation Phase

2) Obtainment of Environmental Permits

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

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 (December 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	0.066	0.128	0.2 mg/m³ (1 Hour)	0.2 mg/m³ (1 Hour)	-	One time / 3 months	Haz-Scanner EPAS	Refer to air quality report
	SO_2	mg/m³	0.024*2	0.063	0.02 mg/m³ (24 Hours)	0.02 mg/m³ (24 Hours)	-			
	CO	mg/m³	0.089	0.656	-	10.26 mg/m³ (24 Hours)	-			
	$PM_{2.5}$	mg/m³	0.08*3	0.188	0.025 mg/m³ (24 Hours)	0.025 mg/m³ (24 Hours)	-			
	PM_{10}	mg/m³	0.021	0.104	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 (December 2017)

*2**Remarks:** During monitoring periods, SO_2 measured value (means) is excess than the standard. Regarding to monitoring results, concentration of SO_2 measured for 5 days exceeded than the target value. After detail analyzed the SO_2 exceed time for construction period according to the win direction from Zone-B, only 5 hours exceeded during seven days are come from the construction site of Zone-B.

*3**Remarks**: During monitoring periods, $PM_{2.5}$ measured value (means) is excess than the standard. Regarding to monitoring results, construction of $PM_{2.5}$ measured for 5 days exceeded than the target value. After detail analyzed the $PM_{2.5}$ exceed time for construction period, 19hours exceeded during seven days are comes from the construction site of Zone-B according to the wind direction.

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
One of villager complaints about the dust emission in front of his home due to the construction soil disposal dump truck for the land grading work of drainage line.	MJTD take action as follow: · Inform to project contractor about the complaints · To minimize the dust emission, avoid passing through in front of complaint location area as much as possible and using the internal road access · Before using of public road near the village, spraying the water the road to prevent the dust emission control

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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	°C	28.0	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.3	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	160	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	4.44	-	-		Instrument Analysis Method	
	BOD_5	mg/L	6.01	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	30.5	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100ml	49	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L	0.01	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-3 (reference point)	Temperature	°C	25.5	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.1	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	332	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	7.79	-	-		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)
	BOD_5	mg/L	7.29	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	0.032	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-4 (reference point)	Temperature	°C	25.9	< 3 (increase)	40		Instrument Analysis Method	
	pH	-	7.4	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	284	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	6.58	-	-	Once per 2 months	Instrument Analysis Method	
	BOD_5	mg/L	6.07	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	5.8	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	0.028	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-7	Temperature	°C	There is no water to sampling	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-		6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L		50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L		-	-		Instrument Analysis Method	
	BOD_5	mg/L		50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L		250	70		APHA 5220 D (Close Reflux Colorimetric Method)	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	Total Coliform*4	MPN/100ml		400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L		10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L		0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-8	Temperature	°C	There is no	< 3 (increase)	40		Instrument Analysis Method	
	pH	-	water to	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	sampling	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L		-	-	Once per	Instrument Analysis Method	
	BOD_5	mg/L	There is no	50	20	2 months	APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	water to	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*4	MPN/100ml	sampling	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L		10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L		0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-9	Temperature	°C	25.9	< 3 (increase)	40		Instrument Analysis Method	
	pH	-	7	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS*3	mg/L	294	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	7.15	-	-	Once per	Instrument Analysis Method	
	BOD_5	mg/L	10.96	50	20	2 months	APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	16.5	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)	

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)
	Chromium	mg/L	0.024	0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
GW-2 (reference point)	Temperature	°C	29.1	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.2	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	6.24	-	-		Instrument Analysis Method	
	BOD_5	mg/L	2.91	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	49	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	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 (December 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 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-3, SW-4 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.

2) (b) Water Quality –February 2018

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	26.2	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	8	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L	30	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	6.52	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.13	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	24.7	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*3	MPN/100ml	24000	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-3 (reference point)	Temperature	°C	27.3	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.4	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L	26	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	5.4	-	-		Instrument Analysis Method	
	BOD_5	mg/L	2.86	50	20		APHA 5210 B (5days BOD Test)	

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)
	COD_{Cr}	mg/L	12.5	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform*3	MPN/100ml	35000	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	3.2	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	°C	27	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.8	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	5.94	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.72	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	27.1	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)	
SW-7	Temperature	°C	There is no water to sampling	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-		6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L		50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L		-	-		Instrument Analysis Method	
	BOD_5	mg/L		50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L		250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100ml		400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	

Location	Item	Unit	Measured Value (Max)	Country's Standard*2	Target value to be applied*1	Frequ-ency	Method	Note (Reason of excess of the standard)
	Oil and Grease	mg/L		10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L		0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-8	Temperature	°C	There is no water to sampling	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-		6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L		50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L		-	-		Instrument Analysis Method	
	BOD_5	mg/L		50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L		250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100ml		400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L		10	10		APHA 5520 B (partition Gravimetric Method)	
	Chromium	mg/L		0.5	0.5		APHA (Inductively Coupled Plasma (ICP) Method)	
SW-9	Temperature	°C	27.3	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.3	6-9	6.0 – 9.0		Instrument Analysis Method	
	SS	mg/L	20	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	6.12	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.44	50	20		APHA 5210 B (5days BOD Test)	
	COD_{Cr}	mg/L	11.6	250	70		APHA 5220 D (Close Reflux Colorimetric Method)	
	Total Coliform	MPN/100ml	23	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	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	Frequ-ency	Method	Note (Reason of excess of the standard)
GW-2 (reference point)	Temperature	°C	31.8	< 3 (increase)	40	Once per 2 months	Instrument Analysis Method	
	pH	-	7.6	6-9	6.0 - 9.0		Instrument Analysis Method	
	SS	mg/L	4	50	30		APHA 2540D (Dry at 103-105°C Method)	
	DO	mg/L	5.81	-	-		Instrument Analysis Method	
	BOD_5	mg/L	3.54	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	< 1.8	400	400		APHA 9221 B (Standard Total Coliform Fermentation Technique)	
	Oil and Grease	mg/L	< 3.1	10	10		APHA 5520 B (partition Gravimetric Method)	
	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 (February 2018)

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

*3Remark: For the monitoring point of SW-2, SW-3 and SW-4 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 (December 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)	60	65	Refer to NEQG Article 1.3	75	Refer the section 2.4 in EIA main report	One time / 3 months		
	Leq (evening)	dB(A)	48	48		60				
	Leq(night)	dB(A)	46	47		55				
Along the road (NV-1)	Leq (day)	dB(A)	58	61		75				
	Leq(night)	dB(A)	52	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 (December 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	14-Dec-2017	Construction Waste	Loads	2	Waste disposing to authorized waste collector (YCDC)
Amount of sludge	26-Dec-2017	Construction Waste	Loads	2	Waste disposing to authorized waste collector (YCDC)
Amount of sludge	10-Jan-2018	Construction Waste	Loads	2	Waste disposing to authorized waste collector (YCDC)
Amount of sludge	24-Jan-2018	Construction Waste	Loads	2	Waste disposing to authorized waste collector (YCDC)
Amount of sludge	23-Feb-2018	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-Dec-2017	98	m^3/ week	6.299	m	
14-Dec-2017	92	m^3/ week	6.297	m	
21-Dec-2017	150	m^3/ week	6.297	m	
28-Dec-2017	130	m^3/ week	6.298	m	

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

6) (b)Ground Subsidence Hydrology

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
4-Jan-2018	120	m^3/ week	-	m	
11-Jan-2018	126	m^3/ week	6.297	m	
18-Jan-2018	130	m^3/ week	6.298	m	
25-Jan-2018	144	m^3/ week	6.298	m	

Remarks: Reference to Monthly Progress Report (January-2018)

6) (c)Ground Subsidence Hydrology

Duration (Week)	Water Consumption		Ground Level		Note
	Quantity	Unit	Quantity	Unit	
1-Feb-2018	152	m^3/ week	6.297	m	
8-Feb-2018	104	m^3/ week	6.297	m	
15-Feb-2018	118	m^3/ week	6.298	m	
22-Feb-2018	143	m^3/ week	6.297	m	

Remarks: Reference to Monthly Progress Report (February-2018)

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	- Two Land Owner agreed with Land Acquisition and Compensation - Four PAHs relocated	
	Income Restoration Program	- Job Matching Program (distribution CV Template and collecting CV) from Zone B relocation site (Phase 1) - Supporting to establish water and electricity user Association in Zone Phase 1 relocation site - Planning Vulnerable People 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
Garbage issue at relocation site (Zone B)	Dowa come and pick the trash in every two week and resolved it.
Job opportunities issue at relocation site (Zone B)	The names of people who wants to get a job is listed to be considered in IRP programs. Trainings are also be provided.
Road damage issue at relocation site (Zone B)	Informed to the respective contractor to do the maintenance works. The contractor had taken action immediately and the road condition is now good.
Livelihood issue at relocation site (Zone B)	TSMC met with Daw Thida who has consulted difficulty in livelihood. MJTD tried to provide her a job to earn daily income but she denied it because she has to look after her daughter who is disable. Her elder daughter is also working at one of the garment factory outside TSEZ.
Water Supply issue at relocation site (Zone B)	MJTD informed to the contractor to find the error and fix the water supply problem. The sensor had been fixed and cleaning had been done by the contractor for once. The water supply is now working properly.

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)
December,2017	Support infrastructure renovation, clinical accessories donation	Myaing Thar Yar village clinic
	Support infrastructure renovation, teaching aids donation, lunch provision to the students	Myaing Thar Yar preschool
January, 2018	Rubbish collection activity	Myaing Thar Yar new ward (93 houses)
February, 2018	Support in renovation of village access road	Myaing Thar Yar new ward (93 houses)

End of Document

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Thilawa Special Economic Zone Management Committee
Ref.No.....
Date.....

Republic of the Union of Myanmar
Thilawa Special Economic Zone Management Committee

Our Ref: Thilawa-2/TSEZ/2018 (033)
Date: 10th January 2018

To: Myanmar Japan Thilawa Development Limited

Subject: **Notification of the comments of Ministry of Natural Resources and Environmental Conservation regarding with the Standard Change of Wastewater Quality of Industrial Zone, Internal Regulations of Thilawa SEZ Zone A and Zone B**

Reference: MJTD/O/17-09-458 on 11th September 2017 submitted by MJTD

Thilawa Special Economic Zone Management Committee (TSMC) received the comments letter from Ministry of Natural Resources and Environmental Conservation (MONREC) regarding the request for the the Standard Change of Wastewater Quality of Industrial Zone, Internal Regulations of Thilawa SEZ Zone A and Zone B by Myanmar Japan Thilawa Development Limited (MJTD) with above reference letter. TSMC would like to notify the comments letter which approved the request of MJTD (Letter No. PC-5/General (6/2018) dated on 5th January 2018, as per enclosed.

Dr. Than Than Thwe
Joint Secretary (1)
Thilawa SEZ Management Committee

Copy forwarded to:—
Vice Chairman (1) of Thilawa Special Economic Zone Management Committee
Vice Chairman (2) of Thilawa Special Economic Zone Management Committee
Secretary of Thilawa Special Economic Zone Management Committee
Joint secretary (2) of Thilawa Special Economic Zone Management Committee
Environment Section of One Stop Service Center of Thilawa Special Economic Zone Management Committee

1

MYANMAR JAPAN THILAWA DEVELOPMENT LTD. MJTD

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ
သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
(ရုံးအမှတ် ၅၃၊ နေပြည်တော်)

စာအမှတ်၊ ကာကွယ်ရေး-၅/ ထွေ (၆ /၂၀၁၈)
ရက်စွဲ၊ ၂၀၁၈ ခုနှစ်၊ ဇန်နဝါရီလ ၅ ရက်

သို့

ဥက္ကဋ္ဌ
သီလဝါအထူးစီးပွားရေးဇုန်စီမံခန့်ခွဲမှုကော်မတီ

အကြောင်းအရာ။ **သီလဝါအထူးစီးပွားရေးဇုန် အပိုင်း (က) နှင့် အပိုင်း (ခ) ရှိ စက်မှုဇုန် ဧရိယာများအတွက် စွန့်ပစ်ရေအရည်အသွေးစံချိန်စံညွှန်းများနှင့် ပတ်သက်၍ ပြင်ဆင်သတ်မှတ်ခွင့်ပြုပါရန် တင်ပြလာခြင်းကိစ္စ**

ရည်ညွှန်း ချက်။ သီလဝါအထူးစီးပွားရေးဇုန်စီမံခန့်ခွဲမှုကော်မတီ၏ ၂၇-၉-၂၀၁၇ ရက်စွဲပါ စာအမှတ်၊ သလဝ-၂/TSEZ/၂၀၁၇(၁၀၅၈)

၁။ အထက်အကြောင်းအရာပါကိစ္စနှင့်ပတ်သက်၍ သီလဝါအထူးစီးပွားရေးဇုန် အပိုင်း (က) နှင့် အပိုင်း (ခ) ရှိ စက်မှုဇုန်ဧရိယာများကို အကောင်အထည်ဖော်ဆောင်ရွက်လျက်ရှိသည့် Myanmar Japan Thilawa Development Limited (MJTD) ကုမ္ပဏီသည် သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၏ အတည်ပြုချက်ရယူပြီးဖြစ်သည့် သီလဝါအထူးစီးပွားရေးဇုန် အပိုင်း (က) နှင့် အပိုင်း (ခ) ရှိ စက်မှုဇုန်ဧရိယာများအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာတွင် ပါဝင်သော စက်ရုံတစ်ခုချင်းစီ၏ ကနဦးရေဆိုးသန့်စင်မှုအတွက် ရေအရည်အသွေးစံချိန်စံညွှန်းသတ်မှတ်ချက်များနှင့် MJTD ၏ Central Wastewater Treatment Plant မှ သန့်စင်ပြီးနောက် ရေထုသို့ စွန့်ပစ်မည့် ရေအရည်အသွေးစံချိန်စံညွှန်းများကို အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာ အရည်အသွေး(ထုတ်လွှတ်မှု)လမ်းညွှန်ချက်များ (National Environmental Quality (Emission) Guidelines -NEQEG) တွင် ပါရှိသော စံချိန်စံညွှန်းများနှင့် ကိုက်ညီမှုရှိစေရန် Parameters အချို့ကို ထပ်မံဖြည့်စွက်ခြင်း၊ NEQEG ထက် ပိုမိုတင်းကြပ်သည့် စံချိန်စံညွှန်းအဖြစ် ပြောင်းလဲပြင်ဆင်သတ်မှတ်ခွင့်ပြုပါရန် MJTD မှ သီလဝါအထူးစီးပွားရေးဇုန်စီမံခန့်ခွဲမှုကော်မတီသို့ တင်ပြလာသည့်အပေါ် ခွင့်ပြုပေးနိုင်ပါရန် ရည်ညွှန်းပါစာဖြင့် သီလဝါအထူးစီးပွားရေးဇုန်စီမံခန့်ခွဲမှုကော်မတီမှ တင်ပြလာပါသည်။

၂။ MJTD ၏ Central Wastewater Treatment Plant မှ သန့်စင်ပြီးနောက် ရေထုသို့ စွန့်ပစ်မည့် ရေအရည်အသွေးစံချိန်စံညွှန်းများနှင့် ပတ်သက်၍ သီလဝါအထူးစီးပွားရေးဇုန် အပိုင်း (က) နှင့် အပိုင်း (ခ) တို့၏ EIA အစီရင်ခံစာတွင် ဖော်ပြထားသည့် စွန့်ပစ်ရေအရည်အသွေးစံချိန်စံညွှန်းများကို အောက်ဖော်ပြပါအတိုင်း အသီးသီး ပြင်ဆင်၍ Parameter (၃၇) မျိုးအား တပြေးညီ သတ်မှတ်နိုင်ရန် တင်ပြလာပါသည် -

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

(က) သီလဝါအထူးစီးပွားရေးဇုန်**အပိုင်း (က)** EIA အစီရင်ခံစာ၏ ဇယား (၂.၂-၃) ၌ ဖော်ပြထားသည့် စွန့်ပစ်ရေအရည်အသွေးအဆင့်သတ်မှတ်ချက်များတွင် Ammonia, Chlorine (total residual), Chromium (hexavalent), COD(Cr) Dicromate value, Cyanide (total), Fluoride, Heavy Metals (total), Iron, Silver, Total Nitrogen, Total Phosphorus စသည့် Parameter (၁၁) မျိုးကို ဖြည့်စွက်ခြင်း၊ Biochemical Oxygen Demand (BOD), Oil and Grease, Total Suspended Solids (TSS) စသည့် Parameter (၃) မျိုးကို ယခင်သတ်မှတ်ချက်ထက် ဖြည်လျော့ခြင်း၊ Arsenic, Copper, Cyanide (as HCN) (Free), Lead, pH, Phenols and Cresols, Temperature, Zinc စသည့် Parameter (၈)မျိုးကို ယခင်သတ်မှတ်ချက်ထက် တင်းကြပ်ခြင်းဖြင့် လည်းကောင်း၊

(ခ) သီလဝါအထူးစီးပွားရေးဇုန် **အပိုင်း (ခ)** EIA အစီရင်ခံစာ၏ ဇယား (၂.၂-၇) ၌ ဖော်ပြထားသည့် စွန့်ပစ်ရေအရည်အသွေးသတ်မှတ်ချက်များတွင် Cyanide (total), Heavy Metal (total), Insecticide, Radioactive Materials, Tar စသည့် Parameter (၅) မျိုးကို ဖြည့်စွက်ခြင်း၊ Biochemical Oxygen Demand (BOD), COD(Cr) Dicromate value, Total Suspended Solids (TSS) စသည့် Parameter (၃) မျိုးကို ယခင်သတ်မှတ်ချက်ထက် ဖြည်လျော့ခြင်း၊ Cadmium, Cyanide (as HCN) (Free), Mercury, Nickel, Phenols and Cresols, Selenium စသည့် Parameter (၆) မျိုး ကို ယခင်သတ်မှတ်ချက်ထက် တင်းကြပ်ခြင်းဖြင့် လည်းကောင်း၊

၃။ သို့ဖြစ်ပါ၍ MJTD ၏ Central Wastewater Treatment Plant အနေဖြင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာနမှ ထုတ်ပြန်ထားသည့် National Environmental Quality (Emission) Guidelines (NEQEG) ၏ နောက်ဆက်တွဲ (က)၊ အပိုဒ်ခွဲ (၂.၄.၂) စွန့်ပစ်ရေသန့်စင်မှုလုပ်ငန်းပါ လမ်းညွှန်ချက်များကို လိုက်နာရန် လိုအပ်ပါကြောင်းနှင့် အထက်အဖော်ပြပါ အပိုဒ် (၂)၊ အပိုဒ်ခွဲ (က) နှင့် အပိုဒ်ခွဲ (ခ) ပါ ထပ်မံဖြည့်စွက်ခြင်း၊ NEQEG ထက် တင်းကြပ်ခြင်း အချက်များအပေါ် ကန့်ကွက်ရန် မရှိပါကြောင်း ပြန်ကြားအပ်ပါသည်။

(လှမောင်သိန်း)
ညွှန်ကြားရေးမှူးချုပ်

မိတ္တူကို
ရုံးလက်ခံ/ မျှော်စာတွဲ

MJTD DEVELOPMENT LIMITED MYANMAR

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်
သီလဝါအထူးစီးပွားရေးဇုန်စီမံခန့်ခွဲမှုကော်မတီ

စာအမှတ်၊ သလဝ-၂/TSEZ /၂၀၁၇ (၁၀၅၈)
ရက်စွဲ၊ ၂၀၁၇ ခုနှစ်၊ စက်တင်ဘာလ(၂၇)ရက်

သို့

ညွှန်ကြားရေးမှူးချုပ်
ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန
သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန

အကြောင်းအရာ။ **သီလဝါအထူးစီးပွားရေးဇုန် အပိုင်း(က)နှင့်အပိုင်း(ခ)ရှိ စက်မှုဇုန်ဧရိယာများ အတွက် စွန့်ပစ်ရေအရည်အသွေးစံချိန်စံညွှန်းများနှင့်ပတ်သက်၍ ပြင်ဆင် သတ်မှတ်ခွင့်ပြုပါရန် တင်ပြခြင်းကိစ္စ။**

ရည်ညွှန်းချက်။ (၁) Myanmar Japan Thilawa Development Limited ၏ ၁၁-၉-၂၀၁၇ ရက်စွဲပါ စာအမှတ်၊ MJTD/O/17-09-458
(၂) ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့်သစ်တောရေးရာဝန်ကြီးဌာန၏ ၁၀-၁၁-၂၀၁၃ ရက်စွဲပါ စာအမှတ်၊ ၂/၂၂၀(ခ)(၆)/(၇၇၉၈/၂၀၁၃)
(၃) သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန၏ ၂၉-၁၂-၂၀၁၆ ရက်စွဲပါ စာအမှတ်၊ (သစ်တော)၃/၁၆(ဃ)(၂၇၇၂/၂၀၁၆)

၁။ အထက်အကြောင်းအရာပါကိစ္စနှင့်ပတ်သက်၍ သီလဝါအထူးစီးပွားရေးဇုန် အပိုင်း(က)နှင့် အပိုင်း(ခ)ရှိ စက်မှုဇုန်ဧရိယာများကို အကောင်အထည်ဖော်ဆောင်ရွက်လျက်ရှိသည့် Myanmar Japan Thilawa Development Limited (MJTD) ကုမ္ပဏီသည် ရည်ညွှန်းချက်(၂)နှင့်(၃)ပါစာ စာများအရ ဝန်ကြီးဌာန၏ အတည်ပြုချက်ရယူပြီးဖြစ်သည့် သီလဝါအထူးစီးပွားရေးဇုန် အပိုင်း(က) နှင့် အပိုင်း(ခ)ရှိ စက်မှုဇုန်ဧရိယာများအတွက် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းအစီရင်ခံစာတွင် ပါဝင်သော စက်ရုံတစ်ခုချင်းစီ၏ ကနဦးရေဆိုးသန့်စင်မှုအတွက် ရေအရည်အသွေးစံချိန်စံညွှန်း သတ်မှတ်ချက်များနှင့် MJTD ၏ Central Wastewater Treatment Plant မှ သန့်စင်ပြီးနောက် ရေထုသို့စွန့်ပစ်မည့် ရေအရည်အသွေးစံချိန်စံညွှန်းများကို ၂၉-၁၂-၂၀၁၅ ရက်နေ့တွင် ထုတ်ပြန်ခဲ့သည့် National Environmental Quality Guideline-NEQG တွင်ပါရှိသော စံချိန်စံညွှန်းများနှင့် ကိုက် ညီမှုရှိစေရန် အချို့သော Parameters များကို ပြောင်းလဲပြင်ဆင် သတ်မှတ်ခွင့်ပြုပါရန် MJTD မှ သီလဝါအထူးစီးပွားရေးဇုန်စီမံခန့်ခွဲမှုကော်မတီသို့ ရည်ညွှန်းချက်(၁)ပါစာဖြင့် တင်ပြလာပါသည်။

၂။ အဆိုပါကိစ္စနှင့်စပ်လျဉ်း၍ သီလဝါအထူးစီးပွားရေးဇုန်စီမံခန့်ခွဲမှုကော်မတီအနေဖြင့် အောက်ပါအတိုင်း စီစစ်သုံးသပ်တင်ပြအပ်ပါသည်-

(က) MJTD ၏ ပူးတွဲယောင်း-၁ တွင် ပြန်လည်ပြင်ဆင်ဖော်ပြထားသော ရေအရည်အသွေး စံချိန်စံညွှန်းများသည် စက်ရုံတစ်ခုချင်းစီမှ ကနဦးရေဆိုးသန့်စင်မှု ဆောင်ရွက်ပြီးနောက် MJTD ၏ Central

Wastewater Treatment Plant သို့ ပို့ဆောင်ရာတွင် စက်ရုံ တစ်ခုချင်းစီမှ လိုက်နာရမည့် စံချိန်စံညွှန်းများဖြစ်ပါသည်။ သီလဝါအထူးစီးပွားရေးဇုန် အပိုင်း(က) EIA အစီရင်ခံစာ၏ ဇယား(၂.၂-၂) တွင်ပါရှိ သော ရေအရည်အသွေးစံချိန် စံညွှန်းများတွင် Total Cyanide, Heavy metals (total), Chromium, Ammonia, Iron စသည့်လိုအပ်သည့် Parameter များထပ်မံဖြည့်စွက်၍ လည်းကောင်း၊ Cyanide Zinc, Arsenic, Copper, Lead ကဲ့သို့သော Parameter များကို NEQG ထက် ပိုမိုတင်းကျပ်သည့် စံချိန်စံညွှန်းများအဖြစ်လည်းကောင်း ပြင်ဆင်သတ်မှတ်ပြီး ပတ်ဝန်း ကျင်ထိန်းသိမ်းရေးဦးစီးဌာန၏ ခွင့်ပြုချက်ရရှိပါက MJTD ၏ Internal Regulation တွင် ပြန်လည်ပြင်ဆင်သတ်မှတ်သွားမည်ဖြစ်ပါသည်။

(ခ) MJTD ၏ ပူးတွဲဇယား-၂ တွင် ပြန်လည်ပြင်ဆင်ဖော်ပြထားသော ရေအရည်အသွေးစံချိန် စံညွှန်းများသည် MJTD ၏ Central Wastewater Treatment Plant မှ သန့်စင်ပြီး နောက် ရေထုသို့စွန့်ပစ်မည့် ရေအရည်အသွေးစံချိန်စံညွှန်းများ ဖြစ်ပါသည်။ သီလဝါ အထူးစီးပွားရေးဇုန် အပိုင်း(ခ) EIA အစီရင်ခံစာ၏ ဇယား(၂.၄-၅) တွင်ပါရှိသော ရေ အရည်အသွေး စံချိန် စံညွှန်းအများစုကို NEQG တွင်ပါရှိသော စံချိန်စံညွှန်းများနှင့် ကိုက်ညီအောင်ပြင်ဆင်ထားပြီး BOD, COD_{Cr}, Mercury, Cadmium, Selenium, Nickel ကဲ့သို့သော Parameter များမှာ NEQG ထက် ပိုမိုတင်းကျပ်သည့် စံချိန်စံညွှန်း များအဖြစ် ဖော်ပြထားပါသည်။ ထို့အပြင် NEQG တွင် ဖော်ပြထားခြင်းမရှိသည့် Formal dehyde, Free Chlorine, Barium, Color and Odor, Total Nitrogen ကဲ့သို့သော Parameter များကို အပိုင်း(ခ)EIAအစီရင်ခံစာတွင် ဖော်ပြထား သည့် စံချိန် စံညွှန်းများအတိုင်း ဆက်လက်ထားရှိမည်ဖြစ်ပါသည်။

၃။ သို့ဖြစ်ပါ၍ MJTD မှ တင်ပြလာသည့် သီလဝါအထူးစီးပွားရေးဇုန် အပိုင်း(က) နှင့်အပိုင်း(ခ) ရှိ စက်မှုဇုန်ဧရိယာများအတွက် စွန့်ပစ်ရေအရည်အသွေးစံချိန်စံညွှန်းများ ပြန်လည်ပြင်ဆင် သတ်မှတ်ရေးကိစ္စ နှင့်ပတ်သက်၍ ခွင့်ပြုပေးနိုင်ပါရန်ညှိနှိုင်းမေတ္တာရပ်ခံတင်ပြအပ်ပါသည်။

ဥက္ကဋ္ဌ(ကိုယ်စား)
(ဒေါက်တာသန်းသန်းသွယ်၊ တွဲဖက်အတွင်းရေးမှူး- ၁)

မိတ္တူကို

ဒုတိယဥက္ကဋ္ဌ၊ သီလဝါအထူးစီးပွားရေးဇုန်စီမံခန့်ခွဲမှုကော်မတီ
အတွင်းရေးမှူး၊ သီလဝါအထူးစီးပွားရေးဇုန်စီမံခန့်ခွဲမှုကော်မတီ
ရုံးလက်ခံ

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Date : 11th September 2017

Ref No.: MJTD/O/17-09-458

Dr. Than Than Thwe

Joint Secretary

Thilawa SEZ Management Committee

Subject : Inform the Standard Change of Wastewater Quality of Industrial Zone, Internal Regulations of Thilawa SEZ Zone A and Zone B

Dear Dr. Than Than,

We would like to express our sincere gratitude for your continuous supports towards our Thilawa SEZ project.

With regard to the above subject, we would like to inform the standard change from the Internal Regulations Zone A and B to the attached table (1) of Wastewater Quality after pre-wastewater treatment by Locators.

Refer to the Notification No. (615/2015) dated on the 29 December 2015, Section 2,1-1.2 National Environmental Quality (Emission) Guidelines (NEQG) updated standard and according to the capability of Thilawa SEZ sewage treatment plant with result record, the said change parameter can control by our treatment plant.

In this connection, we would like to propose to revise Environmental Impact Assessment Report, after pre-wastewater treatment table 2.2-2 of Zone A and 2.4-5 of Zone B as per revise Internal Regulation standard and the standard of effluent water quality table 2.2-3 of Zone A and 2.4-6 of Zone B as the attached table 2 with the purpose of change.

Thank you for your kind consideration and understanding

Yours Truly,

Takashi Yanai
President and CEO
Myanmar Japan Thilawa Development Limited

Cc : Environmental Section of OSSC

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Table-1

Proposed Standard Wastewater quality after Pre-wastewater treatment by the Locator

No.	Items	Zone-A	Zone-B (Temporary)	New WQ standard	Unit	Status of Change (Reason)
1	BOD (5 days at 20°C)	200	200	200	mg/L	NOT Changed
2	Suspended Solids (SS)	200	200	200	mg/L	NOT Changed
3	Total Dissolved Solids	2,000	2,000	2,000	mg/L	NOT Changed
4	pH Value	6.5-8.5	6-9	6-9	—	To be relieved (possible to comply with NEQG after treated by MJTD STP)
5	COD_{Mn} Permanganate value	150	150	-	mg/L	Deleted (COD_{Cr} is monitored instead of COD_{Mn})
*16	COD_{Cr} Dicromate value	300	300	400	mg/L	To be relieved (possible to comply with NEQG after treated by MJTD STP)
7	Sulphide	1 (as HS)	1 (as HS)	1 (as HS)	mg/L	NOT Changed
8	*1Cyanide (as HCN) (Free)	0.2	0.2	0.1	mg/L	To make stricter (Follow NEQG)
*19	*2 Total Cyanide	-	-	1.0	mg/L	Newly added (Follow NEQG)
*110	*3 Oil and grease	5	10	40	mg/L	To be relieved (possible to comply with NEQG after treated by MJTD STP)
*111	Total coliform bacteria	400	-	-	MPN/100 mL	Deleted (possible to comply with NEQG after treated by MJTD STP)
12	Tar	None	None	None	-	NOT Changed
13	Formaldehyde	1	1	1	mg/L	NOT Changed
14	Phenols and Cresols	1	1	0.5 (Phenol)	mg/L	To make stricter (Follow NEQG)
15	Free chlorine	1	-	1	mg/L	NOT Changed
16	Heavy metals (total)	-	10	10	mg/L	Newly added (Follow NEQG)
17	Zinc	5	2	2	mg/L	To make stricter (Follow NEQG)
18	*2 Chromium (Total)	0.5	0.5	0.5	mg/L	NOT Changed
19	Chromium (Hexavalent)	-	0.1	0.1	mg/L	Newly added (Follow NEQG)
20	Arsenic	0.25	0.1	0.1	mg/L	To make stricter (Follow NEQG)
21	Copper	1	0.5	0.5	mg/L	To make stricter (Follow NEQG)
22	Mercury	0.005	0.005	0.005	mg/L	NOT Changed
23	Cadmium	0.03	0.03	0.03	mg/L	NOT Changed
24	Barium	1.0	1.0	1.0	mg/L	NOT Changed

No.	Items	Zone-A	Zone-B (Temporary)	New WQ standard	Unit	Status of Change (Reason)
25	Selenium	0.02	0.02	0.02	mg/L	NOT Changed
26	Lead	0.2	0.1	0.1	mg/L	To make stricter (Follow NEQG)
27	Nickel	0.2	0.2	0.2	mg/L	NOT Changed
28	Insecticides	None	None	None	-	NOT Changed
29	Radioactive Materials	None	None	None	-	NOT Changed
30	Temperature	35	35	≤ 35	°C	NOT Changed
31	Colour and Odor	150	150	150 (Colour)	[Co-Pt]	NOT Changed
32	T-N	80	80	80	mg/L	NOT Changed
33	Ammonia	-	80	80	mg/L	Newly added (possible to comply with NEQG after treated by MJTD STP)
34	Fluoride	-	20	20	mg/L	Newly added (Follow NEQG)
35	Iron	-	3.5	3.5	mg/L	Newly added (Follow NEQG)
36	Silver	-	0.5	0.5	mg/L	Newly added (Follow NEQG)
37	Total Phosphorus	-	2	8	mg/L	Newly added (possible to comply with NEQG after treated by MJTD STP)

Remarks

*1 Locator has to monitor the Free cyanide to comply the standard but Total cyanide is not producing from some types of industry and the standard as reference. If total cyanide is producing from industrial process, total cyanide is required to analyse and comply as regarding standard.

*2Total Cyanide and Chromium (Total) are the new items for the internal regulation as per Zone B EIA

*3Oil and grease standard is only animals and vegetable oils may discharge to sewage system. Industrial oil and grease shall not discharge to sewage system and shall treated by proper oil and grease trap.

*4 According to the investigation of the STP design, the set standard can treat by STP function.

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Table-2

Proposed Standard Effluent Wastewater Quality after Wastewater Treatment at Centralized Treatment plant by Project Proponent (MJTD)

No.	Items	NEQG	EIA (Zone-A)	EIA (Zone-B)	Proposed Target Value	Unit	Remarks
1	BOD (5 days at 20 °C)	50	20	20	30	mg/L	To be relieved (but proposed target value is less than NEQG and equal to indicative values for treated sanitary sewage discharge in IFC General EHS Guideline)
2	Suspended solids (SS)	50	30	30	50	mg/L	To be relieved (but proposed target value is equal to NEQG and indicative values for treated sanitary sewage discharge in IFC General EHS Guideline)
3	Dissolved solids	-	2000	2000	2000	mg/L	Not Changed (it is no guideline value in NEQG)
4	pH Value	6-9	5-9	6-9	6-9	—	Same as the target vale of Zone B EIA and to make stricter from Zone A EIA (Follow NEQG)
5	COD_{Mn} Permanganate value	-	35	35	-	mg/L	Deleted (COD_{Cr} is monitored instead of COD_{Mn})
6	COD_{Cr} Dicromate value	250	-	70	125	mg/L	To be relieved (but proposed target value is less than NEQG and equal to indicative values for treated sanitary sewage discharge in IFC General EHS Guideline)
7	Sulphide	1 (as HS)	1 (as HS)	1 (as HS)	1 (as HS)	mg/L	NOT Changed
8	Cyanide (as HCN) (Free)	0.1	0.2	0.2	0.1	mg/L	To make stricter (Follow NEQG)
9	Cyanide (Total)	1	-	-	1	mg/L	Newly added (Follow NEQG)
10	Oil and grease	10	5	10	10	mg/L	Same as the target vale of Zone B EIA and to be relieved from Zone A EIA (but proposed target value is equal to NEQG and indicative values for treated sanitary sewage discharge in IFC General EHS Guideline)
11	Total coliform bacteria	400	400	400	400	MPN/ 100mL	NOT Changed
12	Tar	-	None	-	None	-	NOT Changed
13	Formaldehyde	-	1	1	1	mg/L	NOT Changed
14	Phenols and Cresols	0.5 (Phenol)	1	1	0.5 (Phenol)	mg/L	To make stricter (Follow NEQG and apply only for Phenols because Phenols includes Cresols)
15	Free chlorine	-	1	-	1	mg/L	Not Changed (it is no guideline value in NEQG)
16	Total Residual Chlorine	0.2	-	-	0.2	mg/L	Newly added (Follow NEQG)
17	Heavy metals (total)	10	-	-	10	mg/L	Newly added (Follow NEQG)
18	Zinc	2	5	2	2	mg/L	To make stricter (Follow NEQG)

No.	Items	NEQG	EIA (Zone-A)	EIA (Zone-B)	Proposed Target Value	Unit	Remarks
19	Chromium (total)	0.5	0.5	0.5	0.5	mg/L	Not Changed
20	Chromium (Hexavalent)	0.1	-	0.1	0.1	mg/L	Same as the target vale of Zone B EIA **and to add newly from Zone A EIA** (Follow NEQG)
21	Arsenic	0.1	0.25	0.1	0.1	mg/L	Same as the target vale of Zone B EIA **and to make stricter from Zone A EIA** (Follow NEQG)
22	Copper	0.5	1	0.5	0.5	mg/L	Same as the target vale of Zone B EIA **and to make stricter from Zone A EIA** (Follow NEQG)
23	Mercury	0.01	0.005	0.01	0.005	mg/L	Same as the target vale of Zone A EIA **and to make stricter from Zone B EIA** (stricter than NEQG)
24	Cadmium	0.1	0.03	0.1	0.03	mg/L	Same as the target vale of Zone A EIA **and to make stricter from Zone B EIA** (stricter than NEQG)
25	Barium	-	1	1	1	mg/L	Not Changed (it is no guideline value in NEQG)
26	Selenium	0.1	0.02	0.1	0.02	mg/L	Same as the target vale of Zone A EIA **and to make stricter from Zone B EIA** (stricter than NEQG)
27	Lead	0.1	0.2	0.1	0.1	mg/L	Same as the target vale of Zone B EIA **and to make stricter from Zone A EIA** (Follow NEQG)
28	Nickel	0.5	0.2	0.5	0.2	mg/L	Same as the target vale of Zone A EIA **and to make stricter from Zone B EIA** (stricter than NEQG)
29	Insecticide	-	None	-	None	-	NOT Changed
30	Radioactive Materials	-	None	-	None	-	NOT Changed
31	Temperature	< 3 (increase)	40	< 3 (increase)	≤ 35	°C	**To make stricter** (According to NEQG, the guideline value is for the mixing point but we monitor at STP discharge points and we proposed the value of temperature.)
32	Color and Odor	-	-	150	150 (Color)	Co-Pt	Same as the target vale of Zone B EIA and **to add newly from Zone A EIA** (there is no guideline value for color and odor in NEQG. The proposed Co-Pt for color only)
33	Total Nitrogen	-	-	80	80	mg/L	Same as the target vale of Zone B EIA and **to add newly from Zone A EIA**
34	Ammonia	10	-	10	10	mg/L	Same as the target vale of Zone B EIA and **to add newly from Zone A EIA** (Follow NEQG)
35	Fluoride	20	-	20	20	mg/L	Same as the target vale of Zone B EIA and **to add newly from Zone A EIA** (Follow NEQG)

No.	Items	NEQG	EIA (Zone-A)	EIA (Zone-B)	Proposed Target Value	Unit	Remarks
36	Iron	3.5	-	3.5	3.5	mg/L	Same as the target vale of Zone B EIA and to add newly from Zone A EIA (Follow NEQG)
37	Silver	0.5	-	0.5	0.5	mg/L	Same as the target vale of Zone B EIA and to add newly from Zone A EIA (Follow NEQG)
38	Total Phosphorus	2	-	2	2	mg/L	Same as the target vale of Zone B EIA and to add newly from Zone A EIA (Follow NEQG)

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Thilawa Special Economic Zone (Zone B)
Development Project –Phase 1 & 2

Appendix

Water and Waste Water Monitoring Report

December 2017

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1 & 2 CONSTRUCTION STAGE)

(Bi-Monthly Monitoring)

December 2017

Myanmar Koei International Ltd.

MYANMAR-JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone B in accordance with the approved Environmental Impact Assessment (EIA) report and Environmental Management Plan (EMP). MJTD has implemented monitoring various environmental items with the specified time frame to know the environmental conditions in and around the area. As for the monitoring of the water quality, total 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	O	O	O	O	O	O	O	On-site measurement
2	Water temperature	O	O	O	O	O	O	O	On-site measurement
3	DO	O	O	O	O	O	O	O	On-site measurement
4	BOD (5)	O	O	O	O	O	O	O	Laboratory analysis
5	COD (Cr)	O	O	O	O	O	O	O	Laboratory analysis
6	Suspended solids	O	O	O	O	O	O	O	Laboratory analysis
7	Total coliform	O	O	O	O	O	O	O	Laboratory analysis
8	Oil and grease	O	O	O	O	O	O	O	Laboratory analysis
9	Chromium	O	O	O	O	O	O	O	Laboratory analysis
10	Escherichia Coli (Self-monitoring)	O	O	O	O	O	O	O	Laboratory analysis
11	Flow Rate	O	-	-	-	-	-	-	On-site measurement

Source: Myanmar Koei International Ltd.

2.2 Description of Sampling Points

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

Table 2.2-1 Outline of Sampling Points

No.	Station	Detailed Information
1	SW-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'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 5th December 2017 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar on 5th December 2017 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	5/12/2017 11:31
2	SW-3	5/12/2017 09:09
3	SW-4	5/12/2017 10:27
4	SW-7	5/12/2017 11:46
5	SW-8	5/12/2017 12:20
6	SW-9	5/12/2017 09:43
7	GW-2	5/12/2017 10:56

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
5/12/2017	00:28	0.46	Low Tide
	05:00	6.19	High Tide
	13:16	0.38	Low Tide
	17:28	5.75	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 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 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 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	℃	28.0	25.5	25.9	-	-	25.9	40.0
2	pH	-	7.3	7.1	7.4	-	-	7.0	6.0-9.0
3	Suspended solid (SS)	mg/L	160	332	284	-	-	294	30
4	Dissolved oxygen (DO)	mg/L	4.44	7.79	6.58	-	-	7.15	-
5	BOD (5)	mg/L	6.01	7.29	6.07	-	-	10.96	20.00
6	COD (Cr)	mg/L	30.5	5.9	5.8	-	-	16.5	70.0
7	Total coliform	MPN/ 100ml	49	160,000	160,000	-	-	>160,000	400
8	Oil and grease	mg/L	< 3.1	< 3.1	< 3.1	-	-	< 3.1	10.0
9	Chromium	mg/L	0.010	0.032	0.028	-	-	0.024	0.500
10	Escherichia Coli	MPN/100ml	< 1.8	1.8	< 1.8	-	-	1.8	(1000)* (CFU/100ml)
11	Flow rate	m^3/s	0.027	-	-	-	-	-	-

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. 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	29.1	40.0
2	pH	-	7.2	6.0~9.0
3	Suspended solid (SS)	mg/L	8	30
4	Dissolved oxygen (DO)	mg/L	6.24	-
5	BOD (5)	mg/L	2.91	20.00
6	COD (Cr)	mg/L	< 0.7	70.0
7	Total coliform	MPN/ 100ml	49	400
8	Oil and grease	mg/L	< 3.1	10.00
9	Chromium	mg/L	≤0.002	0.500
10	Escherichia Coli	MPN/ 100 ml	< 1.8	(100)** (MPN/100ml)
11	Flow Rate	m^3/s	-	-

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

Source: Myanmar Koei International Ltd.

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As described in Chapter 2 (Section 2.5), parameter of SS and total coliform in surface water were exceeded the target value at SW-2, SW-3, SW-4 and SW-9 in this period for construction stage of Thilawa SEZ Zone B. Surface water monitoring points (SW-7 and SW-8) have no water for sampling during the monitoring period.

For SW-3, SW-4 and SW-9 for exceeding the target values of SS and SW-3, SW-4 and SW-9 for exceeding the target value of total coliform, there are some possible reasons 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-3, SW-4, 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 at SW-7 (No water during the monitoring period)

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 at SW-8 (No water during the monitoring period)

Surface water sampling and onsite measurement at SW-9

Ground water sampling and onsite measurement at GW-2

APPENDIX-2 LABORATORY RESULTS

MYANMAR 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]

Report No. : GEM-LAB-201712108
Revision No. : 1
Report Date : 21 December, 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 2-1205 — Sampling Date : 5 December, 2017
Sample No. : W-1712039 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 5 December, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105'C Method)	mg/l	160.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	5.01	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	30.5	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimatric Method)	mg/l	< 3.1	3.1
5	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	49	1.8
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	1.8	0.0
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.137	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	30.03	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
11	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.016	0.01
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.010	0.002
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
16	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.056	0.003
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.016	0.002
20	Cyanide	HACH 8027 (Pyridine -Pyrazolone Method	mg/l	0.010	0.002
21	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	0.1	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.190	0.009
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.071	0.003
24	Phenol	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP With Distillation))	mg/l	0.002	0.002

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

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.

Report No. : GEM-LAB-201712109
Revision No. : 1
Report Date : 21 December, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa
Project Name : -
Sample Description
Sample Name : MKI-SW-1-1205
Sample No. : W-1712040
Waste Profile No. : -
Sampling Date : 5 December, 2017
Sampling By : Customer
Sample Received Date : 5 December, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	332.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	7.25	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	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	160000	1.8
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	3.8	0.0
7	Total Phosphorous	APHA 4500-P.E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	15.96	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
11	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.026	0.002
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.020	0.01
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.032	0.002
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
16	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.056	0.001
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.048	0.002
20	Cyanide	HACH 8027 (Pyridine -Pyrazolone Method	mg/l	0.021	0.002
21	Free Chlorine	APHA 4500 Cl. G (DPD Colorimetric Method)	mg/l	0.3	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.346	0.005
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.098	0.003
24	Phenol	USEPA Method 420.1 (Phenolics (Spectrophotometric, Manual 4AAP With Distillation))	mg/l	< 0.002	0.002

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

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

Report No. : GEM-LAB-201712110
Revision No. : 1
Report Date : 21 December, 2017
Application No. : 0049-C001

Analysis Report

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

Sample Name : MKI-SW-4-1205 — Sampling Date : 5 December, 2017
Sample No. : W-1712041 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 5 December, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105C Method)	mg/l	284.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	6.37	3.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	5.8	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
5	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	160000	1.8
6	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	3.1	0.0
7	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
8	Color	APHA 2120C (Spectrophotometric Method)	TCU	16.73	0.00
9	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
10	Mercury	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
11	Zinc	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.018	0.002
12	Arsenic	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.018	0.01
13	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.028	0.002
14	Cadmium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	<0.001	0.001
15	Selenium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.01	0.01
16	Lead	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
17	Copper	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002
18	Barium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.05	0.001
19	Nickel	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	0.038	0.002
20	Cyanide	HACH 8027 (Pyridine -Pyrazolone Method	mg/l	0.012	0.002
21	Free Chlorine	APHA 4500 CL G (DPD Colorimetric Method)	mg/l	< 0.1	0.1
22	Sulphide	HACH 8131 (USEPA Methylene Blue Method)	mg/l	0.383	0.005
23	Formaldehyde	HACH 8110 (MBTH Method)	mg/l	0.089	0.003
24	Phenol	USEPA Method 420.1 (Phenolics: Spectrophotometric, Manual 4AAP With Distillation)	mg/l	< 0.002	0.002

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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. 41, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 09 796919149

Report No. : GEM-LAB-201712107
Revision No. : 2
Report Date : 22 December, 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-9-1205 Sampling Date : 5 December, 2017
Sample No. : W-1712037 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 5 December, 2017

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	294.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	10.96	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	16.5	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	0.024	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
Kei Nagata
Senior Manager

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. B1, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309611 / 09 796955149

Report No. : GEM-LAB-201712111
Revision No. : 1
Report Date : 21 December, 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-2-1205 Sampling Date : 5 December, 2017
Sample No. : W-1712042 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 5 December, 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	2.91	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	< 0.7	0.7
4	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
5	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	49	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

LAB GEM

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

APPENDIX-3 LABORATORY RESULT

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

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. E1, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel: 01-2309051 / 09-796015149

Report No. : GEM-LAB-201712099
Revision No. : 1
Report Date : 21 December, 2017
Application No. : 0049-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-2-1205 Sampling Date : 5 December, 2017
Sample No. : W-1712048 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 5 December, 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 :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

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

Report No. : GEM-LAB-201712100
Revision No. : 1
Report Date : 21 December, 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-3-1205
Sample No. : W-1712049
Waste Profile No. : -
Sampling Date : 5 December, 2017
Sampling By : Customer
Sample Received Date : 5 December, 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 :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MJTD MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. 13, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel: 01-2304053, 09 796031149

Report No. : GEM-LAB-201712101
Revision No. : 1
Report Date : 21 December, 2017
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-4-1205
Sample No. : W-1712050
Waste Profile No. : -
Sampling Date : 5 December, 2017
Sampling By : Customer
Sample Received Date : 5 December, 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 :
Ni Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. 12, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309651 / 09 790035149

Report No. : GEM-LAB-201712098
Revision No. : 1
Report Date : 21 December, 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-9-1205
Sample No. : W-1712047
Waste Profile No. : -
Sampling Date : 5 December, 2017
Sampling By : Customer
Sample Received Date : 5 December, 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 :
Ni Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. 51, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 (or 9969315126)

Report No. : GEM-LAB-201712102
Revision No. : 1
Report Date : 21 December, 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-2-1205 Sampling Date : 5 December, 2017
Sample No. : W-1712051 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 5 December, 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 :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Thilawa Special Economic Zone (Zone B)
Development Project –Phase 1 & 2

Appendix

Water and Waste Water Monitoring Report

February 2018

WATER QUALITY MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

IN THILAWA SEZ ZONE B

(PHASE 1 & 2 CONSTRUCTION STAGE)

(Bi-Monthly Monitoring)

February 2018

Myanmar Koei International Ltd.

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

1.1 General

Thilawa Special Economic Zone (SEZ) is located in southern district of Yangon region and about 23 km southeast of Yangon city. As the developer of Thilawa SEZ, Myanmar Japan Thilawa Development Ltd. (MJTD) has a responsibility to carry out regular monitoring in the industrial area of Zone B in accordance with the approved Environmental Impact Assessment (EIA) report and Environmental Management Plan (EMP). MJTD has implemented monitoring various environmental items with the specified time frame to know the environmental conditions in and around the area. As for the monitoring of the water quality, total 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' 20.69", E- 96° 17' 18.04"
		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' 42.87", E- 96° 16' 27.36"
		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'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 5th February 2018 and sampling time is shown in Table 2.4-1 to avoid tidal effect. The tide record for Yangon River, Myanmar on 5th February 2018 is shown in Table 2.4-2.

Table 2.4-1 Sampling Time of Each Station

No.	Station	Sampling Time
1	SW-2	05/02/2018 11:06
2	SW-3	05/02/2018 09:21
3	SW-4	05/02/2018 09:55
4	SW-7	05/02/2018 11:30
5	SW-8	05/02/2018 11:20
6	SW-9	05/02/2018 08:56
7	GW-2	05/02/2018 10:32

Source: Myanmar Koei International Ltd.

Table 2.4-2 Tide Record for Yangon River, Myanmar

Date	Time	Height	Tide Conditions
05/02/2018	02:20	0.6	Low Tide
	07:50	5.5	High Tide
	14:40	0.6	Low Tide
	20:10	5.4	High Tide

Source: Myanmar Port Authority, Tide Table for the Yangon River and Elephant Point, 2018

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 total coliform were exceeded than the target value.

As for the result of total coliform of surface water, results at surface water monitoring points (SW-2, SW-3 and SW-4) 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 and SW-4, 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	26.2	27.3	27.0	-	-	27.3	40.0
2	pH	-	8.0	7.4	7.8	-	-	7.3	6.0–9.0
3	Suspended solid (SS)	mg/L	30	26	8	-	-	20	30
4	Dissolved oxygen (DO)	mg/L	6.52	5.40	5.94	-	-	6.12	-
5	BOD (5)	mg/L	3.13	2.86	3.72	-	-	3.44	20.00
6	COD (Cr)	mg/L	24.7	12.5	27.1	-	-	11.6	70.0
7	Total coliform	MPN/ 100ml	24,000	35,000	160,000	-	-	23	400
8	Oil and grease	mg/L	< 3.1	3.2	< 3.1	-	-	< 3.1	10.0
9	Chromium	mg/L	≤0.002	≤0.002	≤0.002	-	-	≤0.002	0.500
10	Escherichia Coli	MPN/100ml	11.0	4.0	6.8	-	-	< 1.8	(1000)* (CFU/100ml)
11	Flow rate	m^3/s	0.010	-	-	-	-	-	-

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. 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	31.8	40.0
2	pH	-	7.6	6.0~9.0
3	Suspended solid (SS)	mg/L	4	30
4	Dissolved oxygen (DO)	mg/L	5.81	-
5	BOD (5)	mg/L	3.54	20.00
6	COD (Cr)	mg/L	< 0.7	70.0
7	Total coliform	MPN/ 100ml	< 1.8	400
8	Oil and grease	mg/L	< 3.1	10.00
9	Chromium	mg/L	≤0.002	0.500
10	Escherichia Coli	MPN/ 100 ml	< 1.8	(100)** (MPN/100ml)
11	Flow Rate	m^3/s	-	-

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

CHAPTER 3: CONCLUSION AND RECOMMENDATIONS

As described in Chapter 2 (Section 2.5), parameter of total coliform for surface water monitoring was exceeded the target value at SW-2, SW-3 and SW-4 in this monitoring period for construction stage of Thilawa SEZ Zone B. Surface water monitoring points (SW-7 and SW-8) have no water for sampling during the monitoring period.

For SW-2, SW-3 and SW-4, there are some possible reasons for exceeding the target values of total coliform are by i) natural origin such as natural bacteria existed in discharged creek because there are various kinds of vegetation and creature such as birds, and small animals in and along the discharged creek and ii) wastewater from the local industrial zone outside of Thilawa SEZ and iii) 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 and SW-4 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. 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 to carry out based on the rainy and dry season data.

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

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

End of the Document

APPENDIX-1 FIELD SURVEY PHOTOS

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

FOR DISCHARGING POINT OF THILAWA SEZ ZONE B

Surface water at SW-7 (No water during the monitoring period)

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 at SW-8 (No water during the monitoring period)

Surface water sampling and onsite measurement at SW-9

Ground water sampling and onsite measurement at GW-2

APPENDIX-2 LABORATORY RESULTS

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

DOWA

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

Report No. : GEM-LAB-201802094
Revision No. : 1
Report Date : 20 February, 2018
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-2-0205 Sampling Date : 5 February, 2018
Sample No. : W-1802014 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 5 February, 2018

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	30.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.13	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	24.7	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	4.7	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.181	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	24000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	35.63	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	2	-
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. E1, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2300051 / 09-7969311449

Report No. : GEM-LAB-201802095
Revision No. : 1
Report Date : 20 February, 2018
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-3-0205 Sampling Date : 5 February, 2018
Sample No. : W-1802015 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 5 February, 2018

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	26.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	2.86	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	12.5	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	5.3	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	0.4	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	35000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	10.00	0.00
8	Odor	APHA 2150 B (Threshold Odor Test)	TON	1	-
9	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	3.20	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. EE, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309051 / 09 790815124

Report No. : GEM-LAB-201802096
Revision No. : 1
Report Date : 20 February, 2018
Application No. : 0049-C001

Analysis Report

Client Name : Myanmar Koei International LTD (MKI)
Address : No.1A /28, Mya Thidar Housing, Ward 11, South Okkalapa.
Project Name : -
Sample Description
Sample Name : MKI-SW-4-0205 Sampling Date : 5 February, 2018
Sample No. : W-1802016 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 5 February, 2018

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	3.72	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	27.1	0.7
4	Total Nitrogen	HACH Method 10072 (TNT Persulfate Digestion Method)	mg/l	4.0	0.0
5	Total Phosphorous	APHA 4500-P E (Ascorbic Acid Method)	mg/l	< 0.05	0.05
6	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	160000	1.8
7	Color	APHA 2120C (Spectrophotometric Method)	TCU	12.74	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 :
鈴木智也
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. E1, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309851, 09 796955149

Report No. : GEM-LAB-201802098
Revision No. : 1
Report Date : 20 February, 2018
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-9-0205 Sampling Date : 5 February, 2018
Sample No. : W-1802018 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 5 February, 2018

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	20.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.44	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	11.6	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	23	1.8
5	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
6	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD.
Lot No. 11, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel 01-2309651/09-796435149

Report No. : GEM-LAB-201802099
Revision No. : 1
Report Date : 20 February, 2018
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-2-0205 Sampling Date : 5 February, 2018
Sample No. : W-1802019 Sampling By : Customer
Waste Profile No. : - Sample Received Date : 5 February, 2018

No.	Parameter	Method	Unit	Result	LOQ
1	SS	APHA 2540D (Dry at 103-105°C Method)	mg/l	4.00	-
2	BOD (5)	APHA 5210 B (5 Days BOD Test)	mg/l	3.54	0.00
3	COD (Cr)	APHA 5220D (Close Reflux Colorimetric Method)	mg/l	< 0.7	0.7
4	Total Coliform	APHA 9221B (Standard Total Coliform Fermentation Technique)	MPN/100ml	< 1.8	1.8
5	Oil and Grease	APHA 5520B (Partition-Gravimetric Method)	mg/l	< 3.1	3.1
6	Chromium	APHA 3120 B (Inductively Coupled Plasma (ICP) Method)	mg/l	≤ 0.002	0.002

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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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

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

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD

Report No. : GEM-LAB-201802085
Revision No. : 1
Report Date : 20 February, 2018
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 : MJTD
Sample Description
Sample Name : MKI-SW-2-0205 — Sampling Date : 5 February, 2018
Sample No. : W-1802023 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 5 February, 2018

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	11.0	1.8

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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

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

Report No. : GEM-LAB-201802086
Revision No. : 1
Report Date : 20 February, 2018
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 : MJTD
Sample Description
Sample Name : MKI-SW-3-0205 | Sampling Date : 5 February, 2018
Sample No. : W-1802024 | Sampling By : Customer
Waste Profile No. : - | Sample Received Date : 5 February, 2018

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

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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. 11, Thilawa SEZ Zone A, Yangon Region, the Union of Myanmar
Tel: 01-2309051, 09 7900 31 20

Report No. : GEM-LAB-201802087
Revision No. : 1
Report Date : 20 February, 2018
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 : MJTD
Sample Description

Sample Name : MKI-SW-4-0205 | Sampling Date : 5 February, 2018
Sample No. : W-1802025 | Sampling By : Customer
Waste Profile No. : - | Sample Received Date : 5 February, 2018

No.	Parameter	Method	Unit	Result	LOQ
1	Escherichia Coli	APHA 9221 F Escherichia Coli Procedure Using Fluorogenic Substrate	MPN/100ml	6.8	1.8

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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB
GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

DOWA

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

Report No. : GEM-LAB-201802089
Revision No. : 1
Report Date : 20 February, 2018
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 : MJTD
Sample Description

Sample Name : MKI-SW-9-0205
Sample No. : W-1802027
Waste Profile No. : -

Sampling Date : 5 February, 2018
Sampling By : Customer
Sample Received Date : 5 February, 2018

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

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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

DOWA

GOLDEN DOWA ECO-SYSTEM MYANMAR CO., LTD
Lot No. 11, ThilawaSEZ Zone A, Yangon Region, the Union of Myanmar
Tel:01-2309051 09 799071120

Report No. : GEM-LAB-201802090
Revision No. : 1
Report Date : 20 February, 2018
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 : MJTD
Sample Description
Sample Name : MKI-GW-2-0205 — Sampling Date : 5 February, 2018
Sample No. : W-1802028 — Sampling By : Customer
Waste Profile No. : - — Sample Received Date : 5 February, 2018

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

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

Analysed By :
Ni Ni Aye Lwin
Assistant supervisor

LAB GEM

Approved By :
Tomoya Suzuki
Director

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

Thilawa Special Economic Zone (Zone B)
Development Project –Phase 1 & 2

Appendix

Air Quality Monitoring Report

December 2017

AIR QUALITY MONITORING

REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1 & 2 CONSTRUCTION STAGE)

(QUARTERLY MONITORING)

December 2017

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

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

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the construction of industrial area in and around Thilawa SEZ Zone B, Air quality had been monitored from 6th December 2017 – 13th December 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 6th December– 13th December, 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 6th December 2017 – 13th December, 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 1.4-1 Status of Air Quality Monitoring Point

2.5 Monitoring Results

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

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

Date	CO	NO_2	$PM_{2.5}$	PM_{10}	SO_2
	ppm	ppm	mg/m^3	mg/m^3	ppm
6 ~ 7 Dec, 2017	0.074 (0.085 mg/m^3)	0.031 (0.058 mg/m^3)	**0.061**	0.015	**0.012 (0.032 mg/m^3)**
7 ~ 8 Dec, 2017	0.085 (0.098 mg/m^3)	0.036 (0.067 mg/m^3)	**0.086**	0.016	**0.009 (0.023 mg/m^3)**
8 ~ 9 Dec, 2017	0.097 (0.111 mg/m^3)	0.035 (0.066 mg/m^3)	**0.089**	0.029	0.007 (0.018 mg/m^3)
9 ~ 10 Dec, 2017	0.067 (0.077 mg/m^3)	0.036 (0.068 mg/m^3)	**0.082**	0.018	**0.009 (0.024 mg/m^3)**
10~ 11 Dec, 2017	0.087 (0.099 mg/m^3)	0.036 (0.067 mg/m^3)	**0.098**	0.041	0.008 (0.021 mg/m^3)
11~ 12 Dec, 2017	0.067 (0.076 mg/m^3)	0.036 (0.067 mg/m^3)	**0.073**	0.015	**0.010 (0.025 mg/m^3)**
12 ~ 13 Dec, 2017	0.070 (0.080 mg/m^3)	0.037 (0.070 mg/m^3)	**0.073**	0.014	**0.009 (0.024 mg/m^3)**
7 Days Average Value	0.078 (0.089 mg/m^3)	0.035 (0.066 mg/m^3)	**0.080**	0.021	**0.009 (0.024 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) *1

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

Construction activities of Thilawa SEZ Zone B are described in Table 2.5-2. $PM_{2.5}$ result and SO_2 result during construction period (8:30-12:00 and 13:00-18:00) are described in Table-2.5-3 and Table 2.5-4. During construction period, 7 days average value for $PM_{2.5}$ were exceeded the target value and Day 1 to Day 7 daily average results were also exceeded the target value. During construction period, although 7 days average value for SO_2 were not exceeded the target value but Day 1 daily average result was exceeded the target value and Day 4 are the same level with target value. Since the average value of SO_2 were not exceeded the target value during monitoring period, the significant impact on SO_2 contamination was not expected.

Table 2.5-2 Construction Activities of Thilawa SEZ Zone B

Date	Time	Location	Construction Activities
6 Dec, 2017	8:30-12:00	Near monastery	Road 12 soil removing and backfilling work, excavated soil carrying work
	13:00-18:00	Near monastery	Road 12 soil removing and backfilling work, excavated soil carrying work
7 Dec, 2017	8:30-12:00	Near monastery	Soil filling and dressing work, excavated soil carrying work
	13:00-18:00	Near monastery	Soil filling and dressing work, excavated soil carrying work
8 Dec, 2017	8:30-12:00	Near monastery	Excavated soil carrying work
	13:00-18:00	Near monastery	Excavated soil carrying work
9 Dec, 2017	8:30-12:00	Near monastery	Soil filling work at BH3
	13:00-18:00	Near monastery	Soil filling work at BH3
10 Dec, 2017	8:30-12:00	Near monastery	Soil filling work at BH1 and BH4
	13:00-18:00	Near monastery	Soil filling work at BH1 and BH4
11 Dec, 2017	8:30-12:00	Near monastery	Soil filling work at BH1 and BH4
	13:00-18:00	Near monastery	Soil filling work at BH1 and BH4
12 Dec, 2017	8:30-12:00	Near monastery	BG3 soil cutting work
	13:00-18:00	Near monastery	BG3 soil cutting work
13 Dec, 2017	8:30-12:00	Near monastery	BG3 soil filling work
	13:00-18:00	Near monastery	BG3 soil filling work

Table 2.5-3 $PM_{2.5}$ Results (During Construction Period)

(8:30-12:00 and 13:00-18:00)

Day	$PM_{2.5}$
	mg/m³
Day 1	**0.035**
Day 2	**0.043**
Day 3	**0.047**
Day 4	**0.041**
Day 5	**0.046**
Day 6	**0.037**
Day 7	**0.037**
7 days Average value	**0.041**
Target Value	**0.025**

Table 2.5-4 SO_2 Results (During Construction Period)

(8:30-12:00 and 13:00 -18:00)

Day	SO_2
	ppm
Day 1	**0.012 (0.031 mg/m³)**
Day 2	0.003 (0.008 mg/m³)
Day 3	0.004 (0.010 mg/m³)
Day 4	**0.008 (0.020 mg/m³)**
Day 5	0.002 (0.005 mg/m³)
Day 6	0.004 (0.009 mg/m³)
Day 7	0.004 (0.010 mg/m³)
7 days Average value	**0.005 (0.013 mg/m³)**
Target Value	**0.008 (0.02 mg/m³)**

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

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

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

Overall summary of total exceeded hours for Day1 to Day 7 during construction and non-construction time for $PM_{2.5}$ and SO_2 are shown in Table 2.5-5 and Table 2.5-6. Based on the summary table of total exceeded hours for $PM_{2.5}$, the total exceeded hours for seven days during construction and non-construction time were 144 hours but exceeded hours for construction time (8:30 am-18:00 pm) was 43 hours. After detailed analyzed the $PM_{2.5}$ exceeded time for construction period, 19 hours exceeded during seven days are come from the construction site of Zone B according to the wind direction. This is some impact from the construction activities of Zone B.

Based on the summary table of total exceeded hours for SO_2, the total exceeded hours for seven days during construction and non-construction were 85 hours but exceeded hours for construction time (8:30 am-18:00 pm) was 11 hours. After detailed analyzed the SO_2 exceeded time for construction period according to the wind direction from Zone B, only 5 hours exceeded during seven days are come from the construction site of Zone B. This is slightly impact from the construction activities of Zone B. Among the seven days monitoring for SO_2 during construction time, exceeded hours were occurred on Day 1, Day 2 and Day 4 and there are no exceeded hours on Day 3, Day 5, Day 6 and Day 7.

Table 2.5-5 Summary of Total Exceeded Hours for Day 1 to Day 7 During construction and non-Construction Period for $PM_{2.5}$

	$PM_{2.5}$						
	Total Exceeded hours	Construction Period (8:30 am-18:00 pm)	Non-construction period	Non-construction period (wind from Zone B)	Non-construction period (wind from other sides)	Construction period (wind from Zone B)	Non-construction period (wind from other sides)
Day-1	20	6	14	11	3	3	3
Day-2	21	6	15	11	4	3	3
Day-3	22	8	14	6	8	2	6
Day-4	20	5	15	3	12	1	4
Day-5	21	7	14	4	10	4	3
Day-6	21	6	15	3	12	5	1
Day-7	19	5	14	2	12	1	4
Total	144	43	101	40	61	19	24

Note: Red color is referred to the construction period (8:30 am-18:00pm) and construction period (wind from Zone B).

Table 2.5-6 Summary of Total Exceeded Hours for Day 1 to Day 7 During Construction and Non-Construction Period for SO_2

	SO_2						
	Total Exceeded hours	Construction Period (8:30 am-18:00 pm)	Non-construction Period	Non-construction Period (wind from Zone B)	Non-construction Period (wind from other sides)	Construction Period (wind from Zone B)	Construction Period (wind from other sides)
Day-1	16	5	11	10	1	3	2
Day-2	13	1	12	9	3	1	0
Day-3	6	1	5	3	2	0	1
Day-4	13	3	10	2	8	1	2
Day-5	10	0	10	4	6	0	0
Day-6	13	0	13	2	11	0	0
Day-7	14	1	13	3	10	0	1
Total	85	11	74	33	42	5	6

Note: Red color is referred to the construction period (8:30 am-18:00pm) and construction period (wind from Zone B).

CHAPTER 3: CONCLUSION AND RECOMMENDATION

The result of air quality of CO, NO_2, PM_{10} during seven days monitoring were not exceeded the target value, thus there are no impacts on the surrounding environments. On the other hand, results of $PM_{2.5}$ SO_2 level measured for seven days consecutive measurement in this monitoring period are higher than the target value. However, the average target value of SO_2 level measured for seven days consecutive measurement during the construction period are lower than the target value.

During the seven days monitoring period, 144 hours results were exceeded for $PM_{2.5}$ totally. According to wind direction of Zone B during construction time, 19 exceeded hours for $PM_{2.5}$ were observed. Therefore, it can be concluded there are some impact from the construction activities of Zone B but most exceeded hours are come from another site of Zone B. Possible emission sources are affected from natural origin such as dust from unpaved vacant area, excavation and vehicles used for construction activities in Zone B, and transportation in and around the monitoring area. According to US Environmental Protection Agency (EPA) and WHO' health effect of particulate matter, there is no evidence of safe level of exposure or a threshold below which no adverse health effects occur. Exposure to $PM_{2.5}$ reduces the life expectancy of the population of the Region by about 8.6 months on average. Short term (hours, days) exposure to $PM_{2.5}$ can cause coughing, shortness of breath, tightness of the chest and irritation of the eyes. In people with heart disease, short term exposures have been linked to heart attacks and arrhythmias. However, healthy children and adults have not been reported to suffer serious effects from short term exposures. Long term exposures (months, years) have been associated with problems such as reduced lung function and the development of chronic bronchitis and even premature death.

During the seven days monitoring period, 85 hours results were exceeded for SO_2. According to wind direction of Zone B during the construction period, only 5 exceeded hours for SO_2 were observed. Therefore, it can be concluded most of the exceeded hours for SO_2 are come from another direction of Zone B. Based on the 3 exceeded hours for SO_2 on Day 1, there are slightly impact from the construction activities of Zone B. According to the Table 2.5-4, 7 days average value and daily average values (Day 2 to Day7) for construction period were not exceeded the target value. Possible emission sources are the combustion of fuel for vehicles and machinery used for construction activities. In the public health statement SO_2 reported by ATSDR (Agency for Toxic Substances and Disease Registry) in US, 100 ppm (261.8 mg/m^3) SO_2 is considered immediately dangerous to life and health (short term). Lung function changes observed when 0.4 to 3 ppm (1.05mg/m^3 to 7.85 mg/m^3) exposure for 20 years or more (long term). Therefore, the significant impact on SO_2 contamination was not expected. The monitoring point (near monastery) during the survey period are very close to the construction site of Zone B may be one of the reason for exceeded hours. As for future subject for air quality monitoring in Zone B, the following action may be taken to achieve the target level:

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

The continuous monitoring will be necessary to grasp the environmental conditions in construction stage in 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 RESULTS

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
06 Dec, 2017	11:00 ~ 11:59	0.002	0.032	0.004	0.002	0.005	1.12	45	NE
06 Dec, 2017	12:00 ~ 12:59	0.002	0.010	0.009	0.001	0.026	1.05	51	ENE
06 Dec, 2017	13:00 ~ 13:59	0.015	0.012	0.013	0.004	0.016	1.07	55	ENE
06 Dec, 2017	14:00 ~ 14:59	0.033	0.016	0.035	0.014	0.019	1.02	66	ENE
06 Dec, 2017	15:00 ~ 15:59	0.064	0.022	0.041	0.006	0.023	0.93	107	ESE
06 Dec, 2017	16:00 ~ 16:59	0.180	0.032	0.063	0.036	0.005	0.93	123	SE
06 Dec, 2017	17:00 ~ 17:59	0.217	0.038	0.047	0.020	0.009	0.82	132	SE
06 Dec, 2017	18:00 ~ 18:59	0.188	0.037	0.061	0.014	0.017	0.87	139	SSE
06 Dec, 2017	19:00 ~ 19:59	0.137	0.039	0.055	0.010	0.007	0.40	99	ESE
06 Dec, 2017	20:00 ~ 20:59	0.068	0.037	0.061	0.024	0.003	0.50	34	NE
06 Dec, 2017	21:00 ~ 21:59	0.097	0.039	0.066	0.023	0.005	0.17	132	SE
06 Dec, 2017	22:00 ~ 22:59	0.152	0.036	0.078	0.020	0.009	0.20	83	E
06 Dec, 2017	23:00 ~ 23:59	0.092	0.037	0.094	0.020	0.009	0.60	41	NE
07 Dec, 2017	0:00 ~ 0:59	0.099	0.039	0.082	0.016	0.009	0.65	35	NE
07 Dec, 2017	1:00 ~ 1:59	0.071	0.040	0.088	0.018	0.012	0.40	25	NE
07 Dec, 2017	2:00 ~ 2:59	0.068	0.037	0.093	0.006	0.018	0.58	33	NE
07 Dec, 2017	3:00 ~ 3:59	0.044	0.036	0.088	0.014	0.018	0.72	34	NE
07 Dec, 2017	4:00 ~ 4:59	0.040	0.037	0.091	0.014	0.015	0.38	28	NE
07 Dec, 2017	5:00 ~ 5:59	0.042	0.035	0.094	0.016	0.020	0.35	23	NE
07 Dec, 2017	6:00 ~ 6:59	0.038	0.033	0.094	0.018	0.015	0.58	28	NE
07 Dec, 2017	7:00 ~ 7:59	0.063	0.032	0.088	0.024	0.006	0.70	28	NE
07 Dec, 2017	8:00 ~ 8:59	0.032	0.024	0.058	0.017	0.008	0.73	31	NE
07 Dec, 2017	9:00 ~ 9:59	0.019	0.021	0.022	0.009	0.013	0.92	33	NE
07 Dec, 2017	10:00 ~ 10:59	0.014	0.017	0.037	0.008	0.007	0.90	45	ENE

Max	0.217 (0.249 mg/m³)	0.040 (0.075 mg/m³)	0.094	0.036	0.026 (0.068 mg/m³)
Avg	0.074 (0.085 mg/m³)	0.031 (0.058 mg/m³)	0.061	0.015	0.012 (0.031 mg/m³)
Min	0.002 (0.002 mg/m³)	0.010 (0.019 mg/m³)	0.004	0.001	0.003 (0.008 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
07 Dec, 2017	11:00 ~ 11:59	0.001	0.024	0.018	0.002	0.010	0.67	56	ENE
07 Dec, 2017	12:00 ~ 12:59	0.005	0.022	0.040	0.006	0.012	0.65	93	ESE
07 Dec, 2017	13:00 ~ 13:59	0.005	0.022	0.013	0.003	0.002	0.93	135	SSE
07 Dec, 2017	14:00 ~ 14:59	0.026	0.029	0.021	0.004	0.002	1.10	161	S
07 Dec, 2017	15:00 ~ 15:59	0.084	0.036	0.049	0.021	0.001	1.10	152	SSE
07 Dec, 2017	16:00 ~ 16:59	0.189	0.039	0.047	0.008	0.002	0.57	156	SSE
07 Dec, 2017	17:00 ~ 17:59	0.193	0.047	0.076	0.020	0.003	0.33	207	SW
07 Dec, 2017	18:00 ~ 18:59	0.278	0.051	0.076	0.007	0.007	0.18	214	SW
07 Dec, 2017	19:00 ~ 19:59	0.282	0.047	0.101	0.026	0.015	0.02	185	SSW
07 Dec, 2017	20:00 ~ 20:59	0.190	0.042	0.110	0.022	0.010	0.20	132	SE
07 Dec, 2017	21:00 ~ 21:59	0.042	0.040	0.106	0.009	0.006	0.12	24	NE
07 Dec, 2017	22:00 ~ 22:59	0.065	0.038	0.121	0.017	0.013	0.42	32	NE
07 Dec, 2017	23:00 ~ 23:59	0.068	0.039	0.126	0.030	0.018	0.62	34	NE
08 Dec, 2017	0:00 ~ 0:59	0.070	0.031	0.134	0.025	0.015	0.60	36	NE
08 Dec, 2017	1:00 ~ 1:59	0.061	0.039	0.129	0.023	0.012	0.43	29	NE
08 Dec, 2017	2:00 ~ 2:59	0.010	0.034	0.127	0.021	0.010	0.20	29	NE
08 Dec, 2017	3:00 ~ 3:59	0.027	0.037	0.112	0.007	0.006	0.20	27	NE
08 Dec, 2017	4:00 ~ 4:59	0.065	0.038	0.111	0.018	0.016	0.30	30	NE
08 Dec, 2017	5:00 ~ 5:59	0.082	0.038	0.135	0.026	0.019	0.10	34	NE
08 Dec, 2017	6:00 ~ 6:59	0.077	0.036	0.123	0.027	0.010	0.30	29	NE
08 Dec, 2017	7:00 ~ 7:59	0.113	0.033	0.122	0.035	0.010	0.58	30	NE
08 Dec, 2017	8:00 ~ 8:59	0.102	0.040	0.090	0.023	0.004	0.98	34	NE
08 Dec, 2017	9:00 ~ 9:59	0.009	0.032	0.035	0.001	0.002	1.07	36	NE
08 Dec, 2017	10:00 ~ 10:59	0.000	0.018	0.037	0.005	0.002	0.67	70	E

Max	0.282 (0.323 mg/m³)	0.051 (0.096 mg/m³)	0.135	0.35	0.019 (0.050 mg/m³)
Avg	0.085 (0.097 mg/m³)	0.036 (0.068 mg/m³)	0.086	0.016	0.009 (0.001 mg/m³)
Min	0.000 (0.000 mg/m³)	0.018 (0.034 mg/m³)	0.013	0.001	0.001 (0.003 mg/m³)

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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
08 Dec, 2017	11:00 ~ 11:59	0.000	0.029	0.052	0.013	0.003	1.07	183	SSW
08 Dec, 2017	12:00 ~ 12:59	0.000	0.020	0.007	0.001	0.001	1.32	160	S
08 Dec, 2017	13:00 ~ 13:59	0.000	0.024	0.029	0.006	0.008	1.20	190	SSW
08 Dec, 2017	14:00 ~ 14:59	0.014	0.031	0.039	0.013	0.002	1.20	158	S
08 Dec, 2017	15:00 ~ 15:59	0.047	0.029	0.044	0.022	0.001	1.25	152	SSE
08 Dec, 2017	16:00 ~ 16:59	0.141	0.041	0.043	0.022	0.000	0.88	155	SSE
08 Dec, 2017	17:00 ~ 17:59	0.409	0.046	0.059	0.033	0.010	0.15	168	S
08 Dec, 2017	18:00 ~ 18:59	0.573	0.051	0.104	0.055	0.016	0.22	156	SSE
08 Dec, 2017	19:00 ~ 19:59	0.017	0.040	0.086	0.010	0.001	0.17	233	WSW
08 Dec, 2017	20:00 ~ 20:59	0.088	0.043	0.097	0.022	0.008	0.02	211	SW
08 Dec, 2017	21:00 ~ 21:59	0.013	0.037	0.102	0.027	0.001	0.02	101	ESE
08 Dec, 2017	22:00 ~ 22:59	0.008	0.035	0.101	0.024	0.000	0.00	21	NNE
08 Dec, 2017	23:00 ~ 23:59	0.044	0.034	0.101	0.016	0.003	0.00	21	NNE
09 Dec, 2017	0:00 ~ 0:59	0.056	0.036	0.106	0.031	0.008	0.12	72	E
09 Dec, 2017	1:00 ~ 1:59	0.038	0.037	0.120	0.048	0.008	0.05	163	S
09 Dec, 2017	2:00 ~ 2:59	0.100	0.035	0.127	0.047	0.006	0.10	190	SSW
09 Dec, 2017	3:00 ~ 3:59	0.094	0.032	0.135	0.039	0.005	0.05	123	SE
09 Dec, 2017	4:00 ~ 4:59	0.416	0.042	0.161	0.076	0.020	0.07	158	S
09 Dec, 2017	5:00 ~ 5:59	0.109	0.030	0.188	0.055	0.023	0.27	36	NE
09 Dec, 2017	6:00 ~ 6:59	0.013	0.031	0.147	0.049	0.014	0.20	87	E
09 Dec, 2017	7:00 ~ 7:59	0.033	0.031	0.139	0.038	0.013	0.35	35	NE
09 Dec, 2017	8:00 ~ 8:59	0.048	0.033	0.098	0.025	0.004	0.70	39	NE
09 Dec, 2017	9:00 ~ 9:59	0.066	0.026	0.040	0.022	0.001	0.68	40	NE
09 Dec, 2017	10:00 ~ 10:59	0.002	0.049	0.016	0.006	0.005	0.57	54	ENE

Max	0.573 (0.656 mg/m^3)	0.051 (0.096 mg/m^3)	0.188	0.076	0.023 (0.060 mg/m^3)
Avg	0.097 (0.111 mg/m^3)	0.035 (0.066 mg/m^3)	0.089	0.029	0.007 (0.018 mg/m^3)
Min	0.000 (0.000 mg/m^3)	0.02 (0.038 mg/m^3)	0.007	0.001	0 (0.000 mg/m^3)

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
09 Dec, 2017	11:00 ~ 11:59	0.000	0.022	0.019	0.007	0.006	0.67	86	E
09 Dec, 2017	12:00 ~ 12:59	0.002	0.021	0.049	0.015	0.012	0.87	115	SE
09 Dec, 2017	13:00 ~ 13:59	0.000	0.013	0.012	0.003	0.010	0.65	126	SE
09 Dec, 2017	14:00 ~ 14:59	0.000	0.024	0.040	0.014	0.007	1.00	161	S
09 Dec, 2017	15:00 ~ 15:59	0.043	0.036	0.054	0.027	0.000	0.97	181	SSW
09 Dec, 2017	16:00 ~ 16:59	0.181	0.038	0.052	0.025	0.000	0.75	163	S
09 Dec, 2017	17:00 ~ 17:59	0.296	0.068	0.076	0.015	0.023	0.82	143	SSE
09 Dec, 2017	18:00 ~ 18:59	0.159	0.050	0.082	0.016	0.006	0.55	161	S
09 Dec, 2017	19:00 ~ 19:59	0.182	0.048	0.090	0.015	0.014	0.05	189	SSW
09 Dec, 2017	20:00 ~ 20:59	0.183	0.049	0.104	0.016	0.012	0.03	189	SSW
09 Dec, 2017	21:00 ~ 21:59	0.032	0.044	0.116	0.015	0.005	0.17	253	W
09 Dec, 2017	22:00 ~ 22:59	0.055	0.041	0.120	0.021	0.008	0.02	260	W
09 Dec, 2017	23:00 ~ 23:59	0.012	0.042	0.112	0.012	0.003	0.20	251	W
10 Dec, 2017	0:00 ~ 0:59	0.033	0.040	0.095	0.022	0.009	0.07	272	WNW
10 Dec, 2017	1:00 ~ 1:59	0.079	0.039	0.108	0.025	0.012	0.02	263	W
10 Dec, 2017	2:00 ~ 2:59	0.003	0.032	0.109	0.019	0.011	0.05	265	W
10 Dec, 2017	3:00 ~ 3:59	0.137	0.039	0.128	0.023	0.012	0.05	125	SE
10 Dec, 2017	4:00 ~ 4:59	0.036	0.036	0.122	0.027	0.009	0.12	180	S
10 Dec, 2017	5:00 ~ 5:59	0.044	0.037	0.121	0.033	0.007	0.22	345	N
10 Dec, 2017	6:00 ~ 6:59	0.069	0.032	0.126	0.026	0.014	0.13	183	SSW
10 Dec, 2017	7:00 ~ 7:59	0.050	0.036	0.125	0.022	0.013	0.30	16	NNE
10 Dec, 2017	8:00 ~ 8:59	0.007	0.028	0.081	0.015	0.008	0.50	23	NE
10 Dec, 2017	9:00 ~ 9:59	0.012	0.027	0.020	0.011	0.010	0.65	22	NNE
10 Dec, 2017	10:00 ~ 10:59	0.002	0.023	0.014	0.013	0.005	0.75	22	NNE

Max	0.296 (0.339 mg/m³)	0.068 (0.128 mg/m³)	0.128	0.033	0.023 (0.060 mg/m³)
Avg	0.067 (0.077 mg/m³)	0.036 (0.068 mg/m³)	0.082	0.018	0.009 (0.024 mg/m³)
Min	0.000 (0.000 mg/m³)	0.013 (0.024 mg/m³)	0.012	0.003	0.000 (0.000 mg/m³)

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED MJTD

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
10 Dec, 2017	11:00 ~ 11:59	0.000	0.020	0.016	0.010	0.005	0.77	78	E
10 Dec, 2017	12:00 ~ 12:59	0.011	0.029	0.025	0.005	0.009	0.80	72	E
10 Dec, 2017	13:00 ~ 13:59	0.006	0.035	0.020	0.004	0.003	0.70	202	SSW
10 Dec, 2017	14:00 ~ 14:59	0.046	0.032	0.031	0.006	0.005	0.60	245	WSW
10 Dec, 2017	15:00 ~ 15:59	0.011	0.038	0.058	0.022	0.001	0.38	277	WNW
10 Dec, 2017	16:00 ~ 16:59	0.140	0.044	0.067	0.025	0.000	0.17	319	NNW
10 Dec, 2017	17:00 ~ 17:59	0.173	0.048	0.053	0.022	0.001	0.40	261	W
10 Dec, 2017	18:00 ~ 18:59	0.179	0.043	0.067	0.020	0.002	0.23	267	W
10 Dec, 2017	19:00 ~ 19:59	0.195	0.045	0.080	0.017	0.001	0.08	265	W
10 Dec, 2017	20:00 ~ 20:59	0.172	0.047	0.103	0.026	0.001	0.02	193	SSW
10 Dec, 2017	21:00 ~ 21:59	0.066	0.047	0.120	0.033	0.007	0.00	176	S
10 Dec, 2017	22:00 ~ 22:59	0.094	0.044	0.132	0.042	0.011	0.10	171	S
10 Dec, 2017	23:00 ~ 23:59	0.127	0.035	0.138	0.055	0.020	0.05	142	SSE
11 Dec, 2017	0:00 ~ 0:59	0.150	0.037	0.149	0.067	0.018	0.02	239	WSW
11 Dec, 2017	1:00 ~ 1:59	0.181	0.037	0.166	0.085	0.015	0.10	165	S
11 Dec, 2017	2:00 ~ 2:59	0.103	0.037	0.167	0.095	0.021	0.00	175	S
11 Dec, 2017	3:00 ~ 3:59	0.020	0.035	0.154	0.074	0.009	0.07	118	SE
11 Dec, 2017	4:00 ~ 4:59	0.032	0.032	0.146	0.060	0.018	0.00	58	ENE
11 Dec, 2017	5:00 ~ 5:59	0.103	0.028	0.143	0.075	0.018	0.00	51	ENE
11 Dec, 2017	6:00 ~ 6:59	0.198	0.027	0.181	0.104	0.023	0.02	51	ENE
11 Dec, 2017	7:00 ~ 7:59	0.016	0.029	0.155	0.059	0.003	0.12	39	NE
11 Dec, 2017	8:00 ~ 8:59	0.049	0.032	0.097	0.035	0.003	0.32	71	E
11 Dec, 2017	9:00 ~ 9:59	0.006	0.026	0.044	0.017	0.000	0.47	134	SE
11 Dec, 2017	10:00 ~ 10:59	0.003	0.025	0.032	0.018	0.001	0.68	28	NE

Max	0.198 (0.227 mg/m^3)	0.048 (0.090 mg/m^3)	0.181	0.104	0.023 (0.060 mg/m^3)
Avg	0.087 (0.100 mg/m^3)	0.036 (0.068 mg/m^3)	0.098	0.041	0.008 (0.021 mg/m^3)
Min	0.000 (0.000 mg/m^3)	0.02 (0.038 mg/m^3)	0.016	0.004	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/m³	mg/m³	ppm	kph	Deg.	Direction
		Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly	Hourly
11 Dec, 2017	11:00 ~ 11:59	0.013	0.034	0.034	0.018	0.002	0.72	16	NNE
11 Dec, 2017	12:00 ~ 12:59	0.003	0.032	0.042	0.005	0.002	0.80	21	NNE
11 Dec, 2017	13:00 ~ 13:59	0.066	0.046	0.071	0.027	0.001	0.63	13	NNE
11 Dec, 2017	14:00 ~ 14:59	0.017	0.033	0.011	0.005	0.002	0.55	276	WNW
11 Dec, 2017	15:00 ~ 15:59	0.049	0.026	0.031	0.018	0.004	0.48	301	NW
11 Dec, 2017	16:00 ~ 16:59	0.062	0.028	0.054	0.032	0.005	0.30	300	NW
11 Dec, 2017	17:00 ~ 17:59	0.164	0.038	0.048	0.023	0.007	0.27	279	WNW
11 Dec, 2017	18:00 ~ 18:59	0.285	0.043	0.050	0.013	0.013	0.03	276	WNW
11 Dec, 2017	19:00 ~ 19:59	0.264	0.048	0.070	0.007	0.006	0.28	253	W
11 Dec, 2017	20:00 ~ 20:59	0.150	0.049	0.096	0.002	0.011	0.35	233	WSW
11 Dec, 2017	21:00 ~ 21:59	0.053	0.042	0.094	0.010	0.010	0.30	231	WSW
11 Dec, 2017	22:00 ~ 22:59	0.047	0.043	0.101	0.018	0.015	0.22	251	W
11 Dec, 2017	23:00 ~ 23:59	0.064	0.038	0.102	0.006	0.021	0.13	245	WSW
12 Dec, 2017	0:00 ~ 0:59	0.006	0.035	0.098	0.009	0.013	0.27	259	W
12 Dec, 2017	1:00 ~ 1:59	0.032	0.039	0.111	0.017	0.012	0.50	255	W
12 Dec, 2017	2:00 ~ 2:59	0.011	0.036	0.106	0.009	0.010	0.25	254	W
12 Dec, 2017	3:00 ~ 3:59	0.033	0.035	0.106	0.019	0.016	0.17	254	W
12 Dec, 2017	4:00 ~ 4:59	0.022	0.037	0.104	0.010	0.024	0.07	240	WSW
12 Dec, 2017	5:00 ~ 5:59	0.037	0.040	0.122	0.024	0.014	0.22	256	W
12 Dec, 2017	6:00 ~ 6:59	0.023	0.035	0.112	0.023	0.019	0.00	290	WNW
12 Dec, 2017	7:00 ~ 7:59	0.142	0.032	0.103	0.019	0.017	0.13	227	WSW
12 Dec, 2017	8:00 ~ 8:59	0.046	0.029	0.052	0.014	0.005	0.30	169	S
12 Dec, 2017	9:00 ~ 9:59	0.009	0.018	0.021	0.013	0.004	0.58	24	NE
12 Dec, 2017	10:00 ~ 10:59	0.000	0.022	0.014	0.015	0.004	0.70	26	NE

Max	0.285 (0.326 mg/m³)	0.049 (0.092 mg/m³)	0.122	0.032	0.024 (0.063 mg/m³)
Avg	0.067 (0.077 mg/m³)	0.036 (0.068 mg/m³)	0.073	0.015	0.01 (0.026 mg/m³)
Min	0.000 (0.000 mg/m³)	0.018 (0.034 mg/m³)	0.011	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
12 Dec, 2017	11:00 ~ 11:59	0.001	0.018	0.008	0.005	0.001	0.55	114	SE
12 Dec, 2017	12:00 ~ 12:59	0.001	0.025	0.019	0.003	0.016	0.73	302	NW
12 Dec, 2017	13:00 ~ 13:59	0.001	0.021	0.018	0.002	0.013	0.63	175	S
12 Dec, 2017	14:00 ~ 14:59	0.020	0.031	0.038	0.016	0.007	0.90	275	WNW
12 Dec, 2017	15:00 ~ 15:59	0.070	0.035	0.055	0.025	0.003	0.83	262	W
12 Dec, 2017	16:00 ~ 16:59	0.182	0.043	0.059	0.027	0.002	0.47	269	W
12 Dec, 2017	17:00 ~ 17:59	0.208	0.048	0.063	0.018	0.001	0.43	262	W
12 Dec, 2017	18:00 ~ 18:59	0.267	0.049	0.070	0.017	0.004	0.87	254	W
12 Dec, 2017	19:00 ~ 19:59	0.291	0.044	0.077	0.008	0.012	0.60	254	W
12 Dec, 2017	20:00 ~ 20:59	0.111	0.045	0.084	0.005	0.011	0.28	249	W
12 Dec, 2017	21:00 ~ 21:59	0.060	0.043	0.088	0.005	0.012	0.68	258	W
12 Dec, 2017	22:00 ~ 22:59	0.042	0.045	0.099	0.002	0.007	0.68	258	W
12 Dec, 2017	23:00 ~ 23:59	0.053	0.046	0.107	0.013	0.012	0.62	260	W
13 Dec, 2017	0:00 ~ 0:59	0.042	0.042	0.102	0.016	0.017	0.95	254	W
13 Dec, 2017	1:00 ~ 1:59	0.028	0.042	0.105	0.008	0.013	0.87	257	W
13 Dec, 2017	2:00 ~ 2:59	0.038	0.041	0.116	0.008	0.012	0.62	258	W
13 Dec, 2017	3:00 ~ 3:59	0.045	0.039	0.114	0.021	0.014	0.27	255	W
13 Dec, 2017	4:00 ~ 4:59	0.052	0.040	0.113	0.018	0.011	0.12	261	W
13 Dec, 2017	5:00 ~ 5:59	0.037	0.041	0.111	0.024	0.012	0.02	319	NNW
13 Dec, 2017	6:00 ~ 6:59	0.012	0.038	0.110	0.024	0.018	0.02	286	WNW
13 Dec, 2017	7:00 ~ 7:59	0.052	0.037	0.093	0.021	0.011	0.10	219	SW
13 Dec, 2017	8:00 ~ 8:59	0.054	0.031	0.059	0.027	0.003	0.33	127	SE
13 Dec, 2017	9:00 ~ 9:59	0.009	0.027	0.023	0.016	0.002	0.62	16	NNE
13 Dec, 2017	10:00 ~ 10:59	0.001	0.021	0.014	0.017	0.003	0.77	28	NE

Max	0.291 (0.333 mg/m^3)	0.049 (0.092 mg/m^3)	0.116	0.027	0.018 (0.047 mg/m^3)
Avg	0.07 (0.080 mg/m^3)	0.037 (0.070 mg/m^3)	0.073	0.014	0.009 (0.024 mg/m^3)
Min	0.001 (0.001 mg/m^3)	0.018 (0.034 mg/m^3)	0.008	0.002	0.001 (0.003 mg/m^3)

Thilawa Special Economic Zone (Zone B)
Development Project –Phase 1 & 2

Appendix

Noise and Vibration Monitoring Report

December 2017

NOISE AND VIBRATION

MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1 & 2 CONSTRUCTION STAGE)

(QUARTERLY MONITORING)

December 2017

Myanmar Koei International Ltd.

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED
MJTD

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

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

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the construction of industrial area in and around Thilawa SEZ Zone B, noise and vibration levels had been monitored from 6th December 2017 – 8th December 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 6th December – 7th December, 2017	Noise Level	L_{Aeq}(dB)	1 (NV-2)	24 hours	On-site measurement by "Rion NL-42 sound level meter"
From 7th December – 8th December, 2017	Noise Level	L_{Aeq}(dB)	1 (NV-1)	24 hours	On-site measurement by "Rion NL-42 sound level meter"
From 6th December – 7th December, 2017	Vibration Level	L_{v10} (dB)	1 (NV-2)	24 hours	On-site measurement by "Vibration Level Meter- VM-53A"
From 7th December – 8th December, 2017	Vibration Level	L_{v10} (dB)	1 (NV-1)	24 hours	On-site measurement by "Vibration Level Meter- VM-53A"

MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED ★ MJTD

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)
7th December – 8th September, 2017	58	52
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)
6th December– 7th December, 2017	60	48	46
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
7th December – 8th September, 2017	6:00-7:00	57	58	75	No Construction Activity
	7:00-8:00	61			
	8:00-9:00	59			
	9:00-10:00	58			
	10:00-11:00	59			
	11:00-12:00	58			
	12:00-13:00	57			
	13:00-14:00	59			
	14:00-15:00	58			
	15:00-16:00	59			
	16:00-17:00	59			
	17:00-18:00	60			
	18:00-19:00	59			
	19:00-20:00	57			
	20:00-21:00	55			
	21:00-22:00	55			
	22:00-23:00	56	52	70	
	23:00-24:00	53			
	24:00-1:00	52			
	1:00-2:00	51			
	2:00-3:00	54			
	3:00-4:00	52			
	4:00-5:00	46			
	5:00-6:00	50			

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
6th December– 7th December, 2017	7:00-8:00	52	60	75	No Construction Activity
	8:00-9:00	63			Construction Activity: Road 12 soil removing and backfilling work, excavated soil carrying work, Soil filling and dressing work, excavated soil carrying work
	9:00-10:00	59			
	10:00-11:00	63			
	11:00-12:00	59			
	12:00-13:00	41			No Construction Activity
	13:00-14:00	56			Construction Activity: Road 12 soil removing and backfilling work, excavated soil carrying work, Soil filling and dressing work, excavated soil carrying work
	14:00-15:00	63			
	15:00-16:00	59			
	16:00-17:00	65			
	17:00-18:00	57			
	18:00-19:00	49			No Construction Activity
	19:00-20:00	48	48	60	
	20:00-21:00	47			
	21:00-22:00	47			
	22:00-23:00	47	46	55	
	23:00-24:00	46			
	24:00-1:00	46			
	1:00-2:00	45			
	2:00-3:00	44			
	3:00-4:00	45			
	4:00-5:00	45			
	5:00-6:00	46			
	6:00-7:00	47			

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

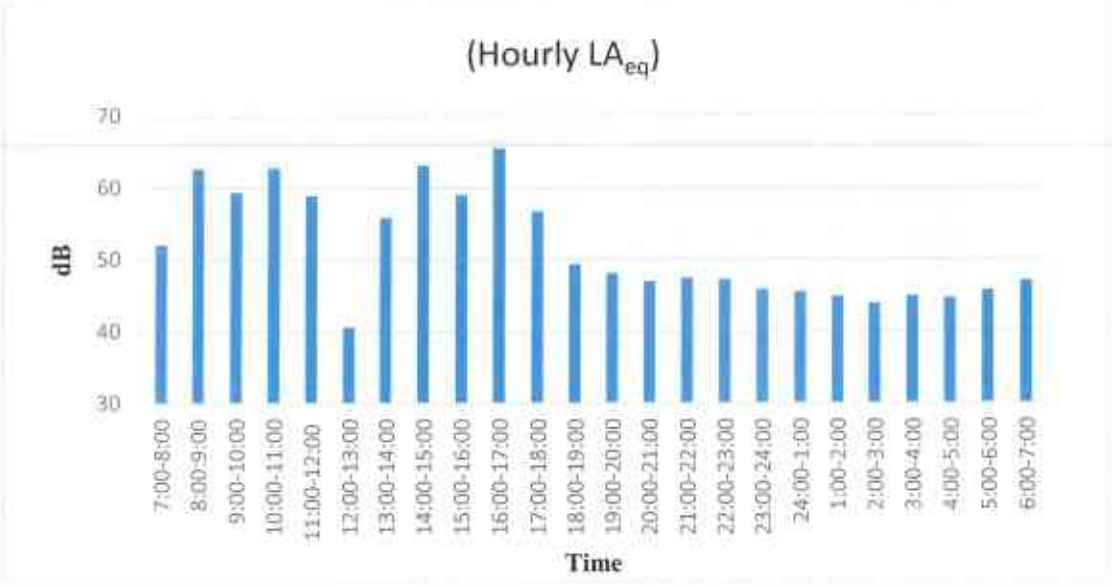

Figure 2.4-2 Results of Noise Levels (LA_{eq}) Monitoring at NV-2

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	7th December – 8th September, 2017	39	37	32
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	6th December– 7th December, 2017	50	25	20
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	7th– 8th Dec 2017	(L_{v10}, dB) Each Category	(L_{v10}, dB) Target Value	Remark
Time	L_{v10} (NV-1)			
7:00-8:00	40	39	70	No construction activity
8:00-9:00	39			
9:00-10:00	39			
10:00-11:00	38			
11:00-12:00	38			
12:00-13:00	37			
13:00-14:00	38			
14:00-15:00	39			
15:00-16:00	40			
16:00-17:00	41			
17:00-18:00	41			
18:00-19:00	39			
19:00-20:00	38	37	70	
20:00-21:00	36			
21:00-22:00	35			
22:00-23:00	37	33	65	
23:00-24:00	32			
24:00-1:00	30			
1:00-2:00	30			
2:00-3:00	33			
3:00-4:00	23			
4:00-5:00	23			
5:00-6:00	25			
6:00-7:00	36			

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

Date	6th – 7th Dec 2017	(L_{v10}, dB) Each Category	(L_{v10}, dB) Target Value	Remark
Time	L_{v10} (NV-2)			
7:00-8:00	30	50	65	No construction activity
8:00-9:00	52			Construction Activity: Road 12 soil removing and backfilling work, excavated soil carrying work, Soil filling and dressing work, excavated soil carrying work
9:00-10:00	56			
10:00-11:00	48			
11:00-12:00	43			
12:00-13:00	25			No construction activity
13:00-14:00	40			Construction Activity: Road 12 soil removing and backfilling work, excavated soil carrying work, Soil filling and dressing work, excavated soil carrying work
14:00-15:00	52			
15:00-16:00	54			
16:00-17:00	51			
17:00-18:00	43			
18:00-19:00	40			No construction activity
19:00-20:00	27	25	65	
20:00-21:00	23			
21:00-22:00	22			
22:00-23:00	21	20	60	
23:00-24:00	18			
24:00-1:00	17			
1:00-2:00	18			
2:00-3:00	17			
3:00-4:00	17			
4:00-5:00	17			
5:00-6:00	20			
6:00-7:00	25			

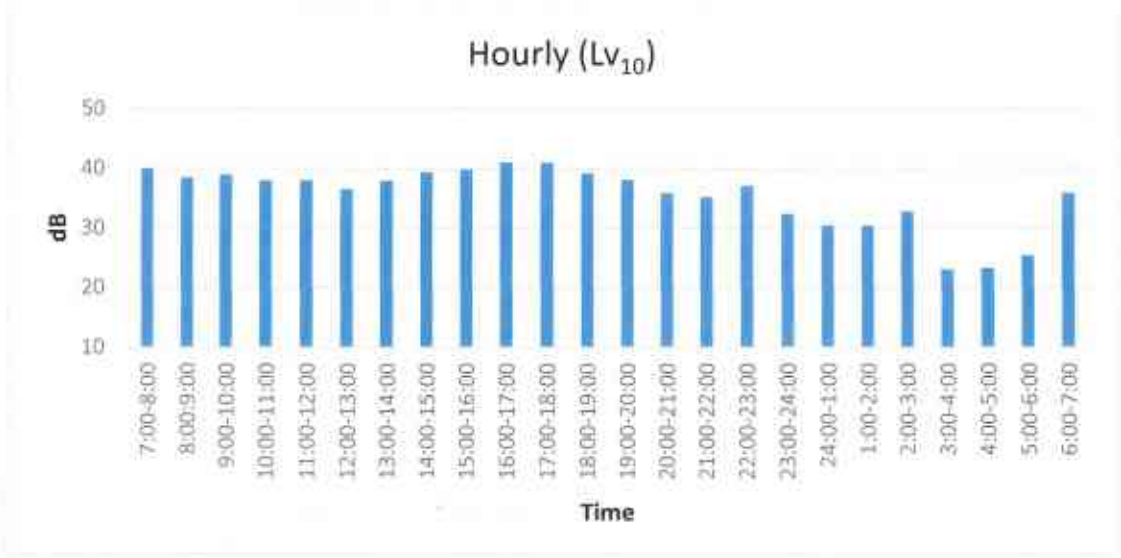

Figure 2.4-3 Results of Vibration Levels (L_{v10}) Monitoring at NV-1

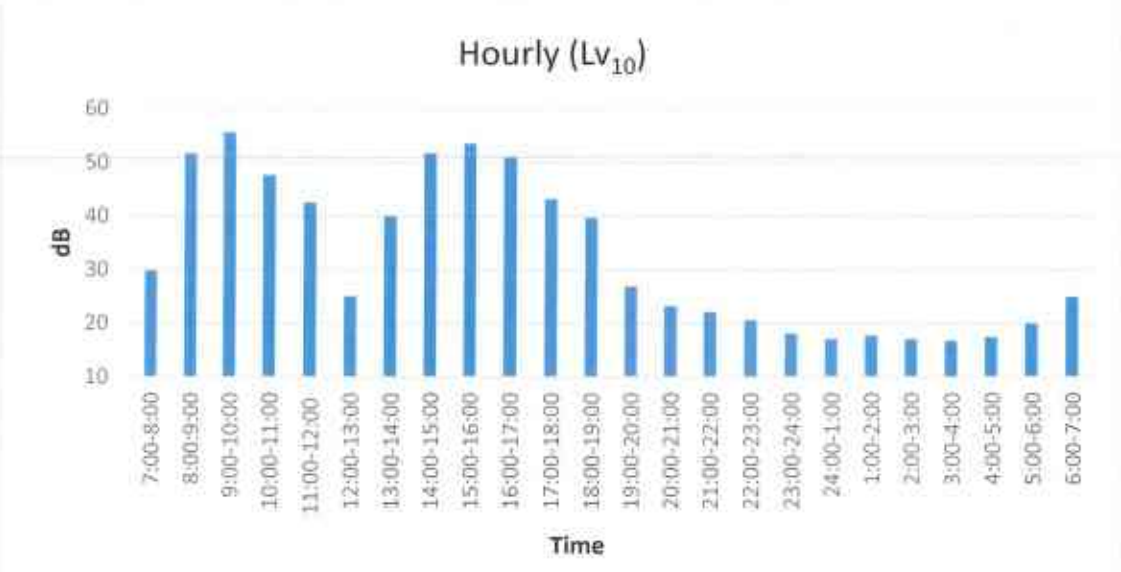

Figure 2.4-4 Results of Vibration Levels (L_{v10}) Monitoring at NV-2

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 & 2

Appendix

Traffic Volume Monitoring Report

December 2017

TRAFFIC VOLUME MONITORING REPORT

FOR DEVELOPMENT OF INDUSTRIAL AREA

THILAWA SEZ ZONE B

(PHASE 1 & 2 CONSTRUCTION STAGE)

(QUARTERLY MONITORING)

December 2017

Myanmar Koei International Ltd.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: OUTLINES AND SUMMARY OF MONITORING PLAN

1.1 General

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

1.2 Outlines of Monitoring Plan

To assess the environmental condition under the construction of industrial area in and around Thilawa SEZ Zone B, Traffic volume had been monitored from 7th December 2017 – 8th December 2017 as follows;

Table 1.2-1 Outlines of Traffic Volume Monitoring

Monitoring Date	Monitoring Item	Parameters	Number of Points	Duration	Monitoring Methodology
From 7th December– 8th December, 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 two times 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	7th December-8th December 2017	Thursday & Friday	1,800	652	339	43	2,834
	Dagon-Thilawa road to Phalan village			1,695	682	322	40	2,739

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 5:00 to 9:00 and in the evening peak hours as 16:00 to 19:00, 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	
12:00	13:00	113	51	15	1	180
13:00	14:00	82	46	22	3	153
14:00	15:00	65	49	29	1	144
15:00	16:00	81	48	32	6	167
16:00	17:00	89	46	42	1	178
17:00	18:00	183	57	31	4	275
18:00	19:00	111	33	16	3	163
19:00	20:00	52	12	20	0	84
20:00	21:00	25	7	10	1	43
21:00	22:00	15	8	3	1	25
22:00	23:00	12	9	6	1	28
23:00	00:00	10	8	5	0	23
00:00	1:00	8	8	4	1	21
1:00	2:00	2	4	3	0	9
2:00	3:00	1	4	0	0	5
3:00	4:00	0	4	0	0	4
4:00	5:00	2	4	0	0	6
5:00	6:00	12	3	2	0	17
6:00	7:00	81	25	9	1	116
7:00	8:00	405	58	23	3	489
8:00	9:00	182	41	20	6	249
9:00	10:00	92	51	18	2	163
10:00	11:00	64	35	12	3	114
11:00	12:00	115	41	17	5	178
Total		1800	652	339	43	2834

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	82	52	15	0	149
12:00	13:00	108	50	27	1	186
13:00	14:00	62	52	24	0	138
14:00	15:00	70	50	27	2	149
15:00	16:00	106	41	24	3	174
16:00	17:00	301	56	43	2	402
17:00	18:00	111	28	14	3	156
18:00	19:00	61	16	15	2	94
19:00	20:00	64	25	14	2	105
20:00	21:00	30	18	12	2	62
21:00	22:00	43	15	16	1	75
22:00	23:00	10	15	4	0	29
23:00	00:00	5	7	5	0	17
00:00	1:00	4	7	3	0	14
1:00	2:00	1	4	2	0	7
2:00	3:00	1	3	1	0	5
3:00	4:00	1	1	3	0	5
4:00	5:00	65	19	3	3	90
5:00	6:00	185	40	12	5	242
6:00	7:00	23	2	1	0	26
7:00	8:00	134	54	20	7	215
8:00	9:00	83	41	10	3	137
9:00	10:00	61	42	16	2	121
10:00	11:00	84	44	11	2	141
Total		1695	682	322	40	2739

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 two times 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.

End of Document