

Thilawa Special Economic Zone (ZONE A) Development

# Environmental Monitoring Report (Construction Phase)



Myanmar Japan Thilawa Development Limited.

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# 1. Executive Summary

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

The monitoring record according to the Environment Monitoring Plan is submitted in conformity with the provision of Chapter 9.1, Table 9.1-2 and 9.2, Table 9.2-2 Content of the EIA Report of Thilawa SEZ Development Project (Zone A).

# 2. Summary of Monitoring Activities

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

EMP for Presconstruction Phase was submitted on March 2014. EMP for Construction Phase First Report was submitted at June 2015, Second Report at September 2014. Third Report schedule to submit at December 2014 but submitted at March 2015 and fourth report was submitted at April 2015. The lifth implementation report during Construction Period is submitted this day attached with operation phase implementation schedule. Subsequent Operation Phase reports will be submitted on a birannually base.

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

+1

- c) Number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation; None
- 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.

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

Please refer to the attached Environmental Monitoring Form.

# 9. Construction Progress

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

- Monthly Progress Report for April, 2015
- Monthly Progress Report for May, 2016.
- Monthly Progress Report for June, 2015

# 4. Monitoring Result

Environmental Monitoring plan report for Construction Phase implemented according to the following table, reference on Table 4.2-2, Chapter 4, EIA report,

#### Monitoring Plan (Construction Phase)

Calegary	Item	Canation	Frequency	Remark	
Air Quality	No2, 302, Co, TSP, PM10	Construction site (Ipraint)	Orbel Smunth	Kay 2015, Miss) acting Report	
Vuter Quality	Water temperature, PK, SS, DO, BOD, GOD, colliform count, oil and gresse, chronium	Construction site (Iprint) Well in the Monastery (I point)	One:22 mans h	April and June 2019 Moretoring Reports	
Waste	Amount of solid waste Management of solid waste of cures restion	Construction sile	Oper/Ament's	Monthly progress reports Odard: April Ling, June, 2015	
oise and Vibration	Notes and vibration level of	Preservation area stack as residence ground the proposed construction eite (2 points)	Once/Smoth (pear period)	Naise and Vibratio	
	casustruction	Preservation site such as readence along the route for consite vahicles (Spoints)	Omen(pask period)	Nay 2015	
Ground Subsidence Hydrology	Ground electure Consumpting of ground weter account	Representative (1 pend)	Every week	Monthly progress reports Merch, April, May, June; 2015	
Rick for infections dispass such as AHSHAV	Etapus of measures of inflations of inflations disease	Cunstronaion site	Onserconth	Monthly progresse reports	
Working conditions (including occupational safety)	Probabilities of condition of occupations and health Probability of infectious disease	Construction sits	Cless/month.	Description April May June) 2015	
Acaidem,	Swaterice of nepidept	Construction rice	As picosico Anze		



# Thilawa Special Economic Zone (ZONE A) Development Project -Phase 1

5. 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 Thileson Special Economic Zone Development Project (Zone A). 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.
- n Pre-Construction Phase

AConstruction Phase

Operation.Phase

23 Obtainment of Environmental Permits (No)

Name of permits	Expected issuance date	Actual issuance date	Concerned authority	Remarks (Conditions, etc.)
tached approval letter				

3) Response/Actions to Comments and Guidance from Government Authorities and the Public (No)

Monitoring Item	Monitoring Results during Report Period	Duration of Report Period	Frequency
Samble and contexts of formal comments enads by the public		Sametiming of	
Nambor and carteria of responses from Government agreeses.		Mannering Separt	Upon memprof committe/complaints

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#### MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

#### (2) Monitoring Results

1) Ambient Air Quality -May 2015

NOs, SOs, CO, TSP, PM10

(tem	Unit	Measured Value (Mean)	Measured Value (Min-Max.)	Country's Standard	Target value to be applied	*Referred International Standard	Frequency	Method	Note (Reason of excess of the standard)
343-	ppis	010	0.00-0.00	NA	N/A	53%	Once in time incertis	HAZECANNIH, EYAS	***************************************
90)	tion.	0.00	0.05-0.01	2008	3N/A	- e/H	Orcentus medis	HAZSCANNER, EMAS	
-00	19#	()0 <del>5</del> 6	#36-3:17.	3606	1966	10	Orcrindres marins	HAZKCANNIH, El'AS	
DF.	ppm	om	0.00-0.00	N/A	20/34	838	Orrintae morbs	HAZSCANNER. EPAS	
Psem	nim.	70.00	meenn	N/A	N/A	932	Occupations .	HAZSCANNER. BPAN	
	30) 00 00	50 pps 50 pps 50 pps 194 pps	them Unit Value (Mean)     545	tem         Unit         Value (Mean)         Value (Min-Max)           sch         γρω         sm         sm-dm           sch         γρω         sm         sm-dm           cm         rpm         sm         sm-dm           cm         rpm         sm         sm-dm           rpm         sm         sm-dm           rpm         sm         sm-dm	See   Unit   Value   (Min-Max.)   Standard	them         Unit         Value (Mean)         Value (Min-Max)         Country's Standard be applied           sch         γρω         ssu         storetts         st/A         st/A         st/A           sh         γρω         ssu         storetts         st/A         st/A         st/A           sh         γρω         ss         st/ss         st/A         st/A         st/A           th         ppm         sin         storett         st/A         st/A         st/A           r         ppm         sin         storett         st/A         st/A         st/A	them         Unit         Value (Mean)         Value (Min-Max)         Country's Standard         value to be applied         International Standard           sch         γρα         sch         sch <t< td=""><td>  Tem   Unit   Value (Mean)   Value (Min-Max.)   Standard   Stand</td><td>  Tell</td></t<>	Tem   Unit   Value (Mean)   Value (Min-Max.)   Standard   Stand	Tell

<sup>\*</sup>Remark: Referred to the Japan and Thailand Standard (EIA Report, Table 6.4-1)

#### Complains from Residents

Are there any complains from residents regarding air quality in this monitoring period?

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

Contents of Complains from Residents	Countermeasures
	12133 1014 22711 111311



# MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

#### 2)(a) Water Quality - April 2015

Measurement Point: Effluent of Wastewater

- Are there any effluents to water body in this monitoring period? O Yes. 4No.

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

Location	item	Unit	Measured Value	Country' s Standard	Target value to be applied	"Referred Internation al Standard	Prequency	Method	Note (Reason of excess of the standard)
EW1	100	mg/l	6.9	NA	SN9902	15-90	Osse to treat march	pi ( metas, Pil/G00629 E pitt Sancar	
	₩.	267	NEX			50		Greverettic method	
	00	11673	0.78			4116		HOWEVELD OWNER	
	000	116/7	2338			30		Dichment method	
	900	11673	6.7			19		Direct inscalation, method	
	Olland Goale	mg/1	5.0			9.1		ATMS-AWWA-WEE Method	
	O.	mg/)	0.00			134		AZHA-AWWA/REE Mymo)	
	Total informe	ans/more	<1.t			75-Q#		ACIAC Printin Method	

<sup>\*</sup>Remark: Referred to the Vietnam Standard (EIA Report), Reference to the Munitoring Report, April 2013.

#### (b)Water Quality -June 2015

Measurement Point: Effloest of Wastewater

- Are there any effluents to water body in this monitoring period? : Yes. 2No

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





# MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

Location	Rem	Unit	Measured Value	Country' \$ 5tandard	Target value to be applied	*Referred Internation al Standard	Frequency	Method	Note (Reznue of excess of the standard
900.0	p0.	ing/t	6.03		3888			pt/min.)10%90261.pf15emc	
	16	TSam	1111		Manager			Greatment method	
	60	mg/t	829		Ä		Oncorprised	(10/100609-2-(0.0)mmm)	
	COD	mg/(	18.9		5043.40			Dichonorie swiffod	
	800	mig/1	2.6	86AG	Verx 30-47		ments	Direct involutions perford	
	Ottomit Charles	mg/i	il ii		Stee 2			APRA-ANNA-WEENering	
	EW.	mg/)	0.092506		960x.05			APRA-ARWA-WEI Status	
	Tipitonimme	cm/1/mod	140		4			AGNIC Patricine Medical	
544-5	p11	19/1	499		10-9.0		District to a	pH mater.HOMPERS.LpH Season	
	96	mg/f	260		MacN			Carrierin metal	
	100	44/1	9.49					HI740MDF-Z,CFCNerman	
	CODE	199/1	26.9	2550	Max, 60			(Schronate pertod	
	800	mg/l	11.2	HEIVE:	Max. 22 std		month	University of the second of th	
	Cliand Grone	24/1	MD		Miss			APRA-AWWA-WEI Nethol	
	(3)	1947	0.000040		Mex. 85			APHALAYWA WID Nated	
	Total (otherwe	chi/100iol	60					ACUSC Patrolites Market	
1W-4	per	99/1	4.79		14:00			p11 nyes;310409091 p115enix	
	98	leg/L	244	N/A	Meckl		Once et tect	Caryments entired	
	DO:	mg/1 -	3.10	2000			, matth	HDWWS-2c0.Otemen	

<sup>&</sup>quot;Remark, Other locations (SW-2, SW-3, SW-4, SW-8) had no water for measurement.



## MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

Location	Item	Unit	Measured Value	Country' * Standard	Target value to he applied	*Referred Internation al Standard	Erequency	Method	Note (Reason of excess of the standard)
	con	210/0	46/5		Max. III			Dichromate method	
	300	me/i	1638		Max. 20-41			Drect occurre outled	
	Oil and Grown	mgd	ND		Min.5			APHA-AWIVA-WEENMING	
	G	mg/1	0.000098		Marc III.5			APHA-AWRIA-WEF Melsid	
	Treat and Attorney	efail titteré	6000					ADAC Printin Method	
W/8	<del>10</del> 1	/mg/1	748		10.011			pH metas, HIP SCHIZE I, pri Science	
	20	P06/1	464		Mei 32			Convitents swifted	
	po	mg/1	3.34	N/A	4			H1240H129-22D Chemina	
	COD	:100/7	47.0		76nc.00		Once in two Dichme	Dichnerow mobod	
	800	mg/S	865		May 25 40		iimids.	Does inculation surfed	
	Oliveral Green	mg/)	NO		Man. E	U.		APHA-XWWA-WEF-Method	
	O.	=6/3	6.000		Mes. 0.5			APHA-ARRIVATED Method	
	Toutestinens	+tu/100m3	3000					ACAC Pennis Nethol	
GWI	pH :	Hell	245			33-90		pH mmc.HI7909829-1 pH 38400	
	20	mult	187			in		Geometri subul	
	100	Hg/I	2.83			346	Section Control of the Control of th	HIWWEST LOD Obertain	
	C00	(mg2)	1871	(N/A/	5 N/W 2	30.	Charattes	Dichmonds serified	
	<b>BCEI</b>	mg/l	6.6			is	month	(Dest recoiner method	
	Clif and Citiese	mg/l	(ND)			111		APIDE ARWA WEEKlobal	
	0	eig/1	0.000041			0.04		APRA-AROVA-WEENebod	

ð



## MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

Location	ltem	Unit	Measured Value	Country' 3 Standard	Target value to be applied	'Referred internation al Standard	Frequency	Method	Note (Reason of excess of the standard)
	Trial soldaning	1947 Hittag	23			73-101		ADAC Number Nathod	

<sup>&</sup>quot;Remark: Referred to the Victnam Standard (EIA Report), Beference to the Monitoring Report, June 2015.

#### Complains from Residents

Are there any complains 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.

Counturmeasures

3) Soil Contamination (only operation phase)

Situations environmental report from tenants

- Are there any serious issues regarding soil contamination in this monitoring period?

n Yes, MNo

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

Contents of Issues on Soil Contamination	Countermeasures

<sup>&</sup>quot;Remark: Total suspended solid has been exceeding the reference standard since before construction phase as reported in the result of EIA Monitoring report (Sep 2013).

#### 4) Noise -May 2015

Noise Level (Along the Thilawa Development Road)

Location	Item	Unit	Measured Value (Mean)	Measured Value (Min-Mas)	Country's Standard	Target value to be applied	*Referred International Standard	Frequency	Method	Note (Reason of excess of (fix standard)
Transcent N. C.	Legislay.	distri	37	49-27	7870	51440V21	25	Charrigous.	Shiping Land	
TNV-1	Legisvet	-(A)(A)	50	49-24	NEA	A N/A	20	pemili	Meter	

<sup>\*</sup>Remark: Referred to the Japan Standard (ETA Report), Reference to the Noise and Vibration Report May 2015.

Noise Level (Living Environment-Near Monastery)

Location	ltem	Unit	Measured Value (Mean)	Measured Value (Min-Max)	Country's Standard	Target value to be applied	*Referred International Standard	Frequency	Method	Note (Reason at excess of the standard)
	Legiday	dftar	9:	8145		79	17	New York	F-1112	
TNV=	Legenti	49(6)	36.	37-39	347.6	4D	Supper	Oter in 3	Second harvel	
	Legenger	æ(Λ)	11	47-50	13.	.000	months	Meter		
	Compilers	atticas	36	32.42		75		3 5	EV. ARC	
TNV-II	Legisleri	49(3)	46	47-46	26/76	40	Singapore	Oren in 3'	Sound live!	
	Legingho	(MICA)	- 41	36-40		50	L. Carrier	investi	Meter	

<sup>&</sup>quot;Remark: Referred to the Singapore Target Noise Standard (EIA Report), Reference to the Noise and Vibration Report May 2015.

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## MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

#### Complains from Residents

Are there any complains from residents regarding noise in this monitoring period? ○ Yes, ② No.
 If yes, please describe the contents of complains and its countermeasures to fill in below the table.

Contents of Complains from Residents	Countermeasures
Separation of a separation continue decision in	And a trace makes and the

#### 5) Solid Waste

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

- Are there any wastes of sludge in this monitoring period? Wes, a No

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

No.	Dato	Description	No. of Loads	Slemarks
1	34-blan 15	Waste Disposed	(0)	VCDC
3	25-Marris	Waste Disposal	en:	VCDC
1.	3-May-15	(Monto Didgenor)	00/	yead
4	+50y-12	Wass Disposal See agri-	10	YEDG
1	13-May-13	Want Disposal	.00	yene
4: 1	16-Mg-11.	Warm Ethyppositibes age)	(102)	YEDO
9: 1	(H-Heiself)	Worse Deponal	- 00	ACDC

<sup>\*</sup>Remark; Reference to the Monthly Progress Report March 2018, May 2018 and June 2015,

#### MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

6) (a)i. Ground Subsidence and Hydrology-March 2015

Duration (Week)	Water Cor	esumption	Ground Level		Section Co.	CHARGO
	Quantity	Unit	Quantity	Unit	Frequency	Note
3-May-2012	190	m3/wesk	+100			
12-Mar-2015	239	ns/werk	16,900	m.	A	
19.14p-2015	296	m3/week	46.003	m	Church World	
26-Attm-2012	- 29	123/Voorb	+6/897	m		

<sup>\*</sup>Reference to the Monthly Progress Report March 2015.

(4)ti. Ground Subsidence and Hydrology-April 2015

Duration (Week)	Water Cor	sumption	Ground Level			Note
	Quantity	Unit	Quantity	Unit	Frequency	None
2-Ap+2019	236	act/week	16,987	#		
6-Apr-2015	230	diffrees	14,963	- 15		
16-Apr-2013	545	ard/week			Oncosek	
25 Apr-2015	236	zd/wesk	74.96%	=		
20-Apr-2011	241	ml/week	+4.865	10		

<sup>\*</sup>Reference to the Monthly Progress Report April 2015.

(a) iii. Ground Subsidence and Hydrology-May 2015

Duration (Week)	Water Consumption		Grant Level		40000000	60.00
Duration (wees)	Quantity	Unit	Quantity	Unit	Frequency	Note
2/May-2005	211	mb/systs	+4,7657	m		
14-64ay-ddt3	266	HEN/wellels	46,794	:111		
21-blay-3219	200	nd/mek	+6,754	:111	Choos a warek	
38-hfs)-2213	198	m(3/mm4)	12,493	- 10		

<sup>\*</sup>Reference to the Monthly Progress Report May 2013.





# MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

(a)iv. Ground Subsidence and Hydrology-June 2015

m mercen	Water Consumption		Ground Level		- TOTAL	600
Duration (Week)	Quantity	Unit	Quantity	třežt	Frequency	Note
4)u=0015	205	m3/smb	~±.002	-th		
D-Iu-am	30	may week	14,941	:#b	Oneawork	
H-bar 2015	10	m3/wate	44.988	16	CHEST STORE	
25-jun-2015	122	mit/wwh.	+4,990	m		

<sup>\*</sup>Reference to the Monthly Progress Report June 2015.

(i) (b) Locator's Temporary Tube Well Water Communition (March, April, May, June) (To stop using after water supply for MJTD starts)

Duration (Month)	Water Cor	niumption .	Frequency	Note
Duration (Month)	Quantity	Unit	Frequency	
Www	1711/0	m//www.		
reputi	2005	=!/web	54500-00000	
May	1536/8m	07/week	Owesmit	
Jares .	2525-65	:m//week/	-	

7) Offensive Odor (only operation phase) Not Applicable at Construction Phase Report.

#### Complains from Residents

Are there any complains from residents regarding offensive odor in this monitoring period? <a href="https://www.icha.com/period/">https://www.icha.com/period/</a>

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

Emintermeasures



#### MYANMAR JAPAN THILAWA DEVELOPMENT LIMITED

Situations environmental report from benants Not Applicable at Construction Phase Report

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

eYes, 42 No

Contents of Incidents	Countermeasures
- Colonial and Control	ACAD STATE OF THE

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

End of Document



# Thilawa Special Economic Zone (ZONE A) Development Project -Phase 1

# Appendix

Water and Waste Water Monitoring Report

April, 2015

And

Air Quality Monitoring Report

May, 2015



#### MONITORING REPORT

FOR

WATER QUALITY (APRIL 2015)

AND

AIR QUALITY (MAY 2015)

THILAWA SPECIAL ECONOMIC ZONE (ZONE A)



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#### RESULT OF AIR AND WATER QUALITY MONITORING

#### 1. Introduction

Water samples were collected on 29th April, 2015 and air quality monitoring measurement was surveyed from 20th – 27th May, 2015 at Thilawa Special Economic Zone. This report sets out the environmental monitoring required throughout the construction of the Thilawa Special Economic Zone (Zone A). The terms of reference for monitoring are shown in Table 1. The location of air and water monitoring points are shown in Figure 1 and Table 1.

Terms of Reference for Monitoring

Table 1 Terms of reference for air and water quality monitoring at TSEZ.

Description	items	Frequency	Location
Air Quality	TSP/PM10	1 time / 3months	At construction site (1point)
Underground water	pH, SS, DO, BOD, COD, Coliform count, oil and grease, chromium	1time /2months	Tube well inside of Mosgyoswan Monastery (1 point)

#### Monitoring Instrument for Air and water

No.	Instrument	Brand & Model	Measurement/ Parameter	
1,	Environmental Perimeter Air Monitoring System	HAZ- SCANNER EPAS	CO, NO <sub>2</sub> , NO, SO <sub>2</sub> , PM (2.5), PM (10), VOCS, Relative Humidity, Temperature, Wind Speed, Wind Direction	
3	Alpha Bottle (Water Sampler)	Wildlife Supply Company* Indonesia		

So far, there is no environmental standard for ambient air quality in Republic of Myanmar, the survey result was evaluated by comparing with the standards in neighboring country like Thailand, Vietnam, lapan and IFC (Table 2). The consultant will apply the air quality standard in Thailand, Victoria, Japan and IFC as shown in Table 1.As for TSP and PM10, the standards in Thailand were applied and the others were compared with the standards in Japan.

Table 2 Amblent Air Quality Standard in Southeast Asia:

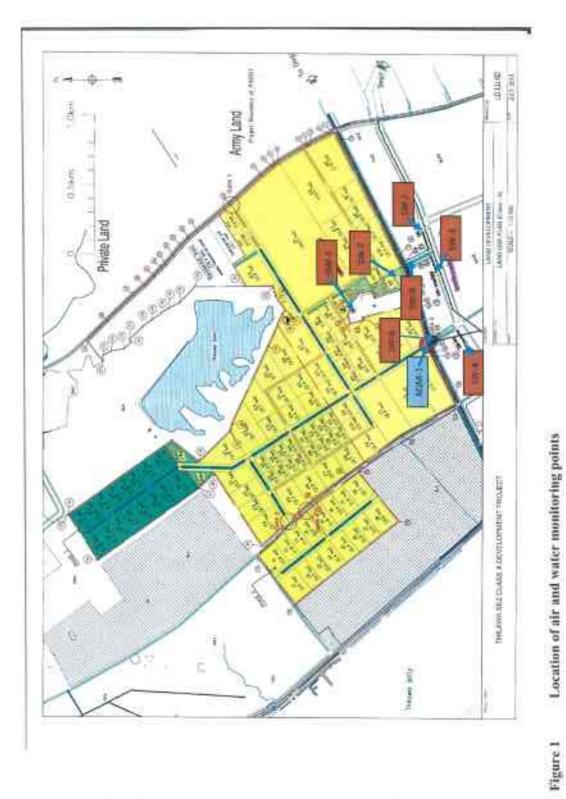
Item	Areraging period	Japan	Thelland	Wetnam :	IIC
90;	10 min		30		0.5mg/m
100	Theor	Э.Турги	J.Jcpm 1	C.35mg/m²	0.1751-g/r/f (InteriorTarget-) 0.05mg/m <sup>2</sup> (InteriorTarget-2) 0.02mg/m <sup>2</sup> (Guide Interior
	24 nours	Л.САррт	6. 2ppm	0.123 mg/mr	\$ <del>+</del> \$
600	1 year	- 33	vara	0.05mg/m²	s-Kellos
10;	Lhour		G.Expair	BREAK ARRAY	Q,2mg/π* .
	57 nou-s	Q Q4-C,Cfraon:		S# 1	
	1 year		D.PG con*	93	0.04mg/n <sup>-2</sup>
VOA	Thour	- 2 0		0.2mz/m*	185 18548
200-	24hours	-	Y No. 1	0.04mm/m <sup>4</sup>	
.0	1 1000	57035	ā9ppr	30mg/m²	(±3)
	8hours .	2Dpam	98	19mg/m²	\$ <b>#</b> \$ W
	24hours	10ppm	95am		
rice.	Potte	2000	Land Barrell	0.3mg/m <sup>4</sup>	F. 175.5
	24hours	anne (e	0.33mg/m <sup>3</sup>	0.2mg/m <sup>2</sup>	4.*4
	2,0001		9.10mg/m.	U.14mg/m³	* <del>†</del> É
PM	24fzcijs	5 <del>3</del> 6	9.12mg/jr.4	0.15ing/ir.*	0.15(rg/m²) nterimTarger.2 0.10(rg/m²) nterimTarger.2 0.17(rg/m²) nterimTarger.3
	1 year	( <u>*</u> ).	0.35mg/m*	J.95mg/m <sup>*</sup>	2.13 mg/m Visiter m Target 3 1.13 mg/m Visiter m Target 2 1.13 mg/m Visiter m Target 3
PM.	1hour	3.2mg/m <sup>2</sup>		24 14	
155	245murs	3.1mg/m*	500 FASS - 55	03 87	A DATA CONTRACTOR OF THE CONTR
ide.	2/100%	3.835mg/m²	3.05mg/m²		0.075 mg/m²/interimTergor-1 0.05mg/m²/interimTarget-a 0.0373mg/m²/interimTarget-1
	1 year	sicting/m	3.025nw/m	14	C.033mg/m²(interlinTarge: 1 C.025mg/m²(interlinTarge: 2 C.015mg/m²(intermilarge: 3
Ozore	1not.	933	0.16pam	E.Rospint	<u> </u>
	o rourdally:		п.с7үүм	E.Zme/rr²	D 16 ng/m² (Inter mTarge: 1 U.1mg/m² (Gujde) no
	J year	045455	6.64 com	f.: 4mg/m	=57,574
Uş	1hcur	C.E6pom	00 NO WEST WAY	2-24/1 <del>02/14/14</del>	
rt:	24hours	5.5	2.2	C (C15me/m)	_5335VVV
	-1 moeth	242	6.0015mg/h/ <sup>3</sup>	SE	
	1,400			E.0005mg/m <sup>2</sup>	

Source: National Air Quality Standard in Japan (Choula: No.25,1973, priginally), Ministry of Environment, Japan Notificationsof National Environmental Spard No.10, 24,28,33, and 36, Ministry of Natural Resources and Environment, Thailand

S 28 S

National Ambient Air Quality Standard (TCVNS973:2005), Ministry of Science and Technology in Viennam, Environmental, Health, and Safety Guide mes, General EHS Guidelines, IFC, 2007.

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Location of air and water monitoring points

#### 2. Description of the air quality monitoring station

#### Survey Period

Air quality survey was conducted once per 3 months as per specification provided by the client. The monitoring period was about 7 consecutive days. The sampling duration for each day is as shown in Table 3. Air quality munituring location is shown in Figure 2.

Table 3 Sampling Duration for Air Quality Survey

Day	(20 <sup>(1)</sup> – 27 <sup>th</sup> May, 2015)
Day 1	May 20 <sup>th</sup> – 21 <sup>st</sup>
Day 2	May 21 <sup>st</sup> 22 <sup>n1</sup>
Day 3	May 22 <sup>nd</sup> 23rd
Day 4	May 23" - 24"
Day 5	May 24 <sup>th</sup> – 25 <sup>th</sup>
Day 6	May 25 <sup>th</sup> – 26 <sup>th</sup>
Day /	May 26" — 27 <sup>th</sup>

Source: Source: Resource & Environment Myanmar Roy Itd.

#### Survey Method

Sampling and analysis of ambien, air pollutants was conducted by referring to the recommendation of United States Favironmental Protection Agency (L.S. EPA). The Haz-Scanner Environmental Perimeter Air Station (EPAS) was used to collect Ambien. Air Munitoring data. The characteristics of the instrument are:

- Portable direct reading
- Configure up to 14 simultaneous air measurements including U.S. EPA criteria sir pullusants.
   The basic specifications of the instrument are as follow.

Instrument .	Brand	Model	Messuren:ent/ Parameter
Environmental	HAZ-SCANNER	EPAS	CO, NO <sub>2</sub> , NO, SO <sub>2</sub> , PM
Perimeter Atr			(2.5), PM (10), VOCS,
Monitoring System			Relative Humidity,
			Temperature, Wind
			Speed, Wind Direction





Figure 2 Location and site condition of air quality monitoring station.

Table 4 Sampling and Analysis Method for Air Quality

No.	Parameter	Analysis Method	
1	Sulfur dioxide (5O <sub>2</sub> )	On site reading	
2	Carbon monoxide (CO)	On site reading	
3	Nitrogen dioxides (NO <sub>2</sub> )	On site reading	
4	Total suspended particle (TSP)	On site reading	
5	Particle matter 10 (PM10)	On site reading	

Source: Resource & Environment Myanmar Co., Ltd.

Table 5 Target Ambient Air Quality Level

Parameters	Averaging Period	Value
SO <sub>2</sub>	24 hours	0.12 ppm <sup>1</sup>
co	24 hours	9 ppm¹
NO <sub>2</sub>	24 hours	0.04 - 0.06 ppm <sup>2</sup>
TSP	24 hours	0.33 mg/m3 <sup>1</sup>
PM10	24 hours	0.12g/m3 <sup>1</sup>

<sup>1</sup> Thailand Standard

#### Survey Result

One day average concentration of CO, NO2, TSP, PM 10 and SO2 are shown in Table 5. Hourly average data are presented in Appendix -1.

Table 6 One day average concentration of CO, NO2, TSP, PM10 and SO2

	Date	Time	Time CO	NO2	TSP	PM-(10)	802
	D.M.Y	Hours	ppm	ppm	mg/m <sup>3</sup>	mgm3	ppm
- 1	20th-21st May, 2015	24	0.26	0.03	0.01	0.00	.0,00
2	21st-22nd May, 2015	24	0.31	0.03	0.01	0.00	0.00
3	22nd-23rd May, 2015	24	1.17	0.03	0.00	0.00	0.00
4	23rd-24th May, 2015	24	137	0.03	0.00	0.00	0.00
- 5	24th-25th May, 2015	24	0.39	0.03	0.01	0.01	0.00
- 6	25th-26th May, 2015	24	0.31	0.03	0.02	0.00	0.01
7	26th-27th May, 2015	24	0.29	0.03	0.02	0:01	0.00
Maximum		.24	1.17	0.03	0.02	0.01	0.01
Average		24:	0.56	0.03	0.01	0.00	0.00
Minimum		24	0.26	0.03	0.00	0.60	0.00
Farget Value	Farget Value		10	<0.06	=0,23	<0.12	<0.04

Source: Resource & Environment Myanmar Co., Ltd.

Concentration levels of all parameters are within the standard in this month.

<sup>2</sup> Japan Standard -

#### 3. Water Quality Monitoring

#### Methodology

Sampling and preservation method

Water samples were taken by Alpha horizontal water sampler and collected in sterifized sample containers. All sampling was in suict accordance with recognized standard procedures. The parameters pH, temperature, dissolved oxygen (DO), electrical conductivity (DC), were measured at each site concurrently with sample collection. All samples were kept in ideal boxes and were transported to the laboratory and stored at 2-4 °C refrigerators.

Table 7 Field Equipment for Water Quality Survey

No.	Equipment	Manufacturer	Originate Country	Madel
1	ph meter	HANNA	USA	HI7609525-1 pH Sensor
2	00 meter	HANNA	USA	HI77C9829 2
3	Digital Water Velocity Meter	Global Water Flow Prote	AZC	FP 211
4	Alpha Sottle (Water Sampler)	Wildlife Supply Company <sup>8</sup>	ndonesia	¥6

Table 8 Container and Preservation Method for Water Samples

Nο	Parameter	Contains	Preservation
1	O'l and Grease	2000 mi glass bottle	Suffurk acid. Refrigerate
2	20.2	500 ml plastic hottle	Sulfuricacid, Refrigaritte
3	800,	1.800 ml plastic bottle	Befrigerate
4	Heavy metals	500 ml plastic bottle	HNG <sub>s</sub> Refrigerate
5	Bacter'a	200 ml glass bottle (Ster Sze)	Refrigerate
5	<b>Úthers</b>	1,800 ml polyethylene battle	Refrigunte

#### Test method

Table 9 The following table provides the test method for water quality,

No	Item	Analysis method
1	£4.	HI7603829-1 pH Sensor
2	Suspended Solles	Gray'n etric method
3	Dissolved Citygan (DO)	HI7609829-2 Galvanic dissolved oxygen (DIO) sensor
4	Chemical oxygen demand(COD)	Dich arrests method
5	Blothemital oxygen demand(BOD <sub>tj</sub>	Direct not viation, nethod
6	Oll & Grease	APHA-AWWA-WEF Wethod
7	Chien: Jre (Cr) (mg/l)	AP IA-AWWA-WED Method
8	hi saliform, Foral coliforms, total coliforms	AUAC Fetrifilm Method

## Monitoring Result (April 2015)

No	literu .	GW 1	Standard	Unit
1	pH	ASO	5.9	W
2	Suspended Satish	ZD	Mrx. 208	ar⊌/.
39	Disselved Oxygen (DO)	0.74		ng.
40	Cheencal oxygon commit(COD)	11.8	Next, 300	نهاد
5	Biochemical oxygen certaid(BOD <sub>5</sub> )	3.7	Max. 200	प्रशुक्त
5	0:1 & Gresse	ND:	Mex. 5	Digino
98	Chromium (Cr) (ng-3)	0.0000	Max. 0.5	mg/I
83	E. roldour	<.1		MP\.:00π1
à.	Feeal ecliforms	ا يغ		MPN(100m1
10	Tetal colliforms	i sa	Max.400	MPN: 00ml

Reinsik , ND as No. Detected.

 $(\mathcal{Z}_{i})(\mathcal{Z}_{i})$ 

#### Result of the Water Quality Monitoring

For this sampling time in May 2015, only ground water sample, GW-1 was surveyed and surface water, the test of sampling points were missed in survey because the water in the stream was not crough to be collected for survey.

According to the Lab result of GW-L, all of parameters are not higher than the MOI standard.

Detailed of laboratory result data are provided in appendix,

# Appendix 1 Hourly Air Quality Result

(S)

Client: Myanmar Japan Thilawa Development Ltd.



Issued Date: 20-05-2015

#### Analysis Report

Project Name: Thilawa Special Economic Zone (TSEZ)
Sample Designated as: Ambient Air Quality Analysis

Sampling Location : AQM 1 (May TSEZ)

Date	Tinic	CO	NO2	TSP	25310	801
DAIA	HALS	ppb	-ppb:	Emiga	Kmiga	pph
20.5.2015	11:00-12:00	979.25	14.16	6.68	3.85	0.00
20.5.2015	12:00-13:00	28,00	34,93	6,07	8.10	0.00
20,5,2015	13:00-14:00	36,67	35.15	5,37	3.00	0.00
20.5:2015	14:00-15:00	646.67	34.98	3.30	3.00	0.00
20.5.2015	15:00-16:00	341.86	35.19	5,58	3.00	0.00
20.5.2015	16:00-17:00	203.33	35.32	5.70	3.05	0.00
20.5.2015	17:00-18:00	26.67	35.00	6.52	3.48	0.00
20.5.2015	18:00-19:00	8.33	34.57	6.68	4.25	6.70
20.5:2015	19:00-20:00	116.67	34.53	6,47	3,45	1.05
20.5.2015	20:00-21:00	50.00	34.98	5.35	3.23	0.00
20.5:2015	21:00-22:00	40.00	34.97	5,93	4.15	0.53
20.5.2015	22:00-23:00	118.33	35.05	6.07	3.92	0,43
20.5.2015	23:00-00:00	123.33	54.72	6.35	3.90	0.00
21.5.2015	90:00-01:00	78.33	-34.80	5.05	3.95	0.40
21.5.2015	01:00-02:00	130.00	34.93	5.90	3.82	0.00
21.5.2015	02:00-03:00	48.33	34.62	6.98	3.81	0.52
21.5.2015	53:00-04:00	53.33	34.30	6.33	3,88	0.30
21.5.2015	04:00-05:00	176.67	35,28	7.12	4.03	0.33
21.5.2015	05:00-06:00	135,00	35.03	7.87	4.82	3,00
21.5.2015	06:00-07:00	875.00	35.32	8.82	3.38	1.33
21.5.2015	07:00-08:00	850,00	34,52	9.03	3.58	0.43
21.5.2015	08:00-09:00	110.00	34.73	9.30	4.90	0.30
21.5.2015	09:00-10:00	116.67	35,18	7.18	4.87	8.25
21.5.2015	10:00-11:00	661.67	34,80	5.65	3.18	0,00
MAX	24hours	979.25	35.32	9.70	8.10	8.25
MIN	24hours	8.33	34,30	3.30	3.00	0.00
Average	24hours	260.59	34.89	6.46	3.95	0.98

		ppm	ppm	mg/m3	mg/m3	ppm
MAX	24hours	0.9792	0.0353	0.0093	0.0081	0.0083
MIN	24hours	0.0083	0.0343	0.0033	0.0030	0.0000
Average	24bours	0.2606	0.0349	0.0965	0.0039	0.0010

Client: Myanmar Japan Thilawa Development Ltd.



Issued Date: 20-05-2015

## Analysis Report

Project Name: Thilawa Special Economic Zone (TSEZ) Sample Designated as: Ambient Air Quality Analysis

Sampling Location: AQM 1 ((May\_TSEZ)

Date	Time	(00)	NO2	TSP	JUME 10	800
D.M.Y	H.M.S	ppb	pph	pgm1	Langua	pph
21.5.2015	11:00-12:00	146.67	34.65	5.77	3.75	2.92
21.5.2015	12:00-13:00	226:67	34.73	4.88	4.57	16,00
21.5.2015	13:00-14:00	866.67	34.77	3.12	3.00	7.95
21.5,2015	14:00-15:00	31.67	34.95	8.32	5.62	0.43
21.5.2015	15:00-16:00	0.00	35.26	6.78	3.50	6,26
21.5,2015	16:00-17:00	42.31	34.88	8.92	3,15	0:00
21.5.2015	17:00-18:00	198,25	35.00	9.47	3.40	0.67
21.5.2015	18:00-19:00	905.00	33.88	4.77	3.00	0.00
21.5.2015	19:00-20:00	656:67	34.35	15,83	3.00	0.00
21.5.2015	20:00-21:00	330.00	35.83	4.23	3.00	0.00
21.5.2015	21:00-22:00	58,33	34.78	4.72	3.03	0.00
21.5 2015	22:00-23:00	29.73	34,84	13.19	3.95	0.00
21.5.2015	23:00-00:00	23:33	34.83	1).97	3.92	0.00
22.5.2015	00:00-01:00	11.67	34.92	9.50	3.60	0.00
22.5.2015	01:00-02:00	34.69	34.55	21.27	5.63	0.00
22.5.2015	02:00-03:00	85,42	34.44	10.33	4.52	0.00
22.5.2015	03:00-04:00	23:33	34,73	12.42	5.05	0.00
22.5.2015	04:00-05:00	70,59	32.65	9.65	4.41	0,00
22.5.2015	05:00-06:00	1080.00	32.60	8.20	3.00	0.00
22.5.2015	06:00-07:00	806:00	34,57	8.40	3.00	0,00
22.5.2015	07:00-08:00	961.67	34.63	6.75	3.00	0.00
22.5.2015	08:00-09:00	90,00	34.82	7.08	3.00	1.82
22.5.2015	09:00-10:00	58.33	34.93	5.63	3.13	3,60
22.5.2015	10:00-11:00	756.82	33,89	9.98	3.00	0.73
MAX	24hours	1080,00	35.83	21.27	5.63	16.00
MIN	24hours	0.00	32.60	3.12	3.00	0.00
Average	24hours	312.24	34.56	N.80	3.67	1.68

		ppm	ppm	ing/m3	mg/m/3	ppm
MAX	24hours	1,0800	0.0358	0.0213	0.0056	0.0160
MIN	24hours	0.0000	0.0326	0.0031	0.0030	0.0000
Average	24hours	0.3122	0.0346	0.0088	0.0037	0,0017

Client: Myanmar Japan Thilawa Development Ltd.



Issued Date: 20-05-2015

#### Analysis Report

Project Name: Thilawa Special Economic Zone (TSEZ) Sample Designated as: Ambient Air Quality Analysis Sampling Location: AQM 1 (May\_TSEZ)

Date .	Thus	CO	N02	TSP	20110	802
D.MAY	HAUS:	ppb	pph:	Emigni 3	Kortan	ppb
22.5.2015	11:00-12:00	1038.33	34,22	7,32	3.00	7.87
22.5.2015	12:00-13:00	116.67	40.77	7,30	3.00	4.28
22.5.2015	13:00-14:00	48.33	35.13	6,52	3.00	3.20
22.5.2015	14:00-15:00	315.00	34.40	8:27	3.00	0.90
22.5,2035	15:00-16:00	38.33	34.35	9,60	3,70	0.63
22.5.2015	16:00-17:00	16.67	34.27	7.15	4.07	5.07
22.5.2015	17:00-18:00	0.00	35.10	3.32	3.00	5.88
22.5.2015	18:00-19:00	0.00	34.50	4.83	3.00	10.77
22.5.2015	19:00-20:00	0.00	34.50	5.08	3.00	0.00
22.5.2015	20:00-21:00	9,09	34.32	4.50	3.00	0.00
22.5.2015	21:00-22:00	1386,36	32.32	2.09	3,00	0.00
22.5.2015	22:00-23:00	1004.11	33.99	4.19	3.00	0.00
22.5.2015	23:00-00:00	639.62	34.47	6.58	3.00	0.00
23.3.2015	00:00-01:00	50.00	33.98	5.36	3,00	0,00
23.5.2015	01:00-02:00	55.81	35.62	10.26	3.81	0.00
23.5:2015	02:00-03:00	66.67	34.53	7.07	3.48	0.00
21.5 2015	03:00-04:00	211.67	34.68	8.15	3.53	0,00
23.5.2015	04:00-05:00	73.53	34.91	6.65	3.68	0.00
23.5.2015	05:00-06:00	59.26	34,67	4.74	3.41	0.00
23.5.2015	06:00-07:00	1561.11	33.61	5.56	3.00	0.00
23.5.2015	07:00-08:00	1124,07	34.54	11.09	3.00	0.00
23.5.2015	08:00-09:00	762.00	34,22	4.76	3,00	9.80
23.5.2015	09:00-10:00	938.33	34.45	4.00	3.23	10.63
23.5.2015	10:00-11:00	10,00	34.17	11.53	6.20	39.60
MAX	24hours	1561.11	40.77	11.53	6.20	39.60
MIN	24hours	0.00	32.32	2.09	3.00	0.00
Average	24hours	396.87	34.63	6.50	3.34	4.07

E Link Paring Lower II D		ppin	ppm	mg/m3	mg/m3	ppm
MAX	24bours	1.5611	0.0408	0.0115	0.0062	0.0396
MIN	24bours	0.0000	0.0323	0.0021	0.0030	6,0000
Average	24hours	0.3969	0.0346	0.0065	0.0033	0.0041

Client: Myanmar Japan Thilawa Development Ltd.



Issued Date: 20-05-2015

#### Analysis Report

Project Name: Thilawa Special Economic Zone (TSEZ) Sample Designated as: Ambient Air Quality Analysis Sampling Location: AQM | (May\_TSEZ)

Date	Time	00	NOR	TSP	PM19	502
DALY	TUMES	ppli	ppb	pg/m3	Cortgan	pph
23.5.2015	11:00-12:00	32,00	36.88	6.42	3.88	17.92
23.5.2015	12:00-13:00	438.33	35.02	4.73	3.00	7.62
23.5.2015	13:00-14:00	1166.67	34,95	4.22	3,32	3.87
23.5.2015	14:00-15:00	278.33	34.70	7,83	5.68	20.53
23.5.2015	15:00-16:00	698.33	34.53	14.03	3.92	18,08
23.5.2015	16:00-17:00	785.00	34.55	11.03	5.23	20,68
23.5.2015	17:00-18:00	101.67	34.90	29.95	8.62	39,72
23.5.2015	18:00-19:00	0.00	34.90	19.27	7.05	41.02
23.5.2015	19:00-20:00	0.00	34.87	25.75	5,43	18.43
23.5.2015	20:00-21:00	121.67	35.00	12.13	4:28	0.00
23,5,2015	21:00-22:00	93.33	34.73	7.30	4.00	0.00
23.5.2015	22:00-23:00	90,00	34.83	9.73	3.87	0.00
23.5.2015	23:00-00:00	33,33	34.97	13.33	3.87	0.03
24.5,2015	00:00-01:00	55.00	34.62	10.17	4.67	0.00
24,5,2015	01:00-02:00	152.63	34.37	5.61	3.24	0.05
24.5.2015	02:00-03:00	20,45	34.27	8.50	3.68	0.00
24.5.2015	03:00-04:00	85.71	34.55	11.00	4,67	0.00
24.5.2015	04:00-05:00	18.33	34.47	15.40	4.08	0.00
24.5.2015	05:00-06:00	66:67	34,42	12.57	4.13	0.00
24.5.2015	06:00-07:00	1486.67	34.72	11.97	3.20	0.00
24.5.2015	07:00-08:00	953.33	34,22	5.03	3.17	0.00
24.5.2015	08:00-09:00	611.63	33.93	5.53	4,02	0,00
24.5.2015	09:00-10:00	1095:00	34.85	7.80	3.40	6.07
24.5.2015	10:00-11:00	373,33	34.70	6.90	3.77	8.27
MAX	24hours	1486.67	36.88	29.95	8.62	41.02
MIN	24hours	0.00	33,93	4.22	3,00	0.00
Average	24hours	367.39	34.76	11.09	4.34	8,43

	ppm	ppm	mg/m3	mg/m3	ppnt	
24hours	0.0320	0.0369	0.0064	0.0039	0.0179	
24hours	0.4383	0.0350	0.0047	0.0030	0.0076	
24hours	1.1667	0.0350	0.0042	0.0033	0.0039	
	24hours	24hours 0.0320 24hours 0.4383	24hours 0.0320 0.0369 24hours 0.4383 0.0350	24hours 0.0320 0.0369 0.0064 24hours 0.4383 0.0350 0.0047	24hours 0.0320 0.0369 0.0064 0.0039 24hours 0.4383 0.0350 0.0047 0.0030	

Client: Myanmar Japan Thilawa Development Ltd.



Issued Date: 20-05-2015

#### Analysis Report

Project Name: Thilawa Special Economic Zone (TSEZ) Sample Designated as: Ambient Air Quality Analysis Sampling Location: AQM 1 (May \_TSEZ)

Date	Time	60	.502	TSP	PMIO	801
DAMA	Hattis	ppb.	pph	pg/m3-	радия	pph
24.5.2015	11:00-12:00	480.00	34.65	5,73	3.63	15.25
24,5.2015	12:00-13:00	733.33	34.73	7.52	6,77	3,97
24,5,2015	13:00-14:00	1086,67	35.20	6.63	3,47	2.45
24.5.2015	14:00-15:00	451.67	34.20	10.98	6,67	0.07
24.5.201.5	15:00-16:00	0.00	34.97	12.07	6.58	11.28
24.5.2015	16:00-17:00	61.67	34.33	7.03	6.22	10.78
24.5,2015	17:00-18:00	33,33	34:07	11.88	7.60	20.00
24.5.2015	18:00-19:00	1.85	34.13	41.43	11.28	26.61
24.5.2015	19:00-20:00	25.00	34:39	13.18	5.89	0.00
24.5.2015	20:00-21:00	225.00	30.50	18.50	5.25	0.00
24.5.2015	21:00-22:00	973.33	34.78	16.23	5.67	0,00
24.5.2015	22:00-23:00	410.94	34.53	28.55	6.03	0.00
24.5.2015	23:00-00:00	44,64	34.39	21.39	5.27	0.00
25.5.2015	00:00-01:00	36,36	34.18	15.45	4.43	0.00
25.5.2015	01:00-02:00	40,00	35.03	18.25	4.18	0.00
25.5.2015	02:00-03:00	221.67	34.53	7,07	3.48	0.00
25.5.2015	03:00-04:00	256.67	34,65	8,12	3.53	0.00
25.5.2015	04:00-05:00	70.00	35.02	8.70	3.85	0.00
25.5.2015	05:00-06:00	381.67	35:28	11.52	4.92	3,35
25.5.2015	06:80-07:00	4K5:00	34.92	16.25	4,67	4.00
25.5.2015	07:00-08:00	1075,00	35,10	12.75	3.75	0.00
25.5,2015	08:00-09:00	750.00	34.98	27,05	6.78	0.00
25.5:2015	09:00-10:00	640.00	40.50	17.05	5.80	1.25
25.5.2015	10:00-11:00	858,33	34.60	11.65	4.65	0.13
MAX	24hours	1086.67	40.50	41.43	11.28	26.63
MIN	24hours	0.00	30,50	5.73	3.47	0.00
Avenige	24bours	389.26	34.74	14.83	5.44	4.17

		ppm	ppm	mg/m3	mg/m3	ppm
MAX	24bours	1.0867	0.0405	0.0414	0.0113	0.0266
MIN	24bours	0.0000	0.0305	0.0057	0.0035	0.0000
Average	24hours	0.3893	0.0347	0.0148	0.0054	0.0042

Client: Myanmar Japan Thilawa Development Ltd.



Issued Date: 20-05-2015

#### Analysis Report

Project Name: Thilawa Special Economic Zone (TSEZ) Sample Designated as: Ambient Air Quality Analysis

Sampling Location: AQM I (May TSEZ)

Date	Xime	(0)	NOZ	TSP	23810	802
DALY	RMS	376,67	34.63	15.33	3.75	0.00
25.5.2015	11:00-12:00	461.67	34.90	9.45	1.82	0.00
25.5,2015	12:00-13:00	15.00	34,32	14,30	4.53	0.00
25.5.2015	13:00-14:00	153.97	34.02	16,75	4.10	0.00
25,5,2015	14:00-15:00	14,04	34.95	18.44	8.19	3.05
25.5.2015	15:00-16:00	0.00	3537	9.42	2,25	24.83
25,5,2015	16:00-17:00	270.00	:34.98	13.68	3.32	4.27
25.5.2015	17:00-18:00	95.24	34.52	24.60	6.14	2.81
25.5.2015	18:00-19:00	62.96	34.56	28.74	5.11	7.04
25.5.2015	19:00-20:00	105.00	34.62	31.87	4.43	1.28
25.5.2015	20:00-21:00	216.67	34.87	39.80	5.77	0.00
25.5.2015	21:00-22:00	141.67	34.72	37.97	4.92	0.00
25.5.2015	22:00-23:00	59.09	34.09	35.55	2.82	0,00
25.5.2015	23:00-00:00	40.00	34.82	24.20	2.47	0.28
26.5.2015	00:00-01:00	51,67	34.87	11.28	3.28	1.87
26.5,2015	01:00-02:00	56.67	35.00	13.47	3.22	8,60
26.5.2015	02:00-03:00	33.33	34.75	11.78	3,65	11.17
26.5.2015	03:00-04:00	61.67	34.02	19.07	4.68	1:45
26.5.2015	04:00-05:00	211.67	33,95	20,75	6.33	29.5
26.5.2015	05:00-06:00	936.00	34.88	9.70	2.52	0.23
26,5,2015	96:00-07:00	275:00	34.33	8,43	2.53	0.00
26.5.2015	07:00-08:00	883.33	34.92	7,03	1.35	0.05
26.5.2015	08:00-09:00	1180.00	34.93	10.92	1,78	2.98
26.5,2015	09:00-10:00	921.62	34.10	8.08	1.08	0.00
26.5.2015	10:00-11:00	1180.00	35.37	39.10	8.19	29.5
MAX	24boars	0.00	33.95	7.03	1.08	0.00
MIN	24hours	277.79	34.63	18.36	3.75	4.14
Average	24hours	311.26	34.66	19.38:	3.95	5.37

		ppm	ppm	mg/m3	mg/m3	ppm
MAX	24hours	0.0000	0.0340	0.0070	0.0011	0.0000
MEN	24hours	0.2778	0.0346	0.0184	0.0038	0.0041
Average	24hours	0.3113	0.0347	0.0194	0.00,19	0.0054

Client: Myanmar Japan Thilawa Development Ltd.



Issued Date: 20-05-2015

#### Analysis Report

Project Name: Thilawa Special Economic Zone (TSEZ) Sample Designated as: Ambient Air Quality Analysis Sampling Location: AQM 1 (May \_TSEZ)

Ditte	Tim	CO	N02	tar	PMI	801
DMA	HALS	7009	ppb:	Payme3	#B/m3	pple
26.5.2015	11:00-12:00	488.33	34,90	8.83	3.75	0.00
26,5,2013	12:00-13:00	1058.33	35,58	6.93	3.18	0.00
26.5.2015	13:00-14:00	516,67	34.33	18.23	5.52	0.00
26.5.2015	14:00-15:00	276.67	34.75	16.82	5.18	0.00
26.5.2015	15:00-16:00	91.67	34.03	20.90	8.78	0.00
26.5.2015	16:00-17:00	0.00	33.57	21:30	10.77	0.58
26.5.2015	17:00-18:00	0.00	34.57	30.02	11.12	32.98
26.5.2015	18:00-19:00	0.00	34.38	22.12	8.02	27.98
26.5.2015	19:00-20:00	0.00	34,65	22.92	10.38	21.77
26.5.2015	20:00-21:00	0.00	34.98	24,91	14.65	10.77
26.5.2015	21:00-22:00	6,38	33,34	11.23	5.21	0.87
26.5.2015	22:00-23:00	100:00	34.85	10:62	4.93	2.32
26.5.2015	23:00-00:00	110.00	35.15	13.47	5.22	4.27
27.5.2015	00:00-01:00	98.33	34.72	13,35	5.13	0.00
27.5.2015	01:00-02:00	114.29	34.38	20.40	5.52	0.00
27.5.2015	02:00-03:00	94.74	34.09	12,42	5.00	0.02
27.5.2015	63:00-64:00	68H.33	13.07	15.97	7.90	0.00
27.5.2015	04:00-05:00	0.00	34.32	12.38	6.82	8.35
27.5.2015	05:00-06:00	91.67	34.87	20.80	9.25	1.98
27.5.2015	06:00-07:00	190.20	34.90	18.98	8.61	0.41
27.5.2015	07:00-08:00	328.30	34.34	28.54	7.74	4.70
27.5.2015	08:00-09:00	1246.67	34.43	17.13	4.27	0.35
27.5.2015	09:00-10:00	1200.00	34.33	23.55	5.98	0.10
27.5.2015	10:00-11:00	345.16	35.06	33.58	7.29	0.35
MAX	24hours	1246.67	35.58	33.58	14.65	32,98
MIN	24hours	0.00	35.07	6,93	3.1%	0.00
Average	24hours	293,57	34.48	18:56	7.09	4.91

Street on towards		ppm	ppm	mg/m3	mg/m3	ppm
MAX	24hours	1.2467	0.0356	0,0336	0.0146	0.0330
MIN	24bours	0.0000	0.8331	0,0069	0.0032	0.0000
Average	24hours	0.2936	0.0345	0.0186	0.0071	0.0049

Client: Myanmar Jupan Thilewa Development Ltd.

Issued Date : 20-05-2015

#### Analysis Report

Project Name: Thilawa Special Economic Zord (TSEZ)
Sample Designated as: Ambiert Air Quality Analysis

Sampling Location : AQM 1 (May TSEZ)

	Date	Time	co	NO2	TAP	PM (10)	802
	DMLY	History	Patri	para	กเลาเมื	rng/m.1	Liun
5300	200-21st May, 2015	34	0.2606	0 0349	0.0065	0.0059	9.0010
refiler	21st-22ml May, 2015	24	11.5122	0.30346	0.0088	0.0037	0.0017
3	22nd-23rd May, 2015	24	1.1667	0.0350	0,0042	0.0033	0.0039
4	23rd-24th May, 2015	24	1 1667	0.0350	0.0042	0.0033	0.0039
- 5	24th-25th May, 2005	24	0.3893	0.0347	3.0148	0.0051	0.0042
6	25th-26th May: 2015	24	63 13	6.0347	0 0194	0.0039	0.0354
	26th-27th May, 2015	24	0.2936	0,3945	0.0186	0.007	0.0049

	Date	Time	CO	N03	TXP	PVI (10)	501
	D,M,V	Hours	opm.	mgc	mg/m3	xe ar	pper
10	20th-21st May, 2015	24	b.26	1 0.03	0.01	0.00	0.00
2	21st 22:xl May, 23/5	24	0.33	0.03	0.01	0.00	9.00
3	22nd-23rd May, 2015	21	1.17	0.03	(0.00	0.00	0.000
4	23rd-24th May, 2015	24	1.17	0.03	0,00	0.00	0.00
2	24th-25th May, 2015	24	0.39	0.03	0.01	0.01	0.00
- E :	25th-26th May, 2015	24	0.5	0.03	0.02-	0.00	0.01
7	36th-37th May, 2015	21	0.29	0.163	0.02	0.01	0.00
Moximum	WG35555	24	1.17	0.53	0.02	\$1.91 .	0.01
Average	E1 3.24	24	0.56	0.03	6.01	0.00	0.00
Minimum	4. 5500 7.7065	24	0.26	0.03-	0.00	0030	0.00
ferrect Valu	(C)	24	10	<9.06	⊲0,33	×9.12	<0.04

Appendix 2 Laboratory Result



# ANALYSIS REPORT

# ORIGINAL

Job Ref: 3119/2015 Date: 05.05.2015 Page 1 of 1

Client Name

RESOURCE AND ENVIRONMENT MYANMAR CO., LTD

B-702 Delta Plaza, Shwegondaing Rd, Bahan Township,

Yangon, Myanmar.

Project Name

Water Quality Monitoring in Thilawa SEZ (Near Thanlyin & Thilawa)

Sample Brought By

Client

Sample Received Date :

30.04.2015

Analysed Date

30.04.2015

	Lab Code	Results (mg/l)			
Commodity Name		Total Suspended Solid	Oll & Grease		
845	   %	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF,22nd ed, 2012; 2540 D	Based on Standard methods for the exemination of water & waste water APHA AWWA & WEF ,22nd ed, 2012 ; 5520 B		
Ground Water	034/15	Not Detected	Not Detected		
Detection Limit		2	0.2		
	252	Name Code  Ground Water 034/15	Commodity Name Code Total Suspended Solid  Based on Standard methods for the examination of water & waste water APHA AWWA & WEF,22nd ed, 2012; 2540 D  Ground Water 034/15 Not Detected		

End Of Report

SGS (Myanmar) Limited

(Nu Nu Yi) Manager

The document is recard by the Company under no Ceneral Conditions of Service accesseder at (<u>top News ton Conditions</u> and <u>constructions</u> of paradocom and <u>paradocom</u> and observed thereon.

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The Republic of the Union of Myanmar

Ministry of Agriculture and Irrigation

Irrigation Department

Soil Survey Section

Soil and Water Analytical Laboratory

ANALYTICAL DATA FOR WATER SAMPLE

PROJECT NAME; Monitoring in Thilawa SEZ

SAMPLING DATE; 29.4,2015 ISSUED DATE; 8.5,2015

Yangon

SAMPLE DESIGNATED AS; Water Quality

SAMPLING LOCATION; Near Thanlyin & Thilawa

Sr			Results (mg/	0	
No	Station	BOD <sub>5</sub>	СОВ	Cr	
1	GW-1 Thilawa SEZ 29.4.2015	8.7	21.8	0.000000	
(WHO)	Highest desirable level	6mg/1	10mg/1	-	
(WHO)	Maximum permissible level		at maximum e pollution	0,01 Slaff O Soil Sur Survey and Inv	

Report No. : 2015-00660 / 001 (Page 1 of 1)

Issued date. May 13, 2015

CLIENT

: RESOURCE AND ENVIRONMENT MYANMAR CO., LTD.

CONTACT

ADDRESS

: Ms. Too Too Heing : B792 Delta Plaza. Shwegondaing Rd., Bahan, Yangon, Myanmar

Tel. +950-73013448

Fex. +951-552901

E-mail: toetoetdainggeo@gmail.cam

# **Analysis Report**

PROJECT NAME

: Water Quality Moretoning in Thisawa SEZ SAMPLING DATE : April 29, 2015

SAMPLE DESIGNATED AS: Groundwater Quality

SAMPLING BY : COM

SAMPLING LOCATION

: Thilawa, Myanmar

Parameters	Units	LDQ	GW-1
Total Coliform Bacteria	MPNU100mL	19 <del>3</del> 44	41
Fecal Coliforn Bacteria	MPN/100mL		<1.1
Eschedatua Car (E.Colf)	MPNPCOML	1	<1.1

Analysis Motheds followed to the Standard McMSCE for the Examinal Origin Water and Wastewater embosed by American Public Health Association (APRIC), American Water World Jasociation (AWWA) and Weter Environment Fedoration (MEF).

Environment Fedoration (MEF). LDO . Limit of Duantite Son

(Simporn Imvatsives)

Environmental Montgoling Manager

heason Yommana)

Technical Manager

#### TY/Cient/PPT/CI

ge personal femon (die Frindlige) in die was in die product and i in provident by the client of building from the personal die personal



# Thilawa Special Economic Zone CLASS A Development Project –Phase 1

# Appendix

Water and Waste Water Monitoring Report
June, 2015

# RESULT OF AIR AND WATER QUALITY MONITORING

## 1. Introduction

This is the water quality monitoring report for June 2015 at Thilawa Special Economic Zone (TSEZ). This report sets out the environmental monitoring required throughout the construction of the Thilawa Special Economic Zone (Zone A). The terms of reference for monitoring are shown in Table 1. The location of air and water monitoring points are shown in Figure 1 and Table 1.

Terms of Reference for Monitoring

Table 1 Terms of reference for air and water quality monitoring at TSEZ,

Description	items	Frequency	Location
Air Quality	TSP / PM10	1 time / 3months	At construction site (1point)
Waste water quality	pH, SS, DO, 900, COD, Coliforn count, oll and grasse, chromium	1time / 2months	At the creek upstream and downstream which is crossed the car road (4 points)
Underground water	pH, SS, DO, BOO, COD, Coliforni count, oil and grease, chromium	titime /2months	Tube well inside of Moegyoswan Monastery (1 point)

# Monitoring Instrument for Air and water

No.	Instrument	Brand & Model	Measurement/ Parameter	
1,-	Environmental Perimeter Air Monitoring System	HAZ- SCANNER EPAS	CO, NO <sub>2</sub> , NO, SO <sub>2</sub> , PM (2.5), PM (10), VDCS, Relative Humidity, Temperature, Wind Speed, Wind Direction	
3	Alpha Bottie (Water Sampler)	Wildlife Supply Company* Indonesia		

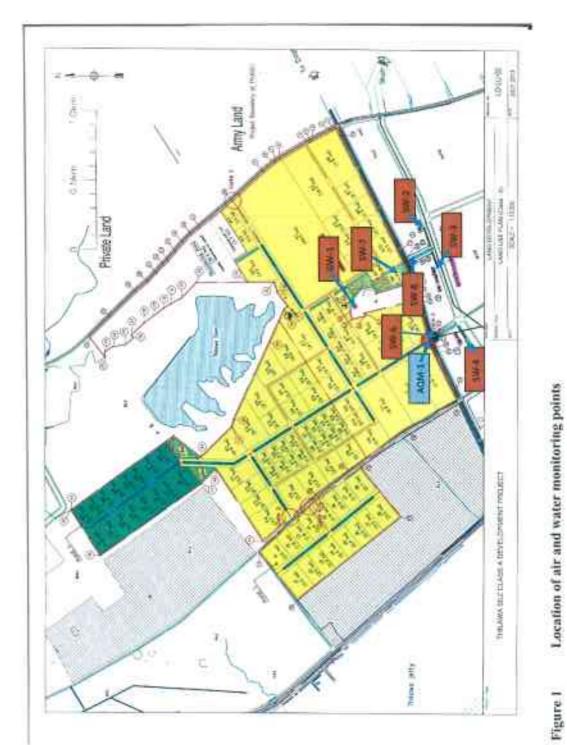
So far, there is no environmental standard for ambient air quality in Republic of Myanmar, the survey result was evaluated by comparing with the standards in neighboring country like Thailand, Vietnam, Japan and IFC (Table 2). The consultant will apply the sir quality standard in Thailand, Vietnam, Japan and IFC as shown in Table 1. As for TSP and PM10, the standards in Thailand were applied and the others were computed with the standards in Japan.

Table 2 Ambient Air Quality Standard in Southeast Asia

Item	Averaging period	Japan	Thailand	Vietnam	irc
<b>v</b> 0,	10 mist 1 hour	U-ipam .	L.Soam	0.35 mg/m*	Olomg/m*   0.125mg/m* htter/mlarget-1
	i	0.55-0.505	500.7500-C		0,05നപ്പ് ന്(InteriorTaget-2) 0.02നപ്പ്വന് (Smiteling)
	24hours	0.04 sam	0.12ppm	0.125 mg/m <sup>3</sup>	10.00000000000000000000000000000000000
	1 veer			0.35mg/m²	
20,	Tipl.	(V)586-W	0.17ppra	2500 1100 110	ť.žmg/n°
	24hours	\$.04-0.95ppm		64	567 (250) 
	1 yest		0.93ррен	92	0.04mg/m
100	1hour	5 <del>4</del> 5	. 😣	0.2mg/m*	
	24hours		111	5,04me/m*	
.U	1hou-	0.00	эйрри	Store/mi 1	<u> </u>
200	810015	20gan	100	10mg/m <sup>3</sup>	Pay Var
	24 agors	13ppt)	9ppm j	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	22
50	1hour	2#3W	532V)[	0.Snrg/m²	23
S2 :	2/100%		2.32mg/m <sup>3</sup>	U.2mg/m²	
	1 year		0.00mg/m*	E.14m;/m*	
Ma	24hcL%		0.12 ng/m²	C.15mg/ni <sup>1</sup>	0.15mg/m <sup>4</sup> linderimTarget-1; 0.13mg/m <sup>4</sup> [inderimTarget-2; 0.67mg/m <sup>3</sup> [inderimTarget-3]
napo:	Lyear	5#6 V	D./Gring/in <sup>3</sup>	O. Corng/m*	9.93mg/m <sup>2</sup> ) nterimi arget 1, 9.95mg/m <sup>2</sup> ) nterimi arget 2, 1.93mg/m <sup>2</sup> ) nterimi arget 2,
FM	1701 - 1	92mini		34712-0-01	
W.,	24hours 24hours	0.1°12/m³ 0.033mg/m³	0.35mg/m*	#00 NS	0.0/amg/m/(Interim arget-1) 3.05mg/m/(InterimTerget-2 0.0375mg/m/(InterimTerget-3
	_yes	3.CISmg/hri	d.325mg/r v		E.C22mg/m²(IntermTarget 1) E.C22mg/m²(IntermTarget 2) C.C2=mg/m²(IntermTarget 3)
Ezone	Thour	£3	3.16рт	0.3m/am	+E
	Sporter A	.3%42	3,5/pp:ii	3.2mg/r r	Dusmg/m/ImerchTags:-1) Jumg/m/jeudaire
	novimum 1 year		и.царрт	2.34p g/ n	(I)
Ďs.	1 Chour	0.06pp:n	илирт п	10350135 II	100
P)	24hpt.rs	D,00000 II	2 0	0.0005mg/m <sup>2</sup>	- 5%
	Lipanta Lipanta		0,0005mg/m³	C OCOScosym <sup>3</sup>	E.

Source: National Air Quality Standard in Japan (Circular No. 25, 1973), originally), Ministry of Historyment, Japan Notifications of Natural Resources and Emisonness, Thailand

National Air slerit Air Gnallby Standard (TCVN5973:2005), Ministry of Science and Technology in Vietnam Environmen ±1. Health, and Sallety Guidelines, General EHS Guidelines, IFC, 2007



Location of air and water monitoring points

# 2. Water Quality Monitoring

## Methodology

# Sampling and preservation method.

Warm samples were taken by Alpha horizontal water sampler and collected in sterilized sample containers. All sampling was in strict accordance with recognized standard procedures. The parameters pH, temperature, dissolved exygen (DO), electrical conductivity (EC), were measured at each site concurrently with sample collection. All samples were kept in ited boxes and were transported to the laboratory and stored at 2.4 °C refrigerators.

Table 7 Reld Equipment for Water Quality Survey

No.	Equipment:	Manufacture*	Originate (Quntry	Vlodel	
1	pH meter	HANNA	ESA	HI7609829-3 pH Sensor	
2	DC meler	HANNA	LSA	HI7E05829-Z	
3	Digital Water Velocity Meter	Global Water Flow Probe	LSA	FP 211	
4	Alpha Bottle (Water Sample:)	Wildlife Supply Company*	Indonesia	d <del>.</del>	

Table 8 Container and Preservation Method for Water Samples

No	Parameter	Container	Preservation		
1	Oil and Grease	1000 ml glass bottle	Sulfuric acid, Refrigerate		
2	COD	500 milp astic bottle	Sulfuric acid, Refrigerate		
3	BOD.	1,900 ml plastic battle	Refrigerate		
1	Heavy metals	500 ml plastic bottle	HNO <sub>2</sub> Refrigerate		40.04
4	Hacteria	200 ml glass auttle (Specified)	Re rigurate	2022	
6	Others	1,800 ml polyethylene bottle	He^riperate	350	0.0

## Test method

The following table provides the test method for water quality.

No	Item	Analysis method	
1	pH	H 7609829-1 pH Sensor	
2	Suspended Sallids	Gravimetris method	
3	Disso ved Ownger (DD)	Et/ab4879 Z Galvanic dissolved mygen (0.63) armset	
4	Chemical daygen demand(CCO)	Dishromate method	
5	Biochemica laxygen semand(BC)	Direct inoculation method	
ž	Oil S. Grease	APHA-AWWA-WcF Method	
7	Enromium (Cr) (mg/ )	APHA-AWWA-WEI Method	
'n	E. coliform, Fedal coliforms, paral coliforms	ACACPet: film Method	

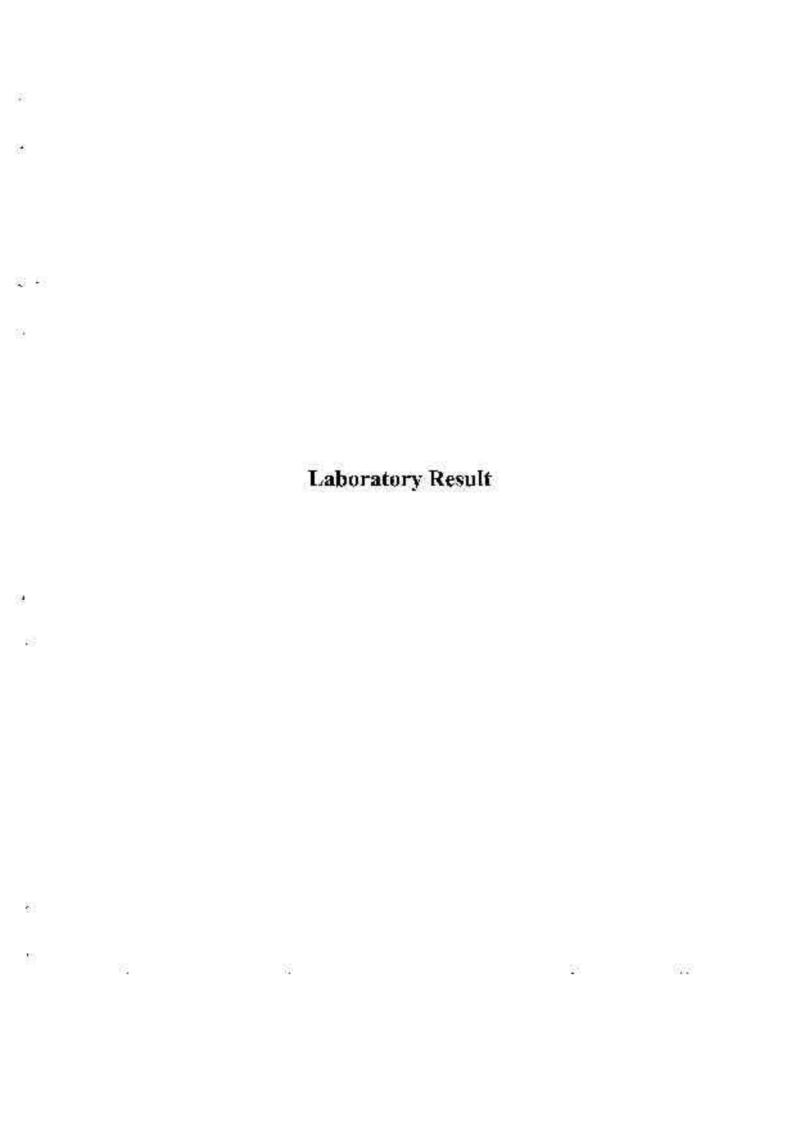
# Monitoring Result (June 2015)

Yo .	ftem	42.M-1	SW-2	SW- 3	SW. 4	SW-8	Standard	Unit
1	į pII	7.65	6.43	6.96	6.39	7.85	5.9	
2	Suspended Solids	157	353	380	314	484	Max. 200	انهب
3	Dissolved Oxygon (DO)	2,82	3.23	3.45	2.10	3,54	84	انهدر
4	Chemical oxygen depund(COD)	153	13.9	25.9	9/10/28 3/10/28	*1.\$)	Mex. 300	ព្រម្លង
š	Binchemical oxygen demand(BOD) <sub>31</sub>	6.8	5.6	11.2	16.0	16.5	Max. 200	നള്/.
6	Ott & Cirense	CN	0.6	30	NB	ND	Max. 5	នេទ្ធភ
3	Christian (Cr) (mg/)	0.000141	5,000368	(4.090246)	\$200008	0.00000	Max. 0.5	ගදු/]
8	To cobilina	12	6.9	9.2	12	23	5 <del>-3</del> 5	MPN/100m
	Fecal colifornas	23	3 15	- 30	240	7367	Eŧā	MPN/100m
	Tetal colilisms	23	249	490	· 11qb *	13500	Max.400	MPN/100mi

Remark: ND is Not Detected.

# Result of the Water Quality Monitoring (June 2015)

As the beginning of the rainy season, the total sampling points of water in project area, 5 points, were surveyed and were more than the dry season survey. According to the result of this time, the suspended solids of all sampling locations except GW-1 were still higher compared to the MOI standard as previous times. Moreover, total coliforms of SW-3, SW-1, SW-1 and SW-8 were higher than the standard.



Modern of the Republic of the Union of Myanmar Michaely of Agriculture and Irrigation

Irrigation Department

Survey and Investigation Branch
Soil Survey Section

Soil and Water Analytical Laboratory

ANALYTICAL DATA FOR WATER SAMPLE

PROJECT NAME; Water Quality Monitoring in Thilawa SEZ

SAMPLE DESIGNATED AS; Water Quality SAMPLING LOCATION; Near Thanlyin & Thilawa

SAMPLING DATE; 11.6.2015 ISSUED DATE ; 19.6.2015 SAMPLING BY ; Client

Sr	L	Results	(mg/l)	Results (ppm)	
No	Station	BOD <sub>5</sub> COD Chromium (Cr)		Chromium (Cr)	Remark
1	GW-1	6.8	17.1	0.000343	
2	SW-2	5.6	13.9	0.000368	
3	SW-3	11.2	28.9	0.000240	
4	SW-4	16.0	40.5	0.000098	
5	SW-8	16.5	41,0	0.000000	
terStandard (O)	Highest desirable level	6 mg/l	10 mg/l		
Drinking WaterStandard (WHO)	Maximum permissible level	Concentration at maximum permissible pollution		0.01 mg/l	

Remark: Analytical mentions are ppb unit by AAS. But this unit is changed as mg/L according to the standard of WHO unit.

(Máy Aye Lwin)
Staff Officer (Lab) &
Soil Survey Section
Survey and Investigation Branch
Irrigation Department
Yangon

: 2015-00749 / 002 (Page 1 of 1) Report No.

Issued date : June 30, 2015

CLIENT CONTACT ADDRESS : RESOURCE AND ENVIRONMENT MYANNAR CO., LTD.

: Ms. Toe Toe Holing : B702 Delta Plaza, Shwegondaing Rd., Bahan, Yangon, Myanmar

Tel. +859-73013448 Fax. +951-552901

E-mail: toetoehlainggeo@cmail.com

# **Analysis Report**

: Water Quality Monitoring in Thilavia SEZ SAMPLING DATS : June 11, 2015 : Groundwater Quality SAMPLING BY : Client PROJECT NAME

SAMPLE DEBIGNATED AS : Groundwater Quality SAMPLING LOCATION : Thilewa, Myanmar

**Parameters** Units LOO GW-1 Total Collorn Bacteria MPN/100mL 23 Fecal Colforn Bacteria MPN/100mL 23 MPN/HoomL Escherichia Coli (E.Coli) 12

Avalysis Asstructs tollowed to the Standard Methods for the Examination of Water and Wasteweler endorsed by American Public Health Association (APRA): American Water Works Association (AWWA)and Water Environment Federation (IVEF).

LOG a Limit of Quantitation Romarks : .

(Siricon Inwitalwan)

Environmental Monitoring Manager

Theoson Yommana)

Fechnical Manager

## TY/CileN/PPT/Cj

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Report No. : 2015-00749 / 001 (Page 1 of 1) Issued date : June 30, 2015

: RESOURCE AND ENVIRONMENT MYANMAR CO., LTD. CLIENT

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Tel. +959-73013448

E-mail: toetoehlainggeo@gmatt.com

# Analysis Report

PROJECT NAME

PROJECT NAME : Water Quality Monitoring in Thiliams, SEZ SAMPLING DATE : June 11, 2015
SAMPLE DESIGNATED AS : Gurface Water Quality SAMPLING BY : Client

SAMPLING LOCATION s Thillawa, Myanmar

	1000		Results				
Peremetera	Unite	roa	8W-2	5W-4	5W-4	SW-8	
Total Collicom Bacteria	MPN/100mL	±89	240	7490	1,100	3,300	
Fecal Colionn Basterla	MPN/100mL	1.0	130 3	130	240	3,300	
Escherichie Coli (E.Coli)	MPN/100mL		6.3	<b>5.2</b>	12	23	

Analysis Methods followed to the Standard Methods for the Examination of Metar and Westerster endorsed by Annolosis Public Health Association (APPIA), American Water Works Appropriate (AVWA) and Weter Springment Foderation (WEF).

LOC - Limb of Obsentiation Remarks 1 -

(Sidporn kitwiletwan) Environmental Montoring Manager hebbon Yommana)

Technical Manager

## TY/Clian/PRT/Circ

w ABAING: The semulate to which the front are recorded herein lither Findarus" relate was sweet drawn and cor provided by the Client or by a faire party doing at the Client's distriction. The Findares canability as example is represented excess of any goods and which relate to the sample is represented excess of any goods and which relate to the sample is represented by a contracted.



# ANALYSIS REPORT

ORIGINAL

Job Ref: 4636/2015 Date: 18.06.2015

Page 1 of 1

Client Name

RESOURCE AND ENVIRONMENT MYANMAR CO., LTD

B-702 Delta Plaza, Shwegondaing Rd, Bahan Township,

Yangon, Myanmar

Project Name

Water Quality Monitoring in Thilawa SEZ (Near Thanlyin & Thilawa)

Sample Brought By : Sample Received Date : Client

Analysed Date

12,06,2015

	923 ////	200	Result	ts (mg/l)
Stations		Lab Code	Total Suspended Solid	Oil & Grease
Method	*	ng Nes	Based on Standard methods for the examination of water & waste water APHA AWWA & WEF.22nd ed, 2012; 2540 D	Based on Standard methods for the examination of water & waste water APHA ,AWWA & WEF ,22nd ed, 2012 ; 5520 B
GW-1	Ground Water	065/15	157	NO
SW-2	Surface Water	066/15	353	0.6
SW-3	Surface Water	067/15	360	ND
SW-4	Surface Water	068/15	314	NO
SW-B	Surface Water	069/15	484	ND
	Detection Limit		2	0.2

End Of Report

SGS (Myanmar) Limited

(Nu Nu Yi) Manager

VARIENTS. The surroins to which the lindings recorded herein the Prindings' I relate was levely attent and it or provided by the Climator by a third party schanger the Climator. The Prinding constitute no warranty of the sample's representativeness of any goods and strictly relate in the sample(s). The Company accepts no testably with regard to the single or several form which the sample(s) pales soot to be accepted. This document is issued by the Company under its General Conditions of Service printed are held or available on request and expensive any topy and within a solid printed and committee of this document is a summation and printed and the effects the control of this document is a summation and printed and committee or representations. Figure 3 or a company's sole responsibility is to be Climated the document burdening at the representation of the control of the formation and account of the document is unlessful and offered in the processor of the document is unlessful and offered in the processor of the document is unlessful and offered in the processor of the document is unlessful and offered in the processor of the document is unlessful and offered in the processor of the document of the formation of the latest and the formation and the representation of the control of the formation and the sample (s) are retained for its feet of the formation accepted and such sample (s) are retained for its samples from registery bodies are to be retained as specified. The stronger and so company of the company.

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## Noise and Vibration Monitoring Report

#### 1. Introduction

The monitoring points are located in the Thilawa SEZ class A area. The site location is shown in Figure 1. Thilawa SEZ is located beside the Thanlyin and Kyauktan towns, about 20 km southeast side of Yangon city as shown in Figure 3.1-1. Project area with 400ha is center of Thilawa SEZ with an area of about 2,400 ha. Thilawa SEZ is surrounded by ring road and accompanied with the container ports along the Yangon River.

There are 2 ways to access to Thilawa SEZ from Yangon city, which are the route passing through Thanlyin Bridge and the route passing through Dagon Bridge.

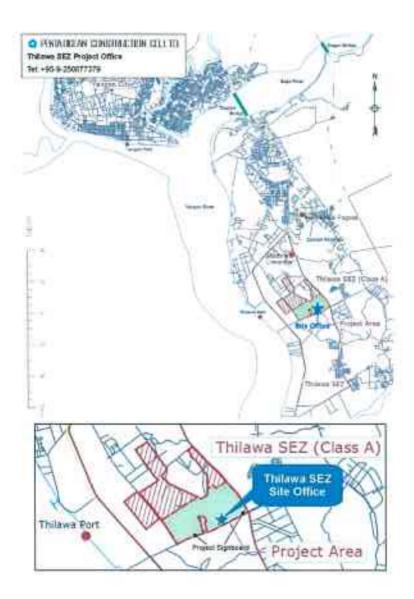


Figure 1 Location map of the Thilawa Special Economic Zone.

## Environmental Standard

#### 2.1 Noise

#### (1) Construction Phase

There is no poise standard of construction activities to receptors in Myanmar and International Organization's standards such as WHO and Environmental, Health, and Safety (EHS) Guidelines prepared by International Flance Cooperation (IFC) in a group member of World Bunk, therefore the turnet noise level at construction stage is set based on the standard in the other foreign countries.

In the south-east Asia countries, only Singapore has the noise standard of construction activities to receptors categorized area to be quiet, residential area, and the other areas. On the basis of the above information, target noise level is set as following concept.

- Residential houses and monastery located less than 150m from the construction site comply with the middle range of the Singapore standard (categorized as "Residential buildings located less than 150m"), or
- Residential houses and menastery located more than 150m from the construction site, office, commercial facilities, and factories shall comply with the moderate range of standard Singapore standard feategarized as "Other buildlags") or

This target noise level is shown in Table 1 and is not so much difference comparing with noise standard at construction stage in the other countries as shown in Table 2.

Table I Target Noise Level in Construction Phase

Category	Day time (Leg) [7am-7pm]	Evening Time (keq) (7pm-10pm)	Night time (Leg) (10pm-7em)
Residential nauses and monestery located essible than 150m	75 dQ	60 iB	5513
Residential nauses and monastery located more than 150m from the construction site, office, commercial facilities, and festiones.	75 d <b>ë</b>	F5113	55 US
Note: By alustion point is at beomdary of holiding.	-		-

Table 2 Noise Standard at Construction Stage in the Various Countries

	Rems	Day time [Leg]	Might time (Leg)	
elsen.	Using heavy equipments with sign notes invol- falling, exceeding acts.)	85 dë (Maximum)	2	
Singapore	Moved als, Admon's, institutions of trigher earning, homes for the aged sick, etc.	60 dB (7am - 7am, 12hrs)	50 dB (7pm - 7cm, 12ms)	
	Residental buildings located less than 150m from the construction stre wiver that halse is half glandbad.	73 dB (7am - 7pm, 12his)	65 d6 (7pm - 18pm, 35h) 55 c6 (18pm - 7am, 5hr)	
	Other Buildings	173.63 (7am - Zpon, 02ths)	65 de (7pm - 7sm, 12hrs)	
L	In rural, subtribut and criban areas away from mein road the file and industrial hoise	70 85 (8:00-, 8:00)	.v 355	
	Urgan creas near thain foces	/2 dis (9:80-58:90)	E 20 3993	
.KA	Residentia i	90 de jahrsi	7C dB (Shrs)	
	Commercial Urban Area with high ambient haise evel PGC GOI	Antient Hoise Jese +0057	85 d5 (8lirs)	

Sugree: Noise Regulation Av., Dipan (Law No.98, 1968, Amundul No.33, 2006)

Fowmer Hental Protection and Miniagement Act in Singapore (Chap.91A, Section 77, revised in 2008)

#### (2) Operation Phase

There is no ambient noise standard to receptors in Myannar. However, most of the countries in southeast Asia have the ambient noise standard to receptors categorized land use or requirement of quiet as well as in Japan, International standard is also available in the EHS Guidelines prepared by IPC, Onthe basis of the above information, target noise level is set as following concept and target ambient noise level.

- According to baseline survey in the Project, ambient noise levels in the menastery in Thilawa-SEZ (Class A) are 54-57 dB in the daytime (6:00-22:00), and 47-51 dB in the nighttime (22:00-6:00).
- Ambient noise standard for sensitive areas of Japan and International Organization, relatively high in comparison with the results of baseline survey especially during nighttime.
- Thus, the target ambient noise level for socialitive and residential area is set in accordance with the noise standard in Singapore which is similar to the ambient noise level of the baseline SUTVEY.

The target noise level is shown in Table 3 and the target noise level is not so much difference comparing with ampient naise standard as shown in Table 4.

Table 3 Target Ambient Noise Level in Operation Phase

Category	Dey Tems (Leq) 	Evening Tens (Leg)      7pm-10pm)	Night Time (Leg) (10pm-2am)
Sensitive area such as Monastery	5.7 de	55 dB	501,3
flesidential Louises	65 dB	ec.ds	351.1
Commercial and Endoet Fall Areas	70:1B	65 03	60 ∉3⊲

Noting Ever you an printing of boundary of building

Table 4 Ambieut Noise Standard at Operation Stage in South-East Countries

	Pers	Day time (Leg)	Night time (Leq)
Inconesia	Noise standard for sensitive areas seen as residences; hasoitals, acheois, places of religious worships		de
	Noise standard for office and commercial	£5	dB
	Noise suckland for commercial and service	70	óB:
Idaloysia	Sensitive Areas/ Low Density Residential Areas	55 d6 (7mm - "0om, 15hrs)	50 d6 (10pm - 7am, 9hrs)
Water State Co.	Sub Urgan Residentis'	60 dB (7cm - 100m, 15hrs)	55 c6 (10pm - 7am, Shrs)
	Uctan Residentia	65 dB (7em 10.5m; 15hrs)	60 c3 (13ph) - 7am, 2lms)
	Commercial and Susiness	20 d3 (7am - 100m, 15hrs)	60 c 3 (10pm - /em, 9hrs)
Singaporo	Sentit ve Areas	60 e3 (7sm – 7sm, 10hrs)	55 dB (7pm – 10pm, 3hr) 56 dB (19pm – 7pm, 9hr)
	Residential Areas	ಹಿಕ3 (/am−/am, 12hrs)	60 de (75m – 105m, Bhr) 55 de (195m – 75m, 9hr)
	Comment al Arcas	70 dB (7am - 7pm, 12hrs)	ES dB (7am = 10pm, Shr) EC dB (10pm = 7am, 9hr)
The and	Voise stappard	70 c3 i	(25h/s)
lepan	Sensitive Area In ass AAI	50 (ID) (6am - 10pm, 16hrs)	40 c3 (10pm – 6pm, 8ns)
	Residential Area (Class A and Class 8)	55 d8 (cam = 13pm, 16h m)	45 c8 (18pm ~ 6pm, 8hm)
	Country's and Industrial Area (Class C)	50 dB (6am - 10pm) (45%)	- 50/03 (10pm, -6pm, 8h/s)
IFC	Residentis , institutional, educational Industrial; commonatal	55 dB (Pein = 10pm; 10hrs) . 70 dB (Yam = 10pm; Libris)	25 du (LOpni – zemi 9n/s) zu de (LOpni – Zemi 9n/s)

Source: Note Standard in Indonesia (GLP-40/MUNERY in 1995)

El Per el Troffie Newbook Mage A close Shidy in Secta 15 Rayo, Selt. 304. McR98 a. Egyliannum Asia, 2010.

Environmental Protection and Management Act in Singa See (Chap. 94A, No. 15m 77, revised in 2008)

Notification of Environmental Doard No. 13 B E. 2540, 1997) under the Conservation and Enhancement of Nickont Environmental (grafty) not B. E. 2535 (1992) dated March. 12. B. F. 2540 (1997) and Matification of Pollution Courts. Department: Navjeon Fold Lacian of Nobel Level Boled Argust 11, R.E. 3543 (1997) in Biothest

#### 2.2 Vibration

#### (3) Construction Phase

There is no vibration standard of construction activity to receptors in Myanmar as well as south cast. Asia and International Organizations such as WHO and IFC. Thus, the target vibration fevel at construction phase shall be set based on the standards in some foreign countries. Accordingly the target level of vibration in construction phase is set based on the following policies.

- Monastery and residential house where are necessary to keep quiet and sleep shall comply
  with the Japanese standard for residential area;
  - Office, commercial facilities, and factories areas shall comply with the Jepanese standard for mixed areas including residential and commercial and industrial areas, and
- The category of times divided into three types in a manner consistency with target noise level for construction.

#### 3. Monitoring Result

#### Noise Level

## Survey Item

Parameter for noise level servey was determined by referring the environmental quality standards in Japan as shown in Table 5.

As there are no environmental standards for noise level in Republic of Myanmar, the survey result was evaluated by comparing with the environmental standards and request limit for mad noise in Japan.

Table 5 Survey Parameters for Noise Level

Nu	/ <b>4</b> 20000000		30335	Environmental Steptord	Request Emit Sor road maise
	Paramons		Limi	Japan Living Environneza Along Ren	
	A weighted lookness	665	Dig*med (8/00422,06)	2.5	- 300 <del>1</del> 50000
. 10	egaricalent (T.Aeq)	,118	Nighti me,02200-5000	45	86

Note) Environmental Quality Standard for Noise (Ostogary B. RosiContia, Arca) in Japan

#### Survey Location

Fifth Time Monitoring (20" - 23rd May, 2015).

Summary of sampling points

The locations of noise level points and vibration monitoring points are shown in Table 6. The detail of each sampling points are described below.

Table 6 Location of Noise and Vibration Monitoring Station

Sampling Point	Coccdigates	Description of Sampling Point
rvv i	1614215.81%, 961690.513	In front of Mysimiat Mantiline University; about 2 in east of carriesis.
TNV-2	16540(18.5°)\; -96515(34.0°)B	Ir. the Mockyeswan Morsestery Compound: about 148 on away from caproonal
INV-3	16°40'20,22%, 96' 10'35.5°E	In the Mosky sawar Mont deny Compound, about 250 misway. Dots main car soso

#### TNV-1

The TNV-1 location was an open area in front of Myanmar Maritime University with about 2m from car road. The road was paved with low traffic volume and moderate speed. The nearest house is 20 meter away and no obstruction from trees. Dominant source of noise was vehicular traffic nearby the site. There was not any other noise source around the house. The location of TNV-1 is shown in Figure 2.



Figure 2 Location of TNV-1.

#### TNV-2

TNV-2 was sited at Moegyoswun Monastery Compound. The location was an open area beside monk houses with about 250m from the car road. The road was paved with low traffic. Dominant sources of noise were alarm song in the compound that ring thrice a day. There was not any other noise source around the monastery compound. The location of TNV-2 is shown in Figure 3.



Figure 3 Location of TNV-2.

# TNV-3

TNV-3 was sited in front of Moegyoswun Monastery. The location was an open area beside the road

with about 260 m from the car road. The road was paved with low traffic. Dominant sources of noise were alarm song in the compound that ring thrice a day and vehicular traffic. The location of



Figure 4 Location of TNV-3.

## Survey Period

Sampling and monitoring of surrounding sound and vibration level at TNV-1, TNV-2 and TNV-3 were conducted during 20th - 23th May, 2015.

Sampling Point	Survey Period	
TNV-1	22 <sup>at</sup> - 23 <sup>rd</sup> May, 2015 (24 hours)	
TNV-2	20 <sup>th</sup> - 21 <sup>th</sup> May, 2015 (24 hours)	
TNV-3	21 <sup>st</sup> - 22 <sup>sd</sup> May, 2015 (24 hours)	

## Survey Method

Sampling and monitoring of surrounding sound and vibration level were conducted by using following instrument for 24 hours/1 day measurement.

Instrument	Brand	Model	Measurement unit
Sound Level Meter	Lutron	SL-0423SD	dB
Vibration Meter	Lastron	VB-8206SD	mm/s, cm/s

## a) Noise Survey

## Frequency

- One time (24 hours monitoring in weekday)

## Total Sample

- Three samples

# Record Interval

One record for 10 minute interval

# b) Vibration Survey

# Frequency.

One time (24 hours monitoring in weekday)
 Total Sample

- Three samples Record Interval
- One record for 5 seconds interval for 10 minutes during an home-

#### Survey Result

Noise levels (L<sub>3.2</sub>) of the monitoring points were presented in Table 7. One day L<sub>3.2</sub> was calculated by using the following array formula in the excel sheet. This formula is firstly used for hourly L<sub>3.2</sub> and then for the 24 hours L<sub>3.6</sub>.

# 10\*LOG10(AVERGAE(10^((RANGE)/10)))

By means of the calculated results, all of the noise levels found lower than the environmental standard (1-day) in Thailand. Noise (evel (LAcq) in present monitoring period was presented in Table 7 and Table 8. Table of observed hourly noise level in three menitoring stations is shown in Appendix 1.

Table 7 Hourly LAcq value in noise monitoring stations.

Unit: dBA

	22" 239	20 21	-212 - 2
- Carlon 1	* May L	May	May
5:00-7:00 .	43	52	52
7:00-8:00	54	58	55
8:00:9:00	56	58	62
9:00-10:00	58	53	57
10:00-11:00	57	46	52
11:00-12:00	77	51	50
12:00 13:00	62	51	63
13:00-14:00	52	50	36
14:00-15:00	51	59	61
15:00-16:00	48	58	62
16:00-17:00	47	63	- 55
17:00-18:00	62	63	55
18:00-19:00	77	63	53
		が発展	5.54
19:00-20:00	56	59	49
20:00-)1:00	48	59	47
21:00-22:00	48	57	47
22:00-23:00	45	51	43
23:00-24:00	50	52	40
24:06-1:08	41	350	42
1:00 2:90	36	53	44
2:00-3:00	41	.53	41
3:00-4:00	48	47	38
4:00-5:00	39	50	41
5:00-6:00	11	52	45

Table 8 A-weighted Loudness Equivalent (i.Aeq) Level

Unit (ISA)

22"		INV-1 23" May 3	2015	TNV-2 20 <sup>th</sup> = 21 <sup>th</sup> May 2015			TNV-3 212 - 22 <sup>cd</sup> May 2015		
Date	Day Time	Evening Time	Night Time	Day Time	Evening Time	Night Time	Day Time	Rvening Time	Night Time
	57	50	43	56	58	51	56	48	42
Target Noise Jasel	75	65	65	75	60	35	75	60	55

#### Vibration

Vibration can be defined as regularly repeated movement of a physical object about a fixed point. The parameter normally used to assess the ground vibration is the peak particle velocity (ppv) expressed in millimeters per second (mm/s).

Vibration can cause varying degrees of damage in buildings and affect vibration-sensitive machinery or equipment. Its effect on people may be to cause disturbance or annoyance or, at higher levels, to affect a person's abouty to work.

Typical levels measured during construction activities are shown below:

Construction Activity	Typical Ground Vibration Level		
Vita story roller	L'p te 1.5mme @ 25m		
Hydraulid rock breakers	4.5 m n/s Ø 5.n, 0.4 Ø 20m, 0.1 Ø 50m		
Compacto:	20mm/s @ 5m, <0.3mm/s @30m		
P e driving	1-3mmys & 50 to depending on ast conditions and alling technique		
Hullcoze:	1-2mm/s & 5m, 0 1 & 50m		
inuck traffic (smooth surface)	<3.2mm/s @ 20m		
inuck treffic (rough surface)	<2 nm/s @ 20m		

#### Sorrey location

Three points (same location as noise survey)

# Frequency

One time (24 hours).

#### Methodology

 Vibration level (dB), Frequency, Velocity, Measurement of vibration level is conducted by International standard method.

#### Result

Vibration results were presented in Figure 5 to 7, Table of observed vibration level is presented in Appendix 2.

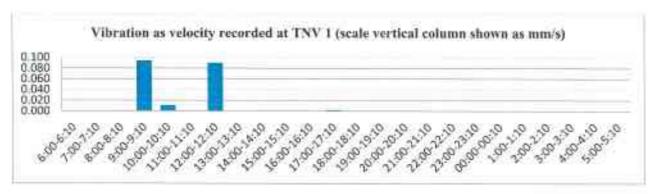


Figure 5 Vibration result of TNV 1.

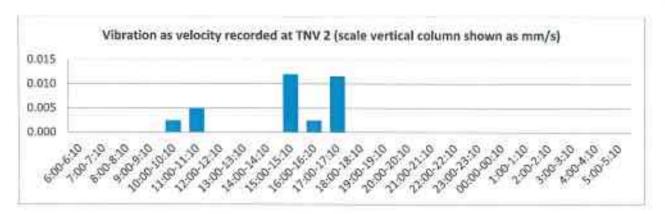


Figure 6 Vibration result of TNV 2.

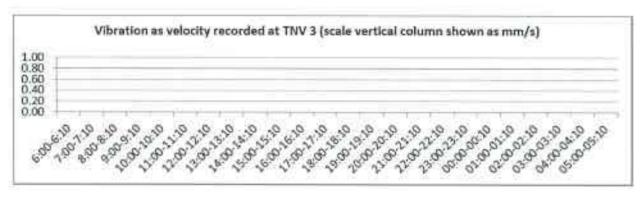


Figure 7 Vibration result of TNV 3.

#### 4. Conclusion

The noise level monitoring results are compared with target noise level proposed in EIA report (Sco-Table 1). Two noise receptors were designated in construction phase based on the baseline noise data.

#### There are a

- Residential houses and monastery located less than 150m from the construction site comply
  with the middle range of the Singapore standard (categorized as "Residential buildings located
  less than 150m"), or
- Residential houses and monastery located more than 150m from the construction site, office, commercial facilities, and factories shall comply with the moderate range of standard Singapore standard (outegorized as "Other buildings")

The noise level monitoring at three sites in and near the project site are lower than the target noise level (See Table 8).

There is no standard relating to vibration during construction activities. Common practice in Myaninar has been to use guidance from internationally recognized standards. Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, the magnitude of vibration is expressed in terms of Peak Particle Velocity (PPV) in millimeters per second (mm/s).

In the case of nominally continuous sources of vibration such as traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or admoying at higher magnitudes. However, higher levels of vibration are typically colerated for single events or events of short duration.

During the monitoring time there are some construction activities inside the Class A compound and the loading and unloading raw materials by small vehicles as well. The main noise and vibration source are largely read traffic noise and vibration. The observed raise and vibration in all monitoring points are lower than the target level in pre-construction phase.