



PARTICLE SIZE DISTRIBUTION

TEST REPORT No. L170310/PS/S-4b

Project : 62801461

Location:

Customer: DHI Water & Environment (m) Sdn Bhd

Lab Ref.: **L170310**

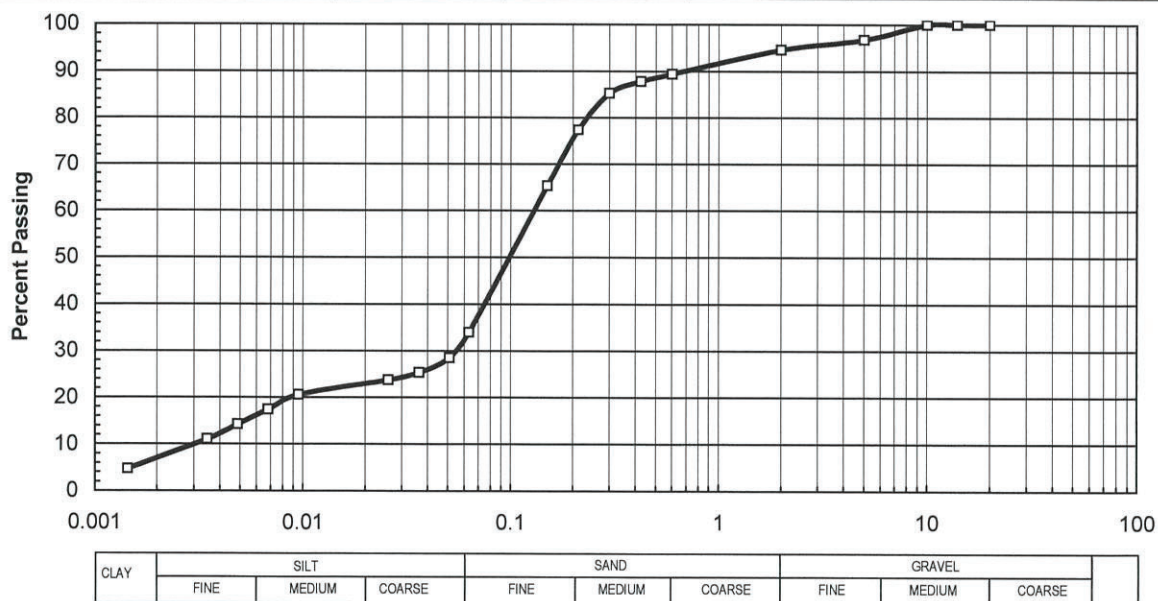
Sample No. : **S-4b**

Depth, m. : **05.10.2017**

Receive Date : **06.10.2017**

Test Date : **16.10.2017**

Test Method: BS1377: 1990, Part 2, Clause 9.2 and 9.3			Initial soil mass, m_1 :		50.0 gm.	
SIZE (mm)	WT.OF SOIL RETAINED, (gm)	PERCENT RETAINED, (%)		SIEVE PERCENT PASSING, (%)		
20.0	0.0	0.0		100.0		
14.0	0.0	0.0		100.0		
10.0	0.0	0.0		100.0		
5.0	1.6	3.2		96.8		
2.0	1.1	2.2		94.6		
0.600	2.6	5.2		89.4		
0.425	0.8	1.6		87.8		
0.300	1.3	2.6		85.2		
0.212	3.9	7.8		77.4		
0.150	6.0	12.0		65.4		
0.063	15.7	31.4		34.0		
Pan	Note: Wt.Retained during DRY sieving do not include WET sieving portion passing 63 micron					
Test Method: BS1377: 1990, Part 2, Clause 9.5				HYDROMETER		
m_1 , gm: 50.0		Viscosity of Water: 0.834 mPa s		Menicus Corr.,cm: 0.50		
Particle Density: 2.71		Temperature: 28 °C		Disper.Sol, 0.9995,Rd: -0.5		
Elapsed Time t (min)	Hydrometer Reading Rh'	True Reading Rh	Effective Depth Hr (mm)	Modified Reading R	Particle Diameter D (mm)	% Finer
1	8.5	9.0	173.3	9.0	0.0509	28.5
2	7.5	8.0	177.1	8.0	0.0364	25.4
4	7.0	7.5	179.0	7.5	0.0258	23.8
30	6.0	6.5	182.8	6.5	0.0095	20.6
60	5.0	5.5	186.6	5.5	0.0068	17.4
120	4.0	4.5	190.4	4.5	0.0049	14.3
240	3.0	3.5	194.2	3.5	0.0035	11.1
1440	1.0	1.5	201.8	1.5	0.0014	4.8
Sample No.		Symbol	CLAY, %	SILT, %	SAND, %	GRAVEL, %
S-4b, 05.10.2017 m.		o	7	27	61	5



NOTES:

The results relate only to the sample received. This document shall not be reproduced except in full, without the written approval of the laboratory.

Tested by: Hasnah/Nor

Approved Signatory

Wong



WONG KIM YUEN
Technical Manager

Annex C

Plankton Laboratory Data

ALCHEMY Laboratory & Services Sdn Bhd
Phytoplankton Data Sheet : Analysed Phytoplankton by Station

Reference ID:
Sample Marking:
Total Volume filtered (l):
Number of replicates:

[illegible]

Phylum	: Miozoa	Class	: Dinophyceae	Order	: Biddulphiales	Genus	4.097	0.29	-0.36	27.651	0.364	-0.368	218.444	0.371	-0.368	138.475	0.212	-0.329						
						: <i>Bacteriastrum</i>							2.560	0.004	-0.024	7.844	0.012	-0.053						
						Family																		
						: Biddulphiaceae																		
						Genus																		
						: <i>Eucampia</i>							0.708	0.001	-0.008									
						: <i>Biddulphia</i>	0.218	0.02	-0.06	0.981	0.013	-0.056	7.245	0.012	-0.054	11.113	0.017	-0.069						
						Order: Hemiaulales																		
						Family																		
						: Hemiaulaceae																		
						Genus																		
						: <i>Hemiaulus</i>				0.229	0.003	-0.017	0.926	0.002	-0.010	3.922	0.006	-0.031						
						: <i>Climacodium</i>																		
						Order: Lithodesmiales																		
						Family																		
						: Lithodesmiasceae																		
						Genus																		
						: <i>Ditylum</i>							2.125	0.004	-0.020	4.685	0.007	-0.035						
						Cyanobacteria	: Miozoa	Class	: Dinophyceae	Order	: Peridiniales	Genus							1.852	0.003	-0.018			
: <i>Protoperidinium</i>																								
Family																								
: Dinophysaceae																								
Genus				0.915	0.012							-0.053	1.852	0.003	-0.018	4.249	0.007	-0.033						
: <i>Dinophysis</i>																								
Order: Gonyaulacales																								
Family																								
: Ceratiaceae																								
Genus				3.040	0.040							-0.129	14.436	0.024	-0.091	11.876	0.018	-0.073						
: <i>Ceratium</i>																								
Total Number of Taxa:												6			11			16			13			
Mean density(units/l):												14.16			75.89			589.53			653.04			
SD :												5.85			32.45			242.83			230.19			
Mean taxa diversity Index																								
(H'):												1.31			1.54			1.62			1.80			
SD:												0.05			0.06			0.04			0.10			
Evenness Index (J'):												0.82			0.69			0.65			0.71			
SD:												0.03			0.04			0.03			0.05			
H' (Genus)									1.35			1.64			1.65			1.80						
J'									0.75			0.68			0.60			0.70						

ALCHEMY Laboratory & Services Sdn Bhd
Phytoplankton Data Sheet : Analysed Phytoplankton by Station

Phytoplankton Data Sheet 1: Analysis of Phytoplankton by Station														
Combined mean density in units per litre														
		Reference ID:	BP10252-53					BP10256-57			BP10258-59			
		Sample Marking:	P5-N			P6-N		P7-N			P8-N			
		Total Volume filtered (l):	577.3			577.3		577.3			577.3			
		Number of replicates:	2	pi	pi*ln(pi)	2	pi	pi*ln(pi)	2	pi	pi*ln(pi)	2	pi	pi*ln(pi)
Phylum: Bacillariophyta	Class: Bacillariophyceae													
	Order: Surirellales													
	Family: Surirellaceae													
	Genus: Surirella													
	Order: Tabellariales													
	Family: Tabellariaceae													
	Genus: Asterionella	42.708	0.088	-0.214	58.789	0.097	-0.226	44.942	0.035	-0.118	35.436	0.061	-0.170	
	Order: Thalassionematales													
	Family: Thalassionemataceae													
	Genus: Thalassionema	156.670	0.323	-0.365	170.484	0.280	-0.357	178.133	0.140	-0.275	150.786	0.259	-0.350	
	Order: Naviculales													
	Family: Naviculaceae													
	Genus: Navicula													
	Family: Pleurosigmataceae													
	Genus: Pleurosigma	3.639	0.007	-0.037	0.893	0.001	-0.010	12.257	0.010	-0.045	1.879	0.003	-0.019	
	Class: Coscinodiscophyceae													
	Order: Coscinodiscales													
	Family: Coscinodiscaceae													
	Genus: Coscinodiscus	12.747	0.026	-0.096	6.145	0.010	-0.046	19.611	0.015	-0.064	1.879	0.003	-0.019	
	Order: Rhizosoleniales													
	Family: Rhizosoleniaceae													
	Genus: Rhizosolenia	138.475	0.285	-0.358	146.679	0.241	-0.343	225.526	0.177	-0.306	166.884	0.287	-0.358	
	Genus: Guinardia	59.879	0.123	-0.258	45.497	0.075	-0.194	108.677	0.085	-0.210	54.557	0.094	-0.222	
	Class: Mediophyceae													
	Order: Thalassiosirales													
	Family: Thalassiosiraceae													
	Genus: Planktoniella													
	Family: Chaetocerataceae													
Genus: Chaetoceros	36.934	0.076	-0.196	145.088	0.239	-0.342	580.974	0.456	-0.358	134.798	0.232	-0.339		
Genus: Bacteriastrium	1.264	0.003	-0.015	16.647	0.027	-0.099	22.879	0.018	-0.072	6.646	0.011	-0.051		
Order: Biddulphiiales														
Family: Biddulphiaceae														
Genus: Eucampia				0.839	0.001	-0.009								
Genus: Biddulphia	12.725	0.026	-0.095	6.929	0.011	-0.051	22.062	0.017	-0.070	9.261	0.016	-0.066		
Order: Hemiaulales														
Family: Hemiaulaceae														
Genus: Hemiaulus	1.264	0.003	-0.015				0.817	0.001	-0.005					
Genus: Climacodium							6.537	0.005	-0.027					
Order: Lithodesmiales														
Family: Lithodesmiasceae														
Genus: Ditylum	1.896	0.004	-0.022				13.074	0.010	-0.047	0.872	0.001	-0.010		
Phylum: Miozoa														
Class: Dinophyceae														
Order: Peridiniales														
Family: Peridiniaceae														

Cyanobacteria	Order: Dinophysiales	Genus: <i>Protoperidinium</i>	1.896	0.004	-0.022	0.839	0.001	-0.009	8.171	0.006	-0.032	1.008	0.002	-0.011
	Family: Dinophysaceae													
	Order: Gonyaulacales	Genus: <i>Dinophysis</i>	3.879	0.008	-0.039				4.086	0.003	-0.018	2.615	0.004	-0.024
	Family: Ceratiaceae													
		Genus: <i>Ceratium</i>	11.788	0.024	-0.090	9.228	0.015	-0.064	26.965	0.021	-0.082	15.035	0.026	-0.094
Total Number of Taxa:			14			12			15			13		
Mean density(units/l):			485.76			608.06			1274.71			581.65		
SD :			58.33			10.89			919.85			50.11		
Mean taxa diversity Index (H')														
SD:			1.79			1.70			1.74			1.70		
Eveness Index (J')			0.09			0.03			0.26			0.01		
SD:			0.73			0.74			0.67			0.70		
SD:			0.03			0.03			0.11			0.01		
H' (Genus)			1.82			1.75			1.73			1.73		
J'			0.69			0.70			0.64			0.67		

P9-N to P11-N

ALCHEMY Laboratory & Services Sdn Bhd

Phytoplankton Data Sheet : Analysed Phytoplankton by Station

Combined mean density in units per litre

		Reference ID: Sample Marking: Total Volume filtered (l): Number of replicates:	BP10260-61 P9-N 577.3 2	pi	pi*ln(pi)	BP10262-63 P10-N 577.3 2	pi	pi*ln(pi)	BP10264-65 P11-N 577.3 2	pi	pi*ln(pi)
Phylum: Bacillariophyta											
Class: Bacillariophyceae											
Order: Surirellales											
Family: Surirellaceae											
Genus: <i>Surirella</i>											
Order: Tabellariales											
Family: Tabellariaceae											
Genus: <i>Asterionella</i>			118.537	0.090	-0.217	22.389	0.018	-0.074	31.301	0.091087246	0.2182393
Order: Thalassionematales											
Family: Thalassionemataceae											
Genus: <i>Thalassionema</i>			294.818	0.225	-0.336	60.467	0.050	-0.149	164.819	0.479626821	0.3524043
Order: Naviculales											
Family: Naviculaceae											
Genus: <i>Navicula</i>			1.743	0.001	-0.009						
Family: Pleurosigmataceae											
Genus: <i>Pleurosigma</i>			5.339	0.004	-0.022	2.125	0.002	-0.011	2.386	0.006943302	0.0345081
Class: Coscinodiscophyceae											
Order: Coscinodiscales											
Family: Coscinodiscaceae											
Genus: <i>Coscinodiscus</i>			10.732	0.008	-0.039	3.922	0.003	-0.019	8.062	0.023461386	0.0880365
Order: Rhizosoleniales											
Family: Rhizosoleniaceae											
Genus: <i>Rhizosolenia</i>			315.300	0.241	-0.343	226.506	0.186	-0.313	44.277	0.128847395	0.2640246
<i>Guinardia</i>			137.658	0.105	-0.237	106.716	0.088	-0.214	24.045	0.069971998	0.1861017
Class: Mediophyceae											
Order: Thalassiosirales											
Family: Thalassiosiraceae											
Genus: <i>Planktoniella</i>											
Family: Chaetocerotaceae											
Genus: <i>Chaetoceros</i>			297.923	0.227	-0.337	733.612	0.604	-0.305	46.609	0.135632175	0.2709671
<i>Bacteriastrium</i>			38.895	0.030	-0.104	24.677	0.020	-0.079	5.153	0.014996264	0.0629836
Order: Biddulphiales											
Family: Biddulphiaceae											
Genus: <i>Eucampia</i>						1.307	0.001	-0.007			
<i>Biddulphia</i>			23.152	0.018	-0.071	16.342	0.013	-0.058	4.914	0.014298764	0.0607352
Order: Hemiaulales											
Family: Hemiaulaceae											
Genus: <i>Hemiaulus</i>			3.595	0.003	-0.016						
<i>Climacodium</i>						2.125	0.002	-0.011			

Phylum: Miozoa	Order: Lithodesmiales									
	Family: Lithodesmiasceae									
	Genus: <i>Ditylum</i>	12.584	0.010	-0.045	5.556	0.005	-0.025	0.381	0.00110966	-0.0075498
	Class: Dinophyceae									
Cyanobacteria	Order: Peridiniales									
	Family: Peridiniaceae									
	Genus: <i>Protoperidinium</i>	7.191	0.005	-0.029	2.125	0.002	-0.011	1.002	0.002916821	-0.0170262
	Order: Dinophysiales									
	Family: Dinophysaceae									
	Genus: <i>Dinophysis</i>	12.366	0.009	-0.044				1.384	0.004026481	-0.0222055
	Order: Gonyaulacales									
	Family: Ceratiaceae									
	Genus: <i>Ceratium</i>	30.016	0.023	-0.087	6.864	0.006	-0.029	9.304	0.027075708	-0.0977194
Total Number of Taxa:		15			14			13		
Mean density(units/l):		1309.85			1214.73			343.64		
SD :		3.47			523.02			245.46		
Mean taxa diversity Index										
(H'):		1.91			1.22			1.72		
SD:		0.09			0.30			0.16		
Eveness Index (J'):		0.75			0.47			0.69		
SD:		0.01			0.10			0.06		
H' (Genus)				1.94			1.31			1.68
J'				0.72			0.50			0.65

DHI Sept/Oct 2017

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[illegible]

Other harpacticoids											
Family: Ectinosomatidae											
Genus: <i>Microsetella</i>	0.062	0.617	0.291	0.139	0.166	0.076	0.062	0.035	0.017	0.083	0.069
Family: Euterpinidae											
Genus: <i>Euterpina</i>	0.180	0.575	0.915	0.527	0.291	0.201	0.568	0.204	0.118	0.603	0.499
Family: Clytemnestridae											
Genus: <i>Clytemnestra</i>		0.090	0.152	0.028	0.125		0.042	0.014		0.007	0.021
Class: Cirripedia											
Class: Malacostraca											
Order: Amphipoda											
Hybrid			0.028	0.028	0.014						
Order: Isopoda											
Isopod	0.007										
Order: Decapoda											
Zoea larvae	0.007	0.083	0.125	0.055		0.007				0.021	0.007
Stomatopod larvae			0.028								0.007
Caridean larvae	0.083	0.340	0.596	0.416	0.055	0.049	0.187	0.049	0.021	0.062	0.159
<i>Lucifer</i>	0.028	0.069	0.083	0.166	0.014		0.014			0.049	0.007
<i>Lucifer protozoa</i>	0.305	1.150	1.427	1.081	1.109	0.346	0.658	0.340	0.111	0.437	0.180
<i>Macruran larvae</i>	0.007			0.028			0.007				
	2.162	8.592	9.424	8.980	5.959	3.977	4.857	2.484	1.653	3.402	3.368
Phylum: Mollusca											
Class: Gastropoda											
Gastropod spat	0.014	0.617	1.483	1.164	0.721	0.201	0.471	0.132	0.100	0.243	0.277
Class: Bivalvia											
Bivalve spat	0.222	0.825	1.164	0.693	0.554	0.305	0.804	0.100	0.062	0.263	0.492
	0.236	1.441	2.647	1.857	1.275	0.506	1.275	0.232	0.163	0.506	0.769
Phylum: Bryozoa											
Phylum: Phoronida											
Phylum: Rotifera											
Phylum: Chaetognatha											
Class: Sagittoidea											
Order: Aphragmophora											
Family: Sagittidae	0.014	0.083	0.055	0.083	0.166	0.125		0.003	0.049	0.090	0.097
Genus: <i>Flaccisagitta</i>		0.187	0.152	0.222	0.208	0.042	0.021	0.118	0.114	0.180	

Phylum: Echinodermata	0.014	0.270	0.208	0.305	0.374	0.166	0.021	0.121	0.163	0.270	0.097
Ophiuroid larvae					0.069	0.028	0.007			0.014	0.035
Phylum: Chordata											
Class: Larvacea											
Order: Oikopleuridae											
Family: Oikopleurinae											
Genus: <i>Oikopleura</i>	0.014	0.381	0.624	0.693	0.845	1.039	0.499	0.197	0.558	0.243	0.173
Order: Salpida											
Family: Salpidae		0.055									
Genus: <i>Thalia</i>											
Fish eggs											
Unknown											
	0.014	0.437	0.624	0.693	0.845	1.039	0.499	0.197	0.558	0.243	0.173
Total Number of Taxa:	29	28	29	34	28	29	33	27	23	31	31
Mean density(units/l):	2.65	12.90	15.67	13.39	11.09	6.51	7.50	3.27	2.97	5.02	4.77
SD :	0.82	12.72	12.33	1.29	2.98	5.45	4.40	3.13	3.25	4.15	2.62
Mean taxa diversity Index (H')	2.65	2.70	2.81	2.89	2.72	2.73	2.84	2.48	2.64	2.82	2.78
SD:	0.05	0.10	0.01	0.01	0.01	0.05	0.04	0.29	0.07	0.03	0.07
Evenness Index (J')	0.83	0.84	0.86	0.86	0.84	0.85	0.84	0.80	0.87	0.87	0.85
SD:	0.04	0.00	0.02	0.02	0.02	0.00	0.00	0.04	0.02	0.01	0.05

Annex D

Macrobenthos Laboratory Data

			Reference ID:								
Station Marking:			MB01			MB02			MB03		
Total area of grab (m2)			0.0594			0.0594			0.0594		
Number of Replicates:			2	pi	pi*ln(pi)	2	pi	pi*ln(pi)	2	pi	pi*ln(pi)
Phylum: Chordata											
	Class: Actinopterygii										
	Order: Amphioxiformes										
	Family: Branchiostomidae										
	Genus: Branchiostoma				84.18	0.08	-0.21	16.84	0.02	-0.07	
Phylum: Annelidae											
	Class: Polychaete										
	Order: Eunicida										
	Family: Lumbrineridae										
	Genus: Lumbrineris	33.67	0.02	-0.09	16.84	0.02	-0.07	101.01	0.10	-0.23	
	Ninoe										
	Family: Onuphidae										
	Genus: Diopatra										
	Genus: Onuphis										
								33.67	0.03	-0.11	
	Order: Phyllodocida										
	Family: Chrysopetalidae										
	Genus: Bhawania										
	Family: Glyceridae										
	Genus: Glycera	151.52	0.10	-0.23	33.67	0.03	-0.11	67.34	0.06	-0.18	
	Family: Nephtyidae										
	Genus: Aglaophamus										
	Genus: Nephtys										
	Micronephtys	50.51	0.03	-0.12	101.01	0.10	-0.23	185.19	0.18	-0.31	
	Family: Neredidae										
	Genus: Leonnates										
	Order: Sabellida										
	Family: Serpulidae										
	Genus: Ditrupa	740.74	0.50	-0.35	151.52	0.15	-0.28	235.69	0.23	-0.34	
	Order: Cirratulida										
	Family: Paraonidae										
	Genus: Cirrophorus										
Order: Sternaspida											
Family: Sternaspidae											

[illegible]

Genus: Apanthura								
Order: Mysida								
Family: Mysidae								
Genus: Gastrosaccus								
Order: Cumacea								
Family: Nannastacidae								
Genus: Cumella								
Phylum: Echinodermata								
Class: Echinoidea								
Order: Clypeastroida								
Order: Spatangoida								
Family: Brissidae								
Order: Ophiurida								
Family: Amphiuridae								
Genus: Amphioplus								
Unidentified	33.67			16.84			0.00	
Total Number of Taxa:	15			15			12	
Mean density(units/m2):	1515.15			1026.94			1043.77	
SD :	380.93			690.44			428.55	
Mean taxa diversity Index (H')	1.569			1.861			1.824	
SD:	0.02			0.03			0.24	
Eveness Index (J')	0.579			0.687			0.734	
SD:	0.015			0.088			0.013	
Total Taxa (not inclusive of unidentified)	14			14			12	
Density (not inclusive of unidentified)	1481.48			1010.10			1043.77	
H' (Genus)			1.79			2.09		1.96
J'			0.67659728			0.7908259		0.78839676

Family: Trochidae									
Genus: Stomatella									
Trochus									
Order: Littorinimorpha									
Family: Cypraeidae									
Genus: Cyprae									
Family: Strombidae									
Genus: Strombus									
Family: Tonnidae									
Genus: Tonna									
Family: Vermetidae									
Genus: Serpulorbis									
Family: Naticidae									
Genus: Glossaulax					33.67	0.03	-0.10		
Mammilla									
Family: Caecidae									
Genus: Caecum									
Family: Rissoinidae									
Genus: Rissoina									
Family: Seraphsidae									
Genus: Terebellum									
Order: Pleurobranchomorpha									
Family: Pleurobranchidae									
Genus: Berthellina									
Order: Pectinoida									
Family: Pectinidae									
Genus: Chlamys									
Family: Spondylidae									
Genus: Spondylus									
Pleurobranchus									
Order: Heterobranchia									
Family: Architectonicoidea									
Genus: Heliacus	16.84	0.03	-0.10	84.18	0.07	-0.19			
Family: Acteonidae									
Genus: Pupa									
Family: Haminoeidea									
Genus: Atys				16.84	0.01	-0.06			
Order: Sorbeoconcha									
Family: Potamididae									
Genus: Telescopium									
Terebralia				33.67	0.03	-0.10			

	Potamides				50.51	0.04	-0.13		
	Family: Turritellidae								
	Genus: Turritella	16.84	0.03	-0.10	134.68	0.11	-0.25		
	Family: Cerithiidae								
	Genus: Cerithium								
	Order: Caenogastropoda								
	Family: Eulimidae								
	Genus: Hypermastus				33.67	0.03	-0.10		
Class: Schaphopoda									
Order: Gadilida									
	Family: Gadilidae								
	Genus: Cadulus								
	Order: Dentaliida								
	Family: Dentaliidae								
	Genus: Tesseracme								
	Dentalium								
	Order: Thecosomata								
	Family: Cavoliniidae								
	Genus: Cavolinia								
Phylum: Arthropoda									
Class: Malacostraca									
Order: Decapoda									
	Family: Callinassidae								
	Genus: Callianassa								
	Family: Alpheidae								
	Genus: Athanas								
	Alpheus								
	Family: Porcellanidae								
	Genus: Petrolisthes								
	Raphidopus								
	Family: Dotillidae								
	Genus: Ilyoplax								
	Family: Leucosiidae								
	Genus: Philyra								
	Order: Amphipoda								
	Family: Corophiidae								
	Genus: Cheiriphotis								
	Order: Isopoda								
	Family: Anthuridae								

Genus: Apanthura									
Order: Mysida									
Family: Mysidae									
Genus: Gastrosaccus									
Order: Cumacea									
Family: Nannastacidae									
Genus: Cumella									
Phylum: Echinodermata									
Class: Echinoidea									
Order: Clypeastroida							16.84	0.06	-0.17
Order: Spatangoida									
Family: Brissidae									
Order: Ophiurida									
Family: Amphiuridae									
Genus: Amphioplus				16.84	0.01	-0.06			
Unidentified	16.84			16.84			50.51		
Total Number of Taxa:	12			21			7		
Mean density(units/m2):	606.06			1212.12			319.87		
SD :	95.23			47.62			166.66		
Mean taxa diversity Index (H'):	1.535			1.744			1.323		
SD:	0.24			0.13			0.64		
Eveness Index (J'):	0.618			0.573			0.680		
SD:	0.011			0.017			0.088		
Total Taxa (not inclusive of unidentified)	11			20			6		
Density (not inclusive of unidentified)	589.23			1195.29			269.36		
H' (Genus)			1.66			2.45			1.59
J'			0.6942441			0.81734875			0.8892956

[illegible]

Genus: Sternaspis									
Oligochaeta									
Phylum: Nemertea									
Phylum: Foraminifera									
Class: Globothalamea									
Order: Rotaliida									
Family: Discorbidae									
Genus: Discorbis									
Phylum: Mollusca									
Class: Bivalvia									
Order: Arcoida									
Family: Arcidae									
Genus: Arca									
Genus: Anadara									
Family: Glycymerididae									
Genus: Glycymeris									
Order: Veneroida									
Family: Veneridae									
Genus: Marcia									
Genus: Timoclea									
Amiantis									
Bassina									
Pitar									
Family: Tellinidae									
Genus: Tellina									
Family: Psammobiidae									
Genus: Soletellina									
Family: Cardiidae									
Genus: Fragum									
Family: Lucinidae									
Genus: Codakia									
Order: Mytiloida									
Family: Mytilidae									
Genus: Lithophaga									
Order: Nuculoida									
Family: Nuculidae									
Genus: Nucula									
Nuculoma									

Family: Trochidae									
Genus: Stomatella									
Trochus									
Order: Littorinimorpha									
Family: Cypraeidae									
Genus: Cyprae									
Family: Strombidae									
Genus: Strombus									
Family: Tonnidae									
Genus: Tonna									
Family: Vermetidae									
Genus: Serpulorbis									
Family: Naticidae									
Genus: Glossaulax				67.34	0.13	-0.26	16.84	0.01	-0.06
Mammilla									
Family: Caecidae									
Genus: Caecum									
Family: Rissoinidae									
Genus: Rissoina									
Family: Seraphsidae									
Genus: Terebellum									
Order: Pleurobranchomorpha									
Family: Pleurobranchidae									
Genus: Berthellina									
Order: Pectinoida									
Family: Pectinidae									
Genus: Chlamys									
Family: Spondylidae									
Genus: Spondylus									
Pleurobranchus									
Order: Heterobranchia									
Family: Architectonicoidea									
Genus: Heliacus									
Family: Acteonidae									
Genus: Pupa									
Family: Haminoeidea									
Genus: Atys							16.84	0.01	-0.06
Order: Sorbeoconcha									
Family: Potamididae									
Genus: Telescopium									
Terebralia							33.67	0.03	-0.10

	Potamides						84.18	0.07	-0.18
Family:	Turritellidae								
	Genus: Turritella				16.84	0.03	-0.11	235.69	0.19
Family:	Cerithiidae								
	Genus: Cerithium								
Order:	Caenogastropoda								
Family:	Eulimidae								
	Genus: Hypermastus								
Class:	Schaphopoda								
Order:	Gadilida								
Family:	Gadilidae								
	Genus: Cadulus								
Order:	Dentaliida								
Family:	Dentaliidae								
	Genus: Tesseracme								
	Dentalium								
Order:	Thecosomata								
Family:	Cavoliniidae								
	Genus: Cavolinia								
Phylum:	Arthropoda								
Class:	Malacostraca								
Order:	Decapoda								
Family:	Callianassidae								
	Genus: Callianassa								
Family:	Alpheidae								
	Genus: Athanas				67.34	0.13	-0.26		
	Alpheus								
Family:	Porcellanidae								
	Genus: Petrolisthes								
	Raphidopus								
Family:	Dotillidae								
	Genus: Ilyoplax								
Family:	Leucosiidae								
	Genus: Philyra								
Order:	Amphipoda								
Family:	Corophiidae								
	Genus: Cheiriphotis								
Order:	Isopoda								
Family:	Anthuridae								

Genus: Apanthura									
Order: Mysida									
Family: Mysidae									
Genus: Gastrosaccus									
Order: Cumacea									
Family: Nannastacidae									
Genus: Cumella									
Phylum: Echinodermata									
Class: Echinoidea									
Order: Clypeastroida									
Order: Spatangoida									
Family: Brissidae									
Order: Ophiurida									
Family: Amphiuridae									
Genus: Amphioplus									
Unidentified	84.18			101.01			33.67		
Total Number of Taxa:	5			15			18		
Mean density(units/m2):	336.70			622.90			1296.30		
SD :	95.23			309.51			166.66		
Mean taxa diversity Index (H'):	1.066			2.120			1.950		
SD:	0.21			0.36			0.39		
Eveness Index (J'):	0.662			0.783			0.675		
SD:	0.028			0.022			0.119		
Total Taxa (not inclusive of unidentified)	4			14			17		
Density (not inclusive of unidentified)	252.53			521.89			1262.63		
H' (Genus)			1.08			2.41		2.07	
J'			0.781402187			0.91169363		0.72916286	

[illegible]

Genus: Sternaspis							
Oligochaeta							
Phylum: Nemertea							
Phylum: Foraminifera							
Class: Globothalamea							
Order: Rotaliida							
Family: Discorbidae							
Genus: Discorbis							
Phylum: Mollusca							
Class: Bivalvia							
Order: Arcoida							
Family: Arcidae							
Genus: Arca							
Genus: Anadara							
Family: Glycymerididae							
Genus: Glycymeris							
Order: Veneroida							
Family: Veneridae							
Genus: Marcia							
Genus: Timoclea							
Amiantis							
Bassina							
Pitar							
Family: Tellinidae							
Genus: Tellina				33.67	0.06	-0.17	
Family: Psammobiidae							
Genus: Soletellina				16.84	0.03	-0.10	
Family: Cardiidae							
Genus: Fragum							
Family: Lucinidae							
Genus: Codakia							
Order: Mytiloida							
Family: Mytilidae							
Genus: Lithophaga							
Order: Nuculoida							
Family: Nuculidae							
Genus: Nucula							
Nuculoma							

[illegible]

Family: Trochidae									
Genus: Stomatella									
Trochus									
Order: Littorinimorpha									
Family: Cypraeidae									
Genus: Cyprae									
Family: Strombidae									
Genus: Strombus									
Family: Tonnidae									
Genus: Tonna									
Family: Vermetidae									
Genus: Serpulorbis									
Family: Naticidae									
Genus: Glossaulax				33.67	0.06	-0.17	67.34	0.026144	-0.09527
Mammilla									
Family: Caecidae									
Genus: Caecum									
Family: Rissoinidae									
Genus: Rissoina									
Family: Seraphsidae									
Genus: Terebellum									
Order: Pleurobranchomorpha									
Family: Pleurobranchidae									
Genus: Berthellina									
Order: Pectinoida									
Family: Pectinidae									
Genus: Chlamys									
Family: Spondylidae									
Genus: Spondylus									
Pleurobranchus									
Order: Heterobranchia									
Family: Architectonicoidea									
Genus: Heliacus	16.84	0.01	-0.05	16.84	0.03	-0.10	117.85	0.045752	-0.14112
Family: Acteonidae									
Genus: Pupa									
Family: Haminoeidea									
Genus: Atys	16.84	0.01	-0.05				50.51	0.019608	-0.07709
Order: Sorbeoconcha									
Family: Potamididae									
Genus: Telescopium									
Terebralia				33.67	0.06	-0.17			

Genus: Apanthura								
Order: Mysida								
Family: Mysidae								
Genus: Gastrosaccus								
Order: Cumacea								
Family: Nannastacidae								
Genus: Cumella								
Phylum: Echinodermata								
Class: Echinoidea								
Order: Clypeastroida							16.84	0.006536 -0.03288
Order: Spatangoida								
Family: Brissidae								
Order: Ophiurida								
Family: Amphiuridae								
Genus: Amphioplus								
Unidentified	50.51			33.67			0.00	
Total Number of Taxa:	15			14			16	
Mean density(units/m2):	1649.83			606.06			2575.76	
SD :	1285.65			142.85			880.91	
Mean taxa diversity Index (H'):	1.843			1.948			1.709	
SD:	0.23			0.47			0.60	
Eveness Index (J'):	0.681			0.738			0.616	
SD:	0.045			0.062			0.242	
Total Taxa (not inclusive of unidentified)	14			13			16	
Density (not inclusive of unidentified)	1599.33			572.39			2575.76	
H' (Genus)			2.02			2.19		2.06
J'			0.76599075			0.8520399		0.741519

Appendix F

Air and Noise Assessment Report



GREENWICH ENVIRONMENT SDN BHD (830974-D)



AIR QUALITY BASELINE STUDY / NOISE LEVEL BASELINE STUDY / NOISE EXPOSURE ASSESSMENT

PROPOSED RECLAMATION AND DEVELOPMENT OF SUNRISE CITY MIXED DEVELOPMENT AT MUKIM SEBERANG TAKIR, KUALA TERENGGANU

Prepared for
DHI Water & Environment (M) Sdn Bhd

Prepared by
Hung Yee Hon
EIA Consultant (C0096)
Greenwich Environment Sdn Bhd

AUGUST 2019

1.0 AIR QUALITY BASELINE STUDY

Six (6) ambient air quality points, namely AN1 to AN6 were established in October 2017. Locations of the air quality sampling points are described in **Table 1.1** and are shown in **Figure 1.1**. A total of five (5) parameters were tested – PM₁₀, PM_{2.5}, NO₂, SO₂ and CO. The sampling results are shown in **Table 1.2** and laboratory analysis certificates are attached in **Annex 1**.

Table 1.1 - Locations of Air Quality Monitoring

Survey Stations	Coordinates (Decimal Degrees)		Location / Distance from the Project Site
	Longitude (E)	Latitude (N)	
AN1	103.13703	5.34751	Kg. Seberang Takir-Within 0.5 km
AN2	103.11438	5.34943	Near Kg. Banggul Buluh-Within 3 km
AN3	103.12405	5.36767	Near Kg. Ketapang-Within 0.5 km
AN4	103.11648	5.37546	Near Klinik Kesehatan, school and surau-Within 0.5 km
AN5	103.10780	5.37864	Nearby to airport boundary as well as army camp-Within 2 km
AN6	103.11324	5.38467	Near Scout Inn Resort and boy scout camp-Within 0.5 km

The monitoring results are compared with Interim Target 2 Limits (by year 2018) of Ambient Air Quality Standard 2013. Findings of the monitoring results can be summarised as follows:

- PM₁₀ levels ranged from 74 to 79 µg/m³, below the ambient standard of 120µg/m³.
- PM₅ levels ranged from 40 to 46 µg/m³, below the ambient standard of 50µg/m³.
- NO₂ levels were below detectable limits of 1.882 µg/m³ for all stations.
- SO₂ levels were below detectable limits of 2.619 µg/m³ for all stations.
- CO levels were below detectable limits of 2.86 mg/m³ for all stations.

Table 1.1 - Locations of Air Quality and Noise Level Monitoring

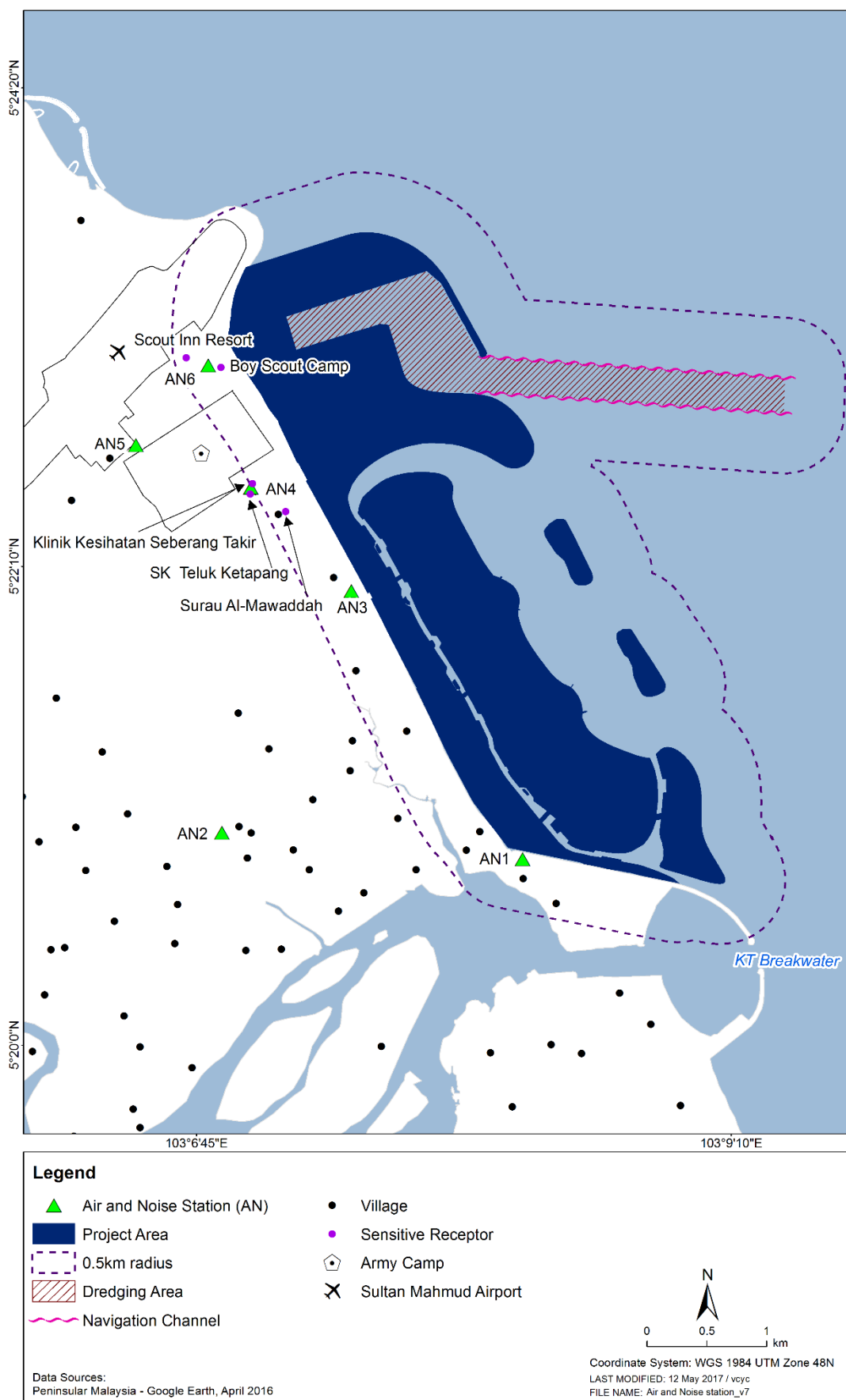


Table 1.2 – Results of Air Quality Sampling

Parameter	Unit	Sampling Point						Ambient Air Quality Standards
		AN1	AN2	AN3	AN4	AN5	AN6	
Particulate Matters (PM10)	µg/m ³	79	75	74	78	79	76	120 (24-hours averaging time)
Particulate Matters (PM2.5)	µg/m ³	41	46	40	43	42	43	50 (24-hours averaging time)
Sulphur Dioxide as SO ₂	µg/m ³	ND <2.619	ND <2.619	ND <2.619	ND <2.619	ND <2.619	ND <2.619	300 (1-hour averaging time)
Nitrogen Dioxide as NO ₂	µg/m ³	ND <1.882	ND <1.882	ND <1.882	ND <1.882	ND <1.882	ND <1.882	300 (1-hour averaging time)
Carbon Monoxide as CO	mg/m ³	ND <2.86	ND <2.86	ND <2.86	ND <2.86	ND <2.86	ND <2.86	35 (1-hours averaging time)

2.0 NOISE LEVEL BASELINE STUDY

Noise level measurements were conducted in Oct 2017 at the locations similar to the air quality points as described **Table 2.1** and shown in **Figure 1.1**. Results of noise level measurements are summarised in **Table 2.2**. The laboratory analysis certificates are attached in **Annex 1**.

The monitoring results are compared with the Planning Guidelines for Environmental Noise Limits and Control, 2007 published by DOE. In general, there are two types of land use throughout the monitoring stations and their respective permissible sound levels are:

- Urban residential area – 60dB(A) daytime; 50dB(A) night time
- Suburban residential area – 55dB(A) daytime; 45dB(A) night time
- Sensitive receptors i.e. school, hospital – 50dB(A) daytime; 40dB(A) night time

Table 2.1 - Locations of Noise Level Monitoring

Survey Stations	Coordinates (Decimal Degrees)		Location / Distance from the Project Site
	Longitude (E)	Latitude (N)	
N1	103.13703	5.34751	Kg. Seberang Takir-Within 0.5 km
N2	103.11438	5.34943	Near Kg. Banggul Buluh-Within 3 km
N3	103.12405	5.36767	Near Kg. Ketapang-Within 0.5 km
N4	103.11648	5.37546	Near Klinik Kesihatan, school and surau-Within 0.5 km
N5	103.10780	5.37864	Nearby to airport boundary as well as army camp-Within 2 km
N6	103.11324	5.38467	Near Scout Inn Resort and boy scout camp-Within 0.5 km

Table 2.2 – Results of Noise Level Measurements [dB(A)]

Station	Type of Land Use	Parameter	Noise Level as L_{eq} , dB(A)		
			Daytime (0700hrs – 1900hrs)	Daytime (1900hrs – 2200 hrs)	Night time (2200hrs – 0700 hrs)
N1	Urban	Leq	53.8	50.3	57.9
		Lmax	70.4	57.4	64.3
		Lmin	47.1	45.4	46.3
		L10	55.4	52.0	60.7
		L50	52.5	49.8	57.4
		L90	50.2	47.6	50.8
N2	Suburban	Leq	57.8	54.2	57.8
		Lmax	65.0	61.0	65.3
		Lmin	50.2	48.7	49.2
		L10	59.7	56.4	60.1
		L50	57.4	53.5	57.4
		L90	54.6	50.6	53.8
N3	Urban	Leq	56.7	54.9	52.6
		Lmax	62.5	59.2	57.7
		Lmin	48.7	47.9	47.3
		L10	58.9	57.0	53.9
		L50	56.2	54.6	52.6
		L90	53.6	51.1	50.3
N4	Sensitive	Leq	58.4	58.9	59.0
		Lmax	69.2	68.3	65.0
		Lmin	49.9	51.3	49.2
		L10	60.3	62.3	61.4
		L50	57.7	56.6	58.3
		L90	54.7	53.0	55.5
N5	Urban	Leq	59.2	56.8	54.9
		Lmax	70.3	66.2	73.1
		Lmin	53.5	52.4	42.2
		L10	61.3	58.1	52.6
		L50	58.5	55.4	49.5
		L90	55.6	53.2	46.8
N6	Urban	Leq	52.6	50.8	53.3
		Lmax	69.8	55.9	67.9
		Lmin	27.6	44.1	29.9
		L10	54.7	52.7	55.6
		L50	49.0	50.4	52.8
		L90	39.6	47.2	43.4

Findings of the monitoring results can be summarized as follows:

- The daytime Leq ranged from 50.3 to 59.2dB(A) while the night time Leq ranged from 52.6 to 59.0dB(A) for all stations. The range of Leq recorded were typical for urban setup.
- The highest daytime and night time Leq were recorded at N4 and N5, near the airport boundary, army camp, clinic, school and surau.
- The lowest daytime and night time Leq were recorded at N1 and N3 respectively.
- Of the urban residential areas (all stations except N2 & N4), the daytime Leq was recorded below the stipulated permissible level of 60dB(A). However, exceeded the night time permissible level of 50dB(A).
- At N2 (suburban), the daytime and night time Leq were recorded above the stipulated permissible levels of 55dB(A) and 45dB(A) respectively.
- At N4 (sensitive receptor), the daytime and night time Leq were recorded above the stipulated permissible levels of 50dB(A) and 40dB(A) respectively.
- At N5 and N6, which are located closer to the airport, occasional high noise levels up to 73.1dBA observed throughout the monitoring period and they are likely caused by the aircraft noise.
- Levels of L90 were below 56 dB(A) throughout the monitoring period at all stations, indicating the noise levels are low most of the time in the background of urban area.
- Levels of L10 were up to 62.3 dB(A) during daytime at all stations, recorded a fair results at urban area. However, L10 levels were above 60 dB(A) during night time at N1, N2 and N4, indicating annoying noise peaks occurred at these stations during night time.

3.0 NOISE EXPOSURE ASSESSMENT

3.1 Introduction

During the construction phase, the bulk of the noise is expected from construction activities involving reclamation, dredging and onshore construction activities. The noise levels will be predicted to assess their disturbance onto the sensitive receptors.

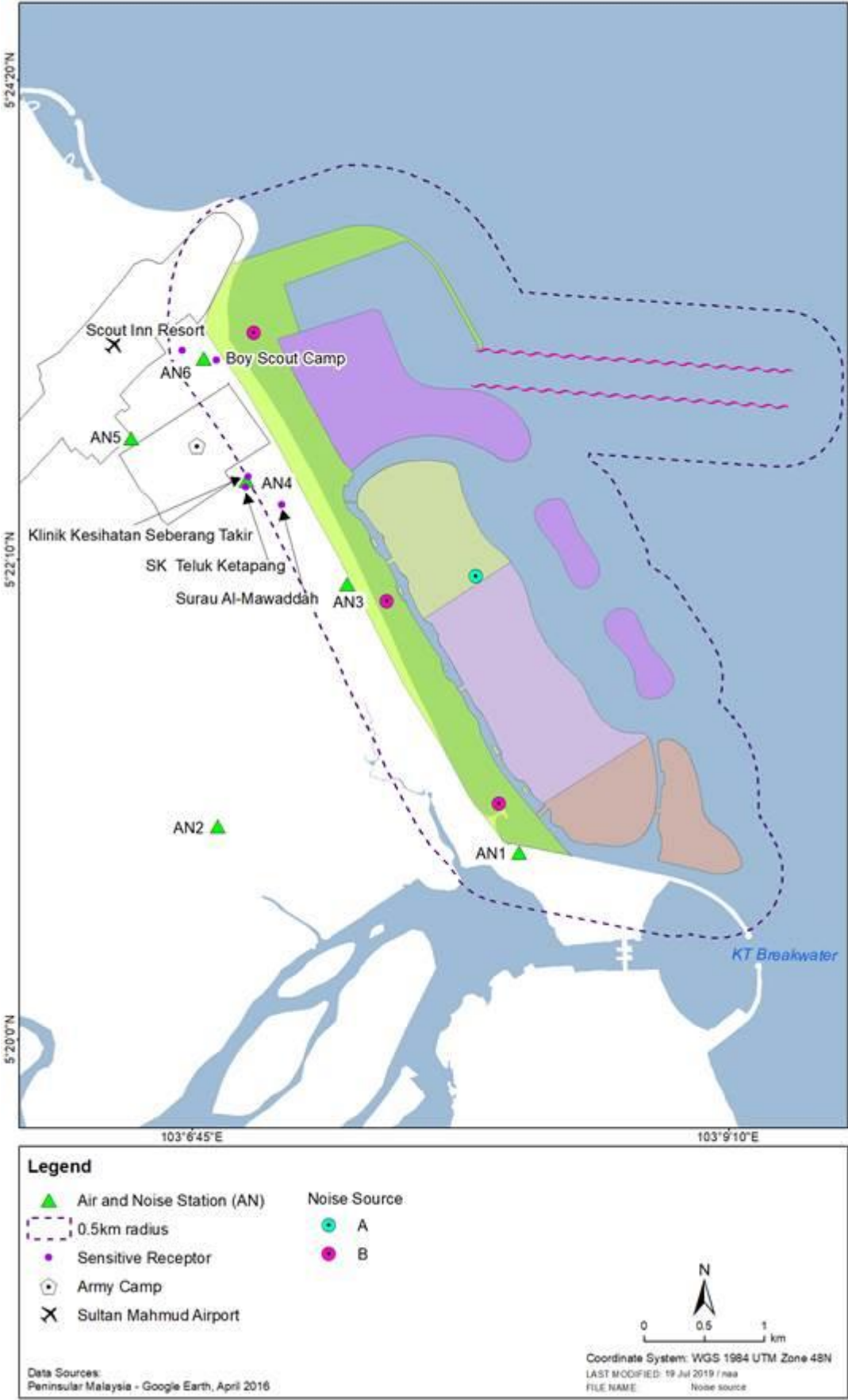
3.2 Noise Sources

During the reclamation phase, there will be 2 sets of machinery, namely Machinery A and Machinery B as follows:

- Machinery A= Trailing Hopper Suction Dredger (THSD), Cutter Suction Dredger and Tug boat
- Machinery B= Loader, excavator, work boat, generators, bulldozer, grader and truck

Machinery A will be used for sand filling / dredging activities while Machinery B will be used for land grading works. During daytime (0700-1900), 1 source for machinery A and 3 sources for machinery B are identified. During evening / night time (1900-0700), only 1 noise source (machinery A) will be used. Location of identified noise sources are shown in **Figure 3.1**.

Figure 3.1 – Location of Noise Sources during Reclamation Phase



In the assessment of noise, a common statistical descriptor is L_{Aeq} . L_{Aeq} is the constant, average noise level, which over a period of time, contains the same amount of energy as the varying levels of the background or traffic noise. The total equivalent sound level for a typical workday during a particular construction activity can be computed as follows:

$$L_{Aeq} = 10 \times \log_{10} \sum [10^{(L_{Aeq\ i} / 10)}] \text{ (dB)}$$

Where,

$L_{Aeq, \text{ total}}$ = the total equivalent noise level for a typical workday during a given period;

k = the number of different types of equipment; and

$L_{Aeq, i}$ = the equivalent noise level for equipment type, i .

Table 3.1 presents typical noise levels from equipment and machinery to be used for project activities. With the above equation, the total equivalent noise level for Machinery A and Machinery B is computed as shown in **Table 3.1**.

Table 3.1 – Typical Noise Level from Construction Equipment

Activities	Equipment	Typical Sound Level (dBA) at 30m from Source
Machinery A: Reclamation / Dredging	Trailing Hopper Suction Dredger (THSD)	84
	Cutter Suction Dredger	84
	Tug Boat	81
	Total Noise Emission Level	87.98
Machinery B: Land Grading Works	Work Boat	81
	Generator	75
	Bulldozer	79
	Truck	78
	Loader	76
	Excavator	79
	Grader	77
	Total Noise Emission Level	86.72

Source: Final Environmental Impact Statement / Environmental Impact Report for TraPac Container Terminal, Los Angeles (2007).

3.3 Methodology

3.3.1 Model Used

The study on noise level will be carried out using the CadnaA model. The mathematical model software used provides options to model noise emissions from a wide range of sources that might be present at industrial areas and urban areas. The basis of the model is the linear sound propagation equation, which is used to model simple point source emissions from vehicles or industries.

3.3.2 Fundamental of Point Source Calculation

Calculation of noise propagation is based on ISO 9613-2 for point source or linear source. The A-weighted sound pressure level at a receiver point LAT (equivalent continuous sound pressure level) according to ISO 9613-2 is calculated by:

$$LAT = LW + DI + D_{\Omega} - A_{div} - A_{atm} - A_{gr} - A_{bar} - A_{misc}$$

Where

- L_W = sound power level in dB, relative to the reference sound power of 1 pW
pW sound pressure level@1m is assumed as sound power level.
- D_I = directivity index
- D_{Ω} = correction for solid angle
- A_{div} = attenuation due to geometrical divergence
- A_{atm} = atmospheric absorption
- A_{gr} = attenuation due to ground effect
- A_{bar} = attenuation due to screening (berms, barriers, buildings, topography)
- A_{misc} = attenuation due to miscellaneous effects (foliage, industrial sites, housing)

3.3.3 Input Data

Noise Source

The following assumptions are made for modeling input of noise sources:

- The modelling adopts the reclamation activities as a single point source with total equivalent noise level of 87.98dBA@30m and 86.72@30m for Machinery A and Machinery B respectively.
- During daytime, 1 source for machinery A and 3 sources for machinery B are identified. During night time, only 1 noise source (machinery A) will be used.
- 87.98dBA@30m and 86.72@30m is further propagated to 1m in distance from source, equals to 117.52dBA@1m and 116.26dBA@1m respectively. This value is considered as sound power level of the noise sources and is used as model input.
- Point sources at ground level is modelled at 1.0m height above ground.

Ground Factor

The ground is assumed to be reflective and the ground coefficient G has been fixed to 0.3. The ground is considered completely flat and the entire project site is sitting on a similar elevation.

Obstacles

No obstacles between noise sources and receivers to demonstrate the worst case scenario.

Noise Spectrum

All noise sources are modelled following a default spectrum by CadnaA.

Geometrical Parameters

The following geometrical parameters are used:

- Maximum distance between source and receiver is 10km.
- Minimum distance between source and reflector is 0.1m.
- Minimum distance between receiver and reflector is 1.0m.

Meteorological Parameters

The following meteorological parameters are used:

- Temperature 30°C
- Relative humidity 80%

Receiver

Modelling is carried out at 1.5m above ground. Therefore, the modeling results given are at the level of 1.5m above ground.

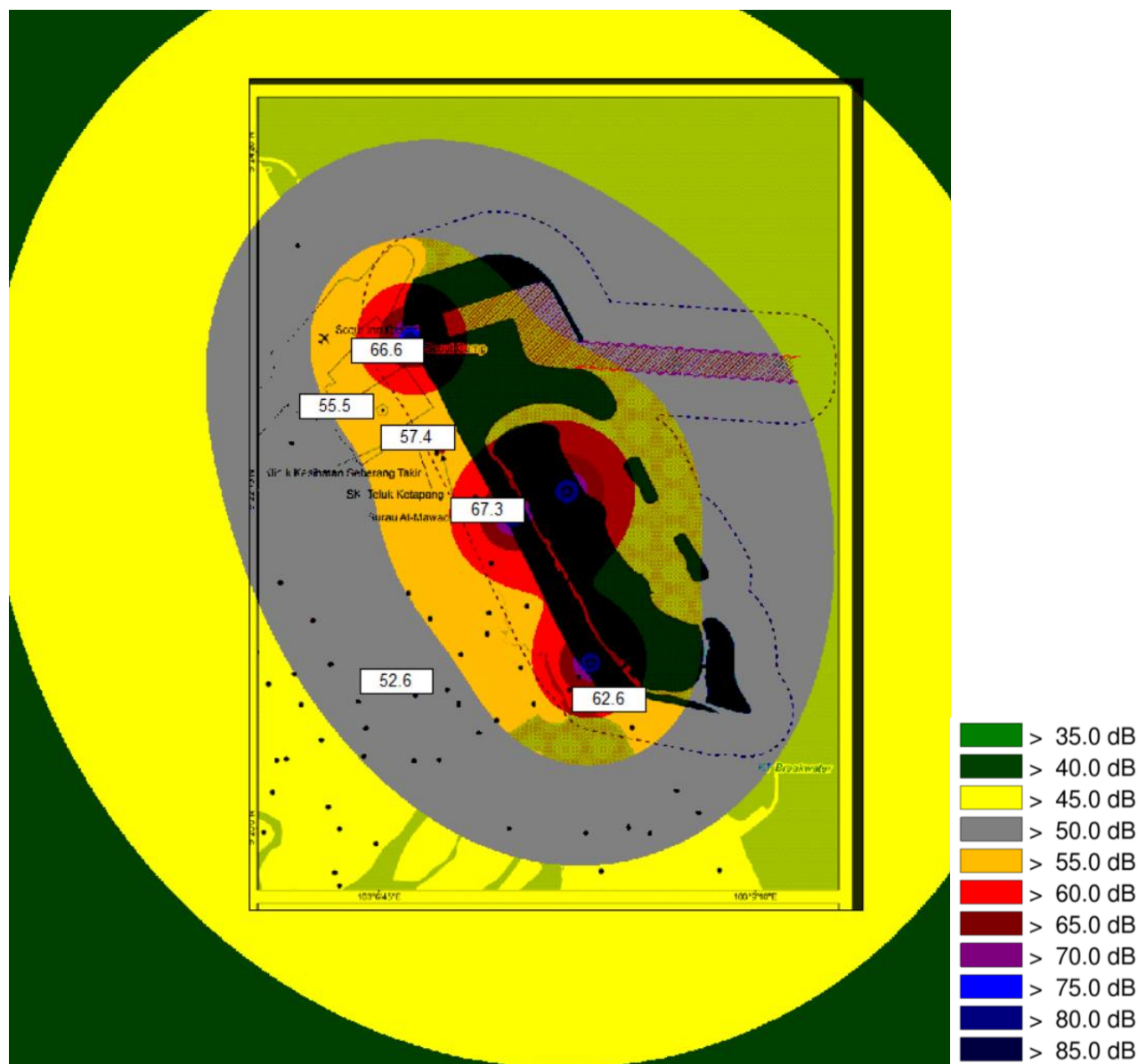
3.4 Assessment Results

Result of the modeling is the maximum noise source emission contours generated from the proposed project as shown in **Figure 3.2** and **Figure 3.3**. Predicted noise source emission level at the receiving land use due to the construction activities is also given in **Table 3.2**.

Table 3.2 : Predicted Maximum Noise Source Emission Level at the Receptors due to the Project Activities

Receiving Land Use / Receptor	Predicted Maximum Noise Source Emission Level (dBA)	
	Daytime (0700-1900)	Evening / Night Time (1900-0700)
N1, Kg. Seberang Takir-Within 0.5 km	62.6	48.3
N2, near Kg. Banggul Buluh-Within 3 km	52.6	46.7
N3, near Kg. Ketapang-Within 0.5 km	67.3	57.1
N4, near Klinik Kesihatan, school and surau-Within 0.4 km	57.4	50.9
N5, nearby to airport boundary as well as army camp	55.5	46.9
N6, Near Scout Inn Resort and boy scout camp-Within 3 km	66.6	47.6

Figure 3.2: Predicted Maximum Daytime Noise Source Emission Contours due to the Project Activities



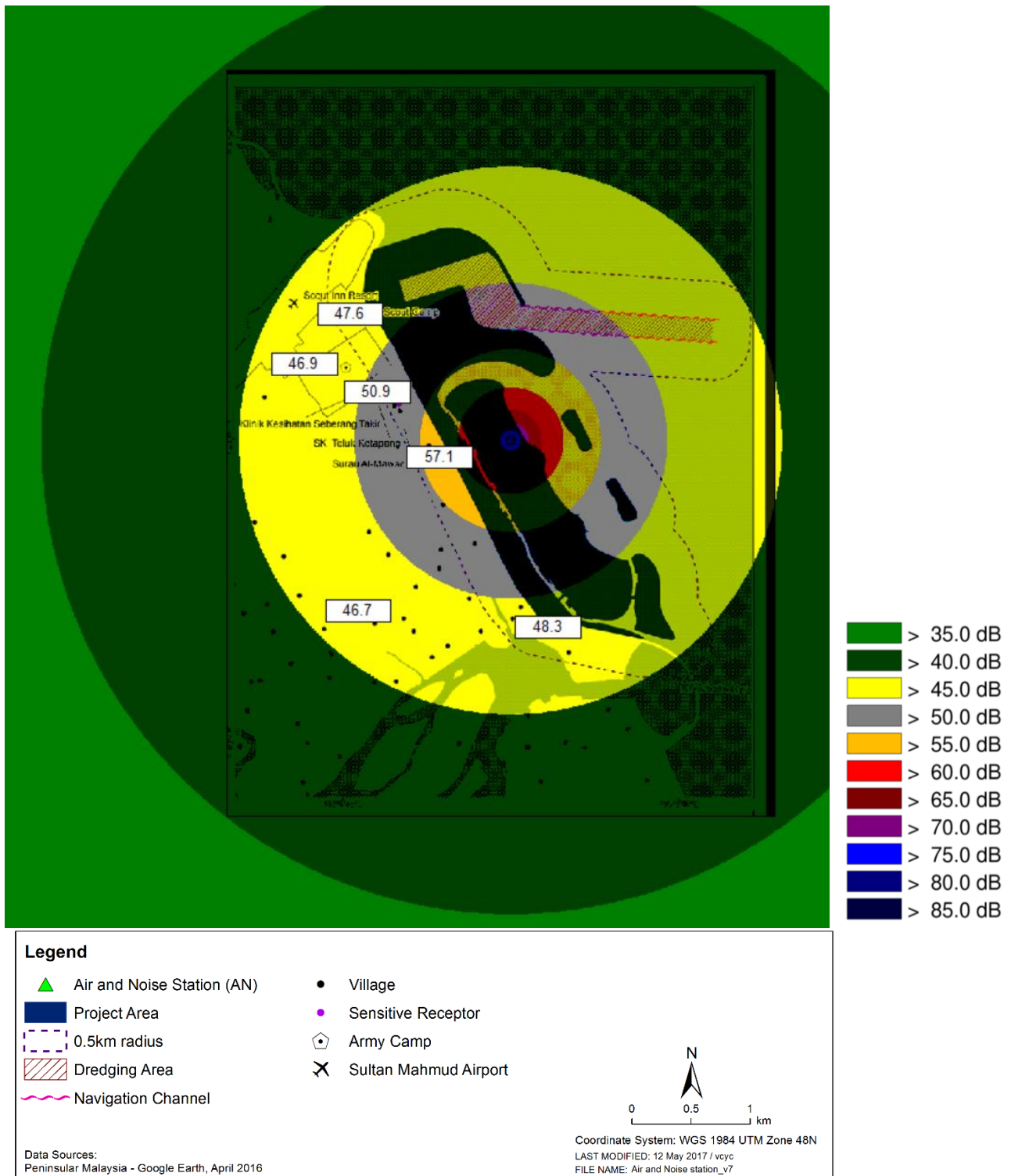
Legend

- ▲ Air and Noise Station (AN)
- Project Area
- 0.5km radius
- Dredging Area
- ~ Navigation Channel
- Village
- Sensitive Receptor
- Army Camp
- ✈ Sultan Mahmud Airport

Data Sources:
Peninsular Malaysia - Google Earth, April 2016


 0 0.5 1 km
 Coordinate System: WGS 1984 UTM Zone 48N
 LAST MODIFIED: 12 May 2017 / vcyc
 FILE NAME: Air and Noise station_v7

Figure 3.3: Predicted Maximum Evening / Night Time Noise Source Emission Contours due to the Project Activities



As shown in **Figure 3.2**, exposure of surrounding receptors (N1 to N6) during daytime ranged from 52.6dBA to 67.3dBA due to the project activities. Kg Seberang Takir (N1), Scott Inn Resort (N6) and Kg Ketapang (N3) is expected to experience the higher project noise emission level of above 60dBA. During evening /

night time, the highest noise emission level is expected at Kg Ketapang, at 57.1dBA while the rest are up to 51dBA.

It should be noted that the predicted noise level is solely from the construction activities. With the baseline noise monitoring results as background noise, the maximum cumulative ambient noise level due to the construction noise as well as the background noise is computed by the equation as follows:

$$L_{Aeq} = 10 \times \log_{10} \sum [10^{(L_{Aeq\ i} / 10)}] \text{ (dB)}$$

Where,

$L_{Aeq, \text{ total}}$ = the total equivalent noise level (dB) for a typical workday during a given period; and

$L_{Aeq, i}$ = the equivalent noise level for equipment type, i.

Table 3.3 shows the results of the cumulative noise level at the receptors.

Table 3.3: Predicted Maximum Cumulative Noise Level at Sensitive Receptors during the Project Implementation

Sensitive Receptor	Daytime (0700-1900)			Evening (1900-2200)			Night Time (2200-0700)		
	Baseline – Lmax (dBA)	Predicted Max. Noise Source Emission Level (dBA)	Cumulative Noise Level – Lmax (dBA)	Baseline – Lmax (dBA)	Predicted Max. Noise Source Emission Level (dBA)	Cumulative Noise Level – Lmax (dBA)	Baseline – Leq (dBA)	Predicted Max. Noise Source Emission Level (dBA)	Cumulative Noise Level – Leq (dBA)
N1, Kg. Seberang Takir-Within 0.5 km	70.4	62.6	71.1	57.4	48.3	57.9	57.9	48.3	58.4
N2, near Kg. Banggul Buluh-Within 3 km	65.0	52.6	65.2	61.0	46.7	61.2	57.8	46.7	58.1
N3, near Kg. Ketapang-Within 0.5 km	62.5	67.3	68.5	59.2	57.1	61.3	52.6	57.1	58.4
N4, near Klinik Kesehatan, school and surau-Within 0.4 km	69.2	57.4	69.5	68.3	50.9	68.4	59.0	50.9	59.6
N5, nearby to airport boundary as well as army camp-Within 2 km	70.3	55.5	70.4	66.2	46.9	66.3	54.9	46.9	55.5
N6, Near Scout Inn Resort and boy scout camp-Within 3 km	69.8	66.6	71.5	55.9	47.6	56.5	53.3	47.6	54.3

Based on the estimated results, the maximum daytime cumulative noise levels at the receptors ranged from 65.2 to 71.5 dBA while the maximum evening cumulative noise levels at the receptors ranged from 56.5 to 68.4 dBA. During the construction phase, noise level guideline limits are referred to Schedule 6 of the Planning Guidelines for Environmental Noise Limits and Control, DOE 2007 as shown in **Table 3.4**. The estimated noise levels are indeed below the daytime $L_{max} - 90$ dBA and evening $L_{max} - 85$ dBA. Compliance to L_{90} and L_{10} during the construction phase could be achieved via mitigating measures and noise control management as highlighted in the following section. Close monitoring should be implemented in this regard.

During night time, the maximum night time cumulative noise levels at the receptors ranged from 54.3 to 59.6 dBA. Noise level guideline limit during night time is referred to Schedule 3 of the Planning Guidelines for Environmental Noise Limits and Control, DOE 2007, which stated $Leq + 3$ dBA. Based on the night time cumulative results, additional Leq is expected up to 1.0 dBA at all receptors except AN3 – Kg Ketapang, which experienced additional 5.8 dBA. Nevertheless, the estimated values are based on worst case scenario without any control measures. Lower noise level is expected with mitigating measures take place.

Table 3.4: Maximum Permissible Sound Level (Percentile L_N and L_{MAX}) of Construction, Maintenance and Demolition Work by Receiving Land Use

Receiving Landuse Category	Noise Parameter	Day Time 7.00 am – 7.00 pm	Evening 7.00 pm – 10.00 pm	Night Time 10.00 pm – 7.00 am
Residential (Note 2 **)	L_{90}	60 dBA	55 dBA	*(Note 1)
	L_{10}	75 dBA	70 dBA	*
	L_{max}	90 dBA	85 dBA	*
Commercial (Note 2**)	L_{90}	65 dBA	60 dBA	NA
	L_{10}	75 dBA	70 dBA	NA
Industrial	L_{90}	70 dBA	NA	NA
	L_{10}	80 dBA	NA	NA

Source: The Planning Guidelines for Environmental Noise Limits and Control, 2007.

Notes:

- *1 At these times the maximum permissible levels are stipulated in the Schedule 1 for the respective residential density type shall apply. This may mean that no noisy construction work can take place during these hours.
- **2 A reduction of these levels in the vicinity of certain institutions such as schools, hospitals, mosque and noise sensitive premises (apartments, residential dwellings, hotel) may be exercised by the local authority or Department of Environment. Where the affected premises are noise sensitive, the limits of the schedule I shall apply.
- 3. In the event that the existing sound level (L_{90}) without construction, maintenance and demolition works is higher than the L_{90} limit of the above schedule, the higher measured ambient L_{90} sound level shall prevail. In this case, the maximum permissible L_{10} sound level shall not exceed the Ambient L_{90} level + 10 dBA, or the above Schedule L_{10} whichever is the higher.
- 4. NA = Non Applicable.

In conclusion, the proposed project is not expected to cause significant noise disturbance to the surrounding receptor during the construction phase. However, the following control measures should be strictly adhered to.

3.5 Mitigating Measures

Mitigating measures below are recommended to carry out during the construction phase.

- Impact during night time can be mitigated by avoiding high noise emitting activities (above 90 dB(A)) (e.g. piling/onshore works) between 10 p.m. – 7 a.m. For example, high noise emitting activities (i.e. piling and onshore works) should be avoided between 10 pm to 7 am;
- All vehicles and machinery will be properly serviced and maintained to ensure good working condition, thereby reducing the possible noise emission;
- Establish hoarding and maintain vegetation belt along the site boundary.
- Suitable noise absorbent materials should be installed on machinery that produces high noise levels. Machinery emitting high noise shall be sited within an enclosure to reduce the noise impact; and
- Speed limit for heavy vehicles is imposed on site.

LIST OF REFERENCES

1. DataKustik GmbH (2013). *Introduction to CadnaA*.
2. D.N.May (1978), Handbook of Noise Assessment.
3. Davis & Cornwell, "Introduction to Environmental Engineering", McGraw-Hill, 3rd Edition, 1998
4. Department of Environment (2007), *The Planning Guidelines for Environmental Noise Limits and Control*

Annex A

Certificates of Analysis

CERTIFICATE OF ANALYSIS

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Company : DHI Water & Environment Sdn. Bhd.
Report No. : E / A / 1710 / 058
Monitoring Date : 24th to 30th October 2017
Reported Date : 08th November 2017
Project Description : Environmental Air Monitoring
Sample Marking : Ambient Air Monitoring at Kuala Terengganu, Terengganu.

Analysis Data for Particulate Matter (PM₁₀).

Sampling Point	<u>Point A1</u>	<u>Point A2</u>	<u>Point A3</u>
Monitoring Date - Start	24/10/17	25/10/17	26/10/17
- Stop	25/10/17	26/10/17	27/10/17
Monitoring Time - Start	7:10 AM	7:25 AM	7:40 AM
- Stop	7:10 AM	7:25 AM	7:40 AM
Atmospheric Pressure (on-site), kPa	101.0	101.0	101.0
Ambient Temperature (on-site), Kelvin	305.0	304.0	305.0
Flowrate, m ³ /min	1.009	1.009	1.009
Volume of Air Sampled, m ³ corrected to S.T.P	1415.41	1420.07	1415.41
Filter Paper Final Weight, g	3.0039	3.0161	3.0067
Filter Paper Initial Weight, g	2.8921	2.9095	2.9018
Particulate Weight, g	0.1118	0.1066	0.1049
Particulate Matter (PM ₁₀) µg/m ³ corrected to S.T.P	79	75	74

Weather Condition: 24/10/17 : Morning : Fine & Sunny, Afternoon: Sunny,
Evening : Sunny & Fine, Night : Fine.
25/10/17 : Midnight : Fine, Morning : Fine & Sunny, Afternoon: Sunny,
Evening : Sunny & Fine, Night : Fine.
26/10/17 : 26/10/17 : Midnight : Fine, Morning : Fine & Sunny, Afternoon: Sunny
Evening : Fine & Sunny, Night : Fine.
27/10/17 : Midnight : Fine, Morning : Fine & Sunny.

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Reported Date : 08th November 2017
Project Description : Environmental Air Monitoring
Sample Marking : Ambient Air Monitoring at Kuala Terengganu, Terengganu.

Analysis Data for Particulate Matter (PM₁₀).

Sampling Point	<u>Point A4</u>	<u>Point A5</u>	<u>Point A6</u>
Monitoring Date - Start	27/10/17	28/10/17	29/10/17
- Stop	28/10/17	29/10/17	30/10/17
Monitoring Time - Start	7:50 AM	8:00 AM	8:15 AM
- Stop	7:50 AM	8:00 AM	8:15 AM
Atmospheric Pressure (on-site), kPa	101.0	101.0	101.0
Ambient Temperature (on-site), Kelvin	305.0	305.0	301.0
Flowrate, m ³ /min	1.009	1.009	1.009
Volume of Air Sampled, m ³ corrected to S.T.P	1415.41	1415.41	1434.22
Filter Paper Final Weight, g	2.9982	3.0097	3.0157
Filter Paper Initial Weight, g	2.8872	2.8977	2.9068
Particulate Weight, g	0.1110	0.1120	0.1089
Particulate Matter (PM ₁₀) µg/m ³ corrected to S.T.P	78	79	76

Weather Condition: 27/10/17 : Morning : Fine & Sunny, Afternoon : Fine & Cloudy,
Evening : Cloudy & Fine, Night : Fine.
28/10/17 : Midnight : Fine, Morning : Fine & Sunny, Afternoon: Sunny,
Evening : Sunny & Fine, Night : Fine.
29/10/17 : Midnight : Fine, Morning : Fine & Sunny, Afternoon: Sunny,
Evening : Sunny & Fine, Night : Fine.
30/10/17 : Midnight : Fine, Morning : Fine.

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Project Description : Environmental Air Monitoring
Sample Marking : Ambient Air Monitoring at Kuala Terengganu, Terengganu.

Analysis Data for Particulate Matter (PM_{2.5}).

Sampling Point	<u>Point A1</u>	<u>Point A2</u>	<u>Point A3</u>
Monitoring Date - Start	24/10/17	25/10/17	26/10/17
- Stop	25/10/17	26/10/17	27/10/17
Monitoring Time - Start	7:10 AM	7:25 AM	7:40 AM
- Stop	7:10 AM	7:25 AM	7:40 AM
Atmospheric Pressure (on-site), mmHg	757.6	757.6	757.6
Ambient Temperature (on-site), Kelvin	305.0	304.0	305.0
Flowrate, L/min	5.0	5.0	5.0
Volume of Air Sampled, m ³ corrected to S.T.P	7.0	7.0	7.0
Filter Paper Final Weight, mg	150.241	154.488	152.789
Filter Paper Initial Weight, mg	149.952	154.165	152.509
Particulate Weight, mg	0.2890	0.3230	0.2800
Particulate Matter (PM _{2.5}) µg/m ³ corrected to S.T.P	41	46	40

Weather Condition: 24/10/17 : Morning : Fine & Sunny, Afternoon: Sunny,
Evening : Sunny & Fine, Night : Fine.
25/10/17 : Midnight : Fine, Morning : Fine & Sunny, Afternoon: Sunny,
Evening : Sunny & Fine, Night : Fine.
26/10/17 : 26/10/17 : Midnight : Fine, Morning : Fine & Sunny, Afternoon: Sunny
Evening : Fine & Sunny, Night : Fine.
27/10/17 : Midnight : Fine, Morning : Fine & Sunny.

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Reported Date : 08th November 2017
Project Description : Environmental Air Monitoring
Sample Marking : Ambient Air Monitoring at Kuala Terengganu, Terengganu.

Analysis Data for Particulate Matter (PM_{2.5}).

Sampling Point	<u>Point A4</u>	<u>Point A5</u>	<u>Point A6</u>
Monitoring Date - Start	27/10/17	28/10/17	29/10/17
- Stop	28/10/17	29/10/17	30/10/17
Monitoring Time - Start	7:50 AM	8:00 AM	8:15 AM
- Stop	7:50 AM	8:00 AM	8:15 AM
Atmospheric Pressure (on-site), mmHg	757.6	757.6	757.6
Ambient Temperature (on-site), Kelvin	305.0	305.0	301.0
Flowrate, L/min	5.0	5.0	5.0
Volume of Air Sampled, m ³ corrected to S.T.P	7.0	7.0	7.1
Filter Paper Final Weight, mg	156.237	155.681	154.173
Filter Paper Initial Weight, mg	155.937	155.387	153.870
Particulate Weight, mg	0.300	0.294	0.303
Particulate Matter (PM _{2.5}) µg/m ³ corrected to S.T.P	43	42	43

Weather Condition: 27/10/17 : Morning : Fine & Sunny, Afternoon : Fine & Cloudy,
Evening : Cloudy & Fine, Night : Fine.
28/10/17 : Midnight : Fine, Morning : Fine & Sunny, Afternoon: Sunny,
Evening : Sunny & Fine, Night : Fine.
29/10/17 : Midnight : Fine, Morning : Fine & Sunny, Afternoon: Sunny,
Evening : Sunny & Fine, Night : Fine.
30/10/17 : Midnight : Fine, Morning : Fine.

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Monitoring Date : 24th to 30th October 2017
Reported Date : 08th November 2017
Project Description : Environmental Air Monitoring
Sample Marking : Ambient Air Monitoring at Kuala Terengganu, Terengganu.

Analysis Data For Nitrogen Dioxide, NO₂.

Sampling Point	<u>Point A1</u>	<u>Point A2</u>	<u>Point A3</u>
Monitoring Date	24/10/17	25/10/17	26/10/17
Monitoring Time - Start	7:10 AM	7:25 AM	7:40 AM
- Stop	8:10 AM	8:25 AM	8:40 AM
Sampling Duration (min)	60	60	60
Flow Rate, L/min	0.20	0.20	0.20
Volume of Air Sampled (m ³)	0.012	0.012	0.012
Concentration of Nitrogen Dioxide (ppm)	ND < 0.001	ND < 0.001	ND < 0.001
Concentration of Nitrogen Dioxide (µg/m ³)	ND < 1.882	ND < 1.882	ND < 1.882

Sampling Point	<u>Point A4</u>	<u>Point A5</u>	<u>Point A6</u>
Monitoring Date	27/10/17	28/10/17	29/10/17
Monitoring Time - Start	7:50 AM	8:00 AM	8:15 AM
- Stop	8:50 AM	9:00 AM	9:15 AM
Sampling Duration (min)	60	60	60
Flow Rate, L/min	0.20	0.20	0.20
Volume of Air Sampled (m ³)	0.012	0.012	0.012
Concentration of Nitrogen Dioxide (ppm)	ND < 0.001	ND < 0.001	ND < 0.001
Concentration of Nitrogen Dioxide (µg/m ³)	ND < 1.882	ND < 1.882	ND < 1.882

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Reported Date : 08th November 2017
Project Description : Environmental Air Monitoring
Sample Marking : Ambient Air Monitoring at Kuala Terengganu, Terengganu.

Analysis Data For Sulphur Dioxide, SO₂.

Sampling Point	<u>Point A1</u>	<u>Point A2</u>	<u>Point A3</u>
Monitoring Date	24/10/17	25/10/17	26/10/17
Monitoring Time - Start	7:10 AM	7:25 AM	7:40 AM
- Stop	8:10 AM	8:25 AM	8:40 AM
Sampling Duration (min)	60	60	60
Flow Rate, L/min	2.00	2.00	2.00
Volume of Air Sampled (m ³)	0.12	0.12	0.12
Concentration of Sulphur Dioxide (ppm)	ND < 0.001	ND < 0.001	ND < 0.001
Concentration of Sulphur Dioxide (µg/m ³)	ND < 2.619	ND < 2.619	ND < 2.619

Sampling Point	<u>Point A4</u>	<u>Point A5</u>	<u>Point A6</u>
Monitoring Date	27/10/17	28/10/17	29/10/17
Monitoring Time - Start	7:50 AM	8:00 AM	8:15 AM
- Stop	8:50 AM	9:00 AM	9:15 AM
Sampling Duration (min)	60	60	60
Flow Rate, L/min	2.00	2.00	2.00
Volume of Air Sampled (m ³)	0.12	0.12	0.12
Concentration of Sulphur Dioxide (ppm)	ND < 0.001	ND < 0.001	ND < 0.001
Concentration of Sulphur Dioxide (µg/m ³)	ND < 2.619	ND < 2.619	ND < 2.619

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Monitoring Date : 24th to 30th October 2017
Reported Date : 08th November 2017
Project Description : Environmental Air Monitoring
Sample Marking : Ambient Air Monitoring at Kuala Terengganu, Terengganu.

Analysis Data For Carbon Monoxide, CO.

Sampling Point	<u>Point A1</u>	<u>Point A2</u>	<u>Point A3</u>
Monitoring Date	24/10/17	25/10/17	26/10/17
Monitoring Time - Start	7:10 AM	7:25 AM	7:40 AM
- Stop	8:10 AM	8:25 AM	8:40 AM
Sampling Duration (min)	60	60	60
Concentration of Carbon Monoxide (ppm)	ND < 2.5	ND < 2.5	ND < 2.5
Concentration of Carbon Monoxide (mg/m ³)	ND < 2.86	ND < 2.86	ND < 2.86

Sampling Point	<u>Point A4</u>	<u>Point A5</u>	<u>Point A6</u>
Monitoring Date	27/10/17	28/10/17	29/10/17
Monitoring Time - Start	7:50 AM	8:00 AM	8:15 AM
- Stop	8:50 AM	9:00 AM	9:15 AM
Sampling Duration (min)	60	60	60
Concentration of Carbon Monoxide (ppm)	ND < 2.5	ND < 2.5	ND < 2.5
Concentration of Carbon Monoxide (mg/m ³)	ND < 2.86	ND < 2.86	ND < 2.86

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Monitoring Date	: 24 th to 30 th October 2017
Reported Date	: 08 th November 2017
Project Description	: Environmental Noise Monitoring
Sample Marking	: Noise Monitoring at Kuala Terengganu, Terengganu.

	<u>Point N1 (Day)</u>	<u>Point N1 (Evening)</u>	<u>Point N1 (Night)</u>
Monitoring Date - Start	24/10/17	24/10/17	24/10/17
- Stop	24/10/17	24/10/17	25/10/17
L eq, dB(A)	53.8	50.3	57.9
L max, dB(A)	70.4	57.4	64.3
L min, dB(A)	47.1	45.4	46.3
L 10, dB(A)	55.4	52.0	60.7
L 50, dB(A)	52.5	49.8	57.4
L 90, dB(A)	50.2	47.6	50.8

	<u>Point N2 (Day)</u>	<u>Point N2 (Evening)</u>	<u>Point N2 (Night)</u>
Monitoring Date - Start	25/10/17	25/10/17	25/10/17
- Stop	25/10/17	25/10/17	26/10/17
L eq, dB(A)	57.8	54.2	57.8
L max, dB(A)	65.0	61.0	65.3
L min, dB(A)	50.2	48.7	49.2
L 10, dB(A)	59.7	56.4	60.1
L 50, dB(A)	57.4	53.5	57.4
L 90, dB(A)	54.6	50.6	53.8

NOTE : The above noise monitoring were carried out using ACE 6270+ Sound Level Meter complete with microphone and tripod.

Attn : Ms. Vicki Chew
DHI Water & Environment Sdn. Bhd.
3A01 & 02, Block G,
Pusat Perdagangan Phileo Damansara 1,
No. 9, Jalan 16/11. Off Jalan Damansara,
36350, Petaling Jaya, Selangor Darul Ehsan, Malaysia.



Ms. C. Y. Ng, B. Sc., AMIC
IKM No: M / 2132 / 4619 / 04
Senior Chemist

CERTIFICATE OF ANALYSIS

Page 2 of 3

Company : DHI Water & Environment Sdn. Bhd.
Report No. : E / N / 1710 / 058
Monitoring Date : 24th to 30th October 2017
Reported Date : 08th November 2017
Project Description : Environmental Noise Monitoring
Sample Marking : Noise Monitoring at Kuala Terengganu, Terengganu.

	<u>Point N3 (Day)</u>	<u>Point N3 (Evening)</u>	<u>Point N3 (Night)</u>
Monitoring Date - Start	26/10/17	26/10/17	26/10/17
- Stop	26/10/17	26/10/17	27/10/17
L eq, dB(A)	56.7	54.9	52.6
L max, dB(A)	62.5	59.2	57.7
L min, dB(A)	48.7	47.9	47.3
L 10, dB(A)	58.9	57.0	53.9
L 50, dB(A)	56.2	54.6	52.6
L 90, dB(A)	53.6	51.1	50.3

	<u>Point N4 (Day)</u>	<u>Point N4 (Evening)</u>	<u>Point N4 (Night)</u>
Monitoring Date - Start	27/10/17	27/10/17	27/10/17
- Stop	27/10/17	27/10/17	28/10/17
L eq, dB(A)	58.4	58.9	59.0
L max, dB(A)	69.2	68.3	65.0
L min, dB(A)	49.9	51.3	49.2
L 10, dB(A)	60.3	62.3	61.4
L 50, dB(A)	57.7	56.6	58.3
L 90, dB(A)	54.7	53.0	55.5

NOTE : The above noise monitoring were carried out using ACE 6270+ Sound Level Meter complete with microphone and tripod.

Attn : Ms. Vicki Chew
DHI Water & Environment Sdn. Bhd.
3A01 & 02, Block G,
Pusat Perdagangan Phileo Damansara 1,
No. 9, Jalan 16/11. Off Jalan Damansara,
36350, Petaling Jaya, Selangor Darul Ehsan, Malaysia.


Ms. C. Y. Ng, B. Sc., AMIC
IKM No: M / 2132 / 4619 / 04
Senior Chemist

CERTIFICATE OF ANALYSIS

Page 3 of 3

Company : DHI Water & Environment Sdn. Bhd.
Report No. : E / N / 1710 / 058
Monitoring Date : 24th to 30th October 2017
Reported Date : 08th November 2017
Project Description : Environmental Noise Monitoring
Sample Marking : Noise Monitoring at Kuala Terengganu, Terengganu.

	<u>Point N5 (Day)</u>	<u>Point N5 (Evening)</u>	<u>Point N5 (Night)</u>
Monitoring Date - Start	28/10/17	28/10/17	28/10/17
- Stop	28/10/17	28/10/17	29/10/17
L eq, dB(A)	59.2	56.8	54.9
L max, dB(A)	70.3	66.2	73.1
L min, dB(A)	53.5	52.4	42.2
L 10, dB(A)	61.3	58.1	52.6
L 50, dB(A)	58.5	55.4	49.5
L 90, dB(A)	55.6	53.2	46.8

	<u>Point N6 (Day)</u>	<u>Point N6 (Evening)</u>	<u>Point N6 (Night)</u>
Monitoring Date - Start	29/10/17	29/10/17	29/10/17
- Stop	29/10/17	29/10/17	30/10/17
L eq, dB(A)	52.6	50.8	53.3
L max, dB(A)	69.8	55.9	67.9
L min, dB(A)	27.6	44.1	29.9
L 10, dB(A)	54.7	52.7	55.6
L 50, dB(A)	49.0	50.4	52.8
L 90, dB(A)	39.6	47.2	43.4

NOTE : The above noise monitoring were carried out using ACE 6270+ Sound Level Meter complete with microphone and tripod.

Attn : Ms. Vicki Chew
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3A01 & 02, Block G,
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36350, Petaling Jaya, Selangor Darul Ehsan, Malaysia.



Ms. C. Y. Ng, B.Sc., AMIC
IKM No: M / 2132 / 4619 / 04
Senior Chemist

Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N1 DAY)

Device Model: ACE 6270+

Device Serial Number: 061075

Project Duration: From 24 October 2017 07:15:17 To 24 October 2017 18:59:30

Total Runtime: 0 Day-11h44m13s

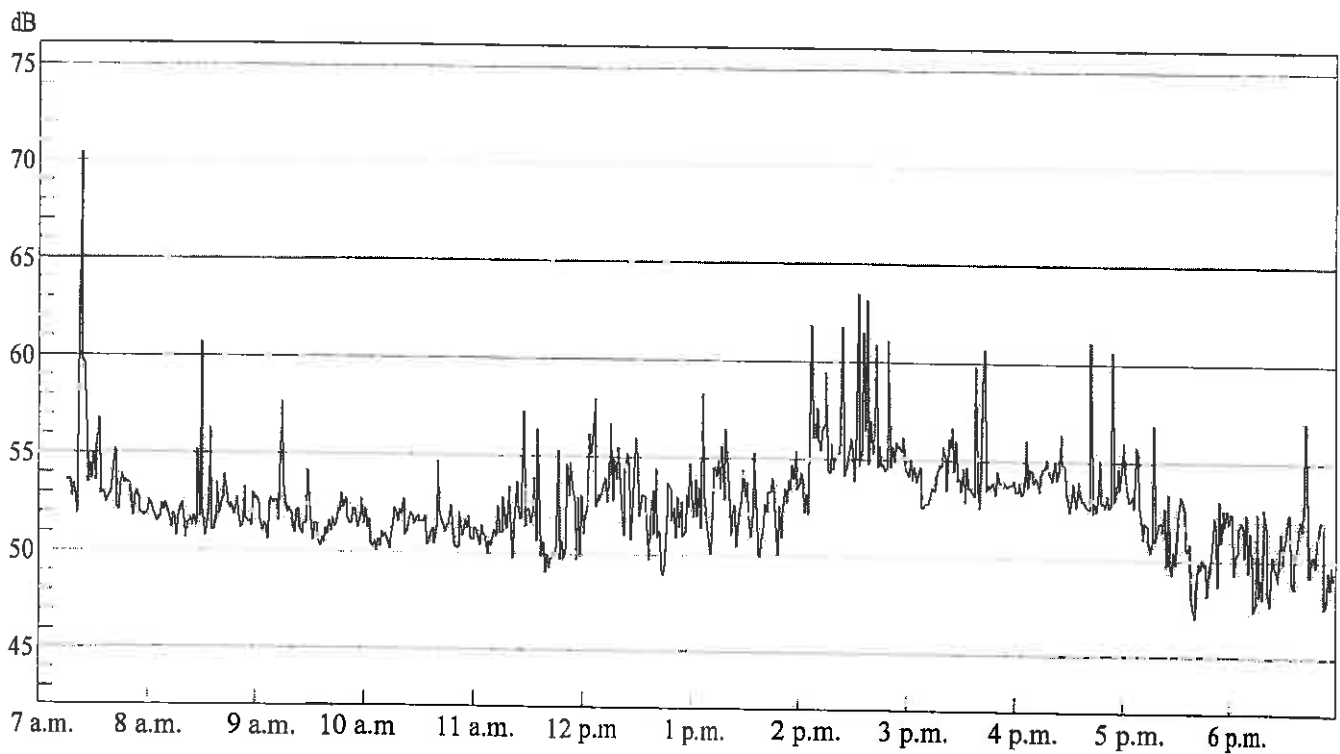
Leq of Total Runtime: 53.8 dB

Data Summary

Max Level: 70.4 dB at 07:22:17

Min Level: 47.1 dB at 17:40:30

L5: 56.4 L10: 55.4 L50: 52.5 L90: 50.2 L95: 49.7 L99: 48.1



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N1 EVENING)

Device Model: ACE 6270+ Device Serial Number: 061075

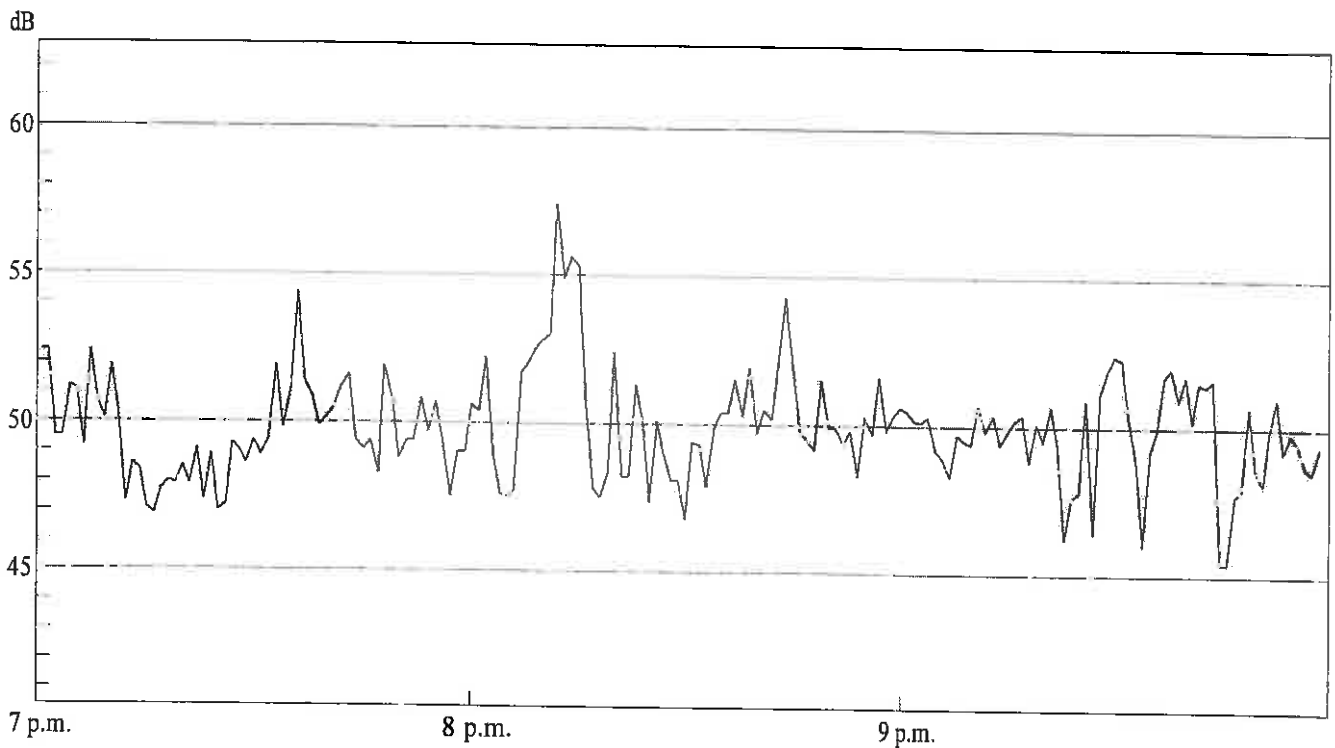
Project Duration: From 24 October 2017 19:00:33 To 24 October 2017 21:59:36

Total Runtime: 0 Day-02h59m03s Leq of Total Runtime: 50.3 dB

Data Summary

Max Level: 57.4 dB at 20:11:33 Min Level: 45.4 dB at 21:44:36

L5: 52.5 L10: 52.0 L50: 49.8 L90: 47.6 L95: 47.1 L99: 45.4



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N1 NIGHT)

Device Model: ACE 6270+

Device Serial Number: 061075

Project Duration: From 24 October 2017 22:00:39 To 25 October 2017 07:03:50

Total Runtime: 0 Day-09h03m11s

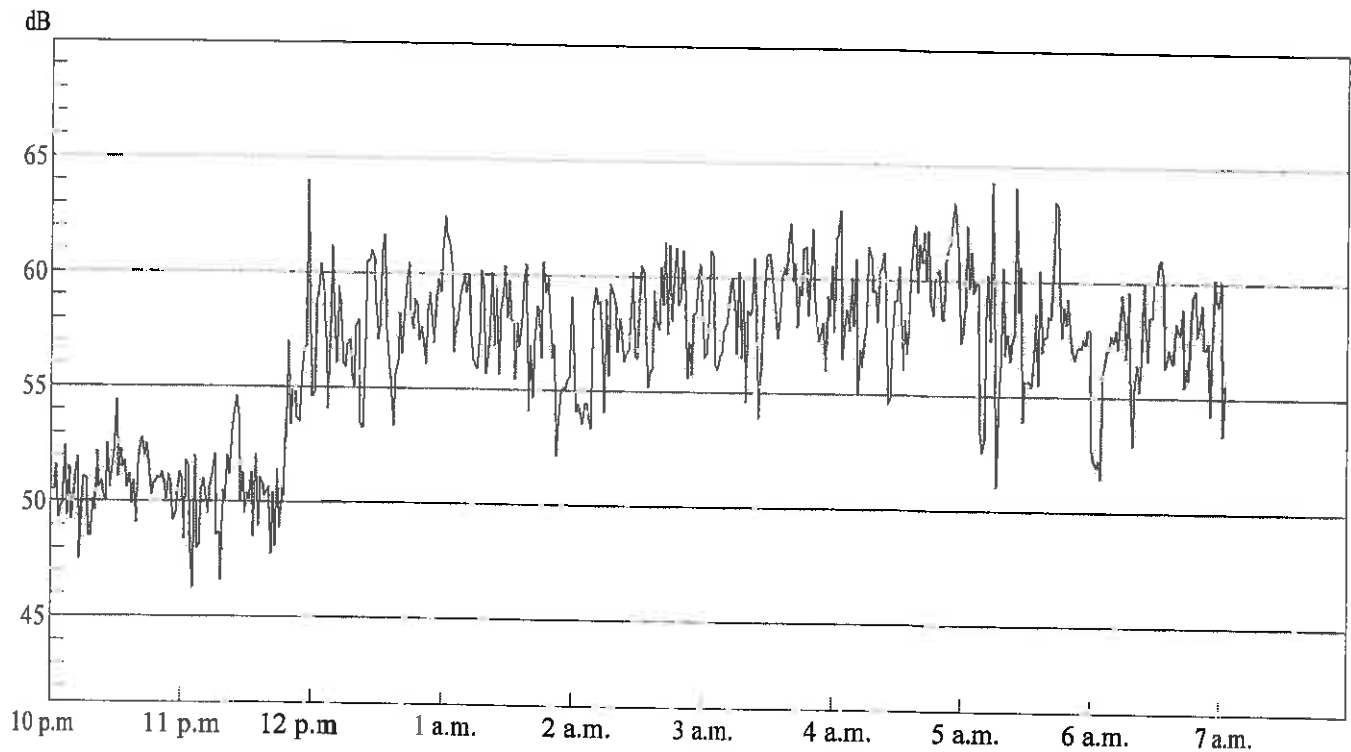
Leq of Total Runtime: 57.9 dB

Data Summary

Max Level: 64.3 dB at 05:14:47

Min Level: 46.3 dB at 23:04:39

L5: 61.4 L10: 60.7 L50: 57.4 L90: 50.8 L95: 49.9 L99: 48.1



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N2 DAY)

Device Model: ACE 6270+

Device Serial Number: 061075

Project Duration: From 25 October 2017 07:30:38 To 25 October 2017 18:59:51

Total Runtime: 0 Day-11h29m13s

Leq of Total Runtime: 57.8 dB

Data Summary

Max Level: 65.0 dB at 09:02:38

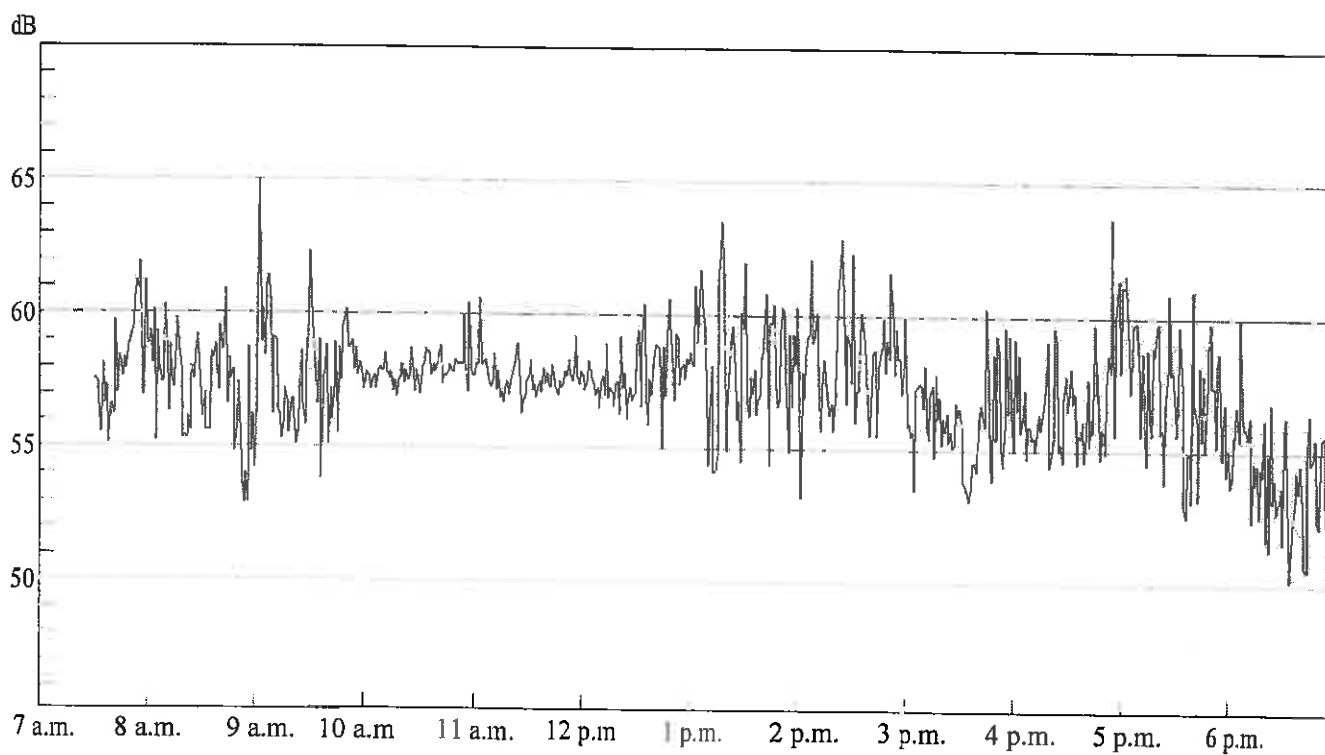
Min Level: 50.2 dB at 18:35:51

L5: 60.6 L10: 59.7 L50: 57.4

L90: 54.6

L95: 53.5

L99: 51.5



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N2 EVENING)

Device Model: ACE 6270+ Device Serial Number: 061075

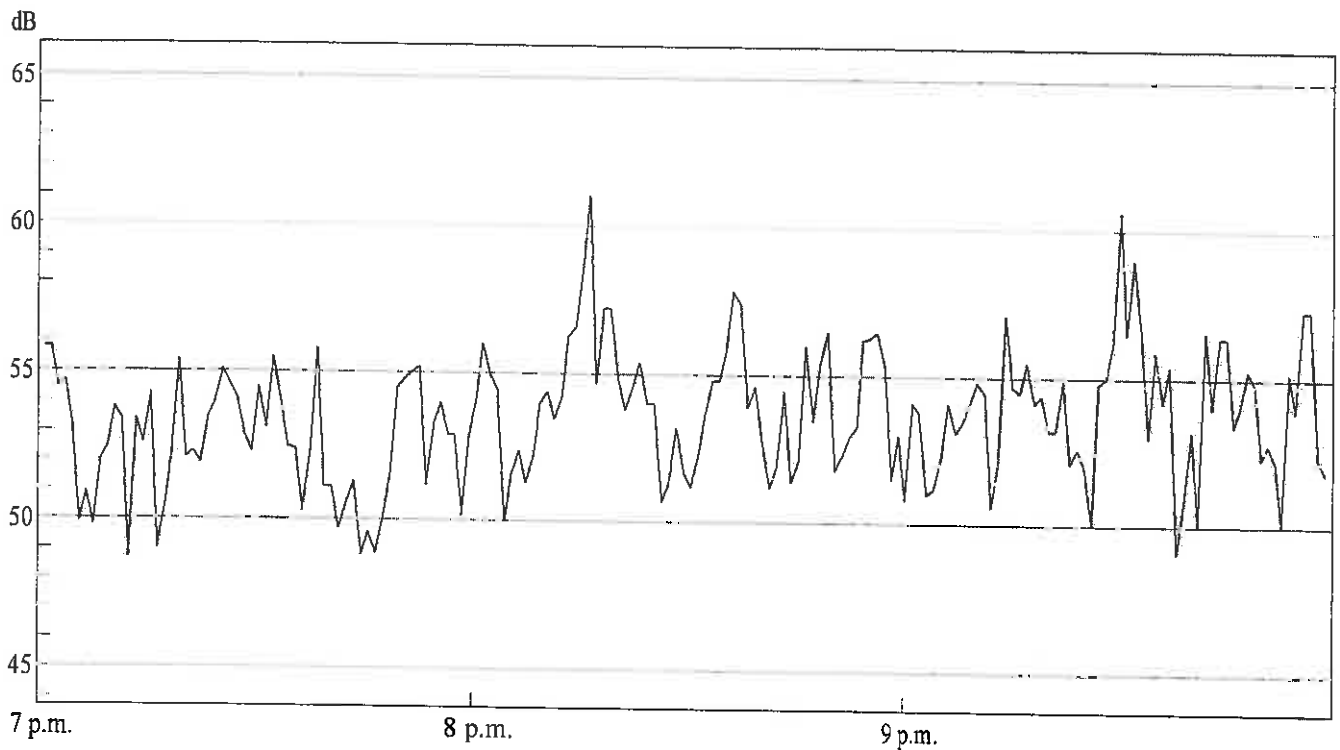
Project Duration: From 25 October 2017 19:00:54 To 25 October 2017 21:59:57

Total Runtime: 0 Day-02h59m03s Leq of Total Runtime: 54.2 dB

Data Summary

Max Level: 61.0 dB at 20:15:54 Min Level: 48.7 dB at 19:11:54

L5: 57.2 L10: 56.4 L50: 53.5 L90: 50.6 L95: 49.9 L99: 48.8



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N2 NIGHT)

Device Model: ACE 6270+ Device Serial Number: 061075

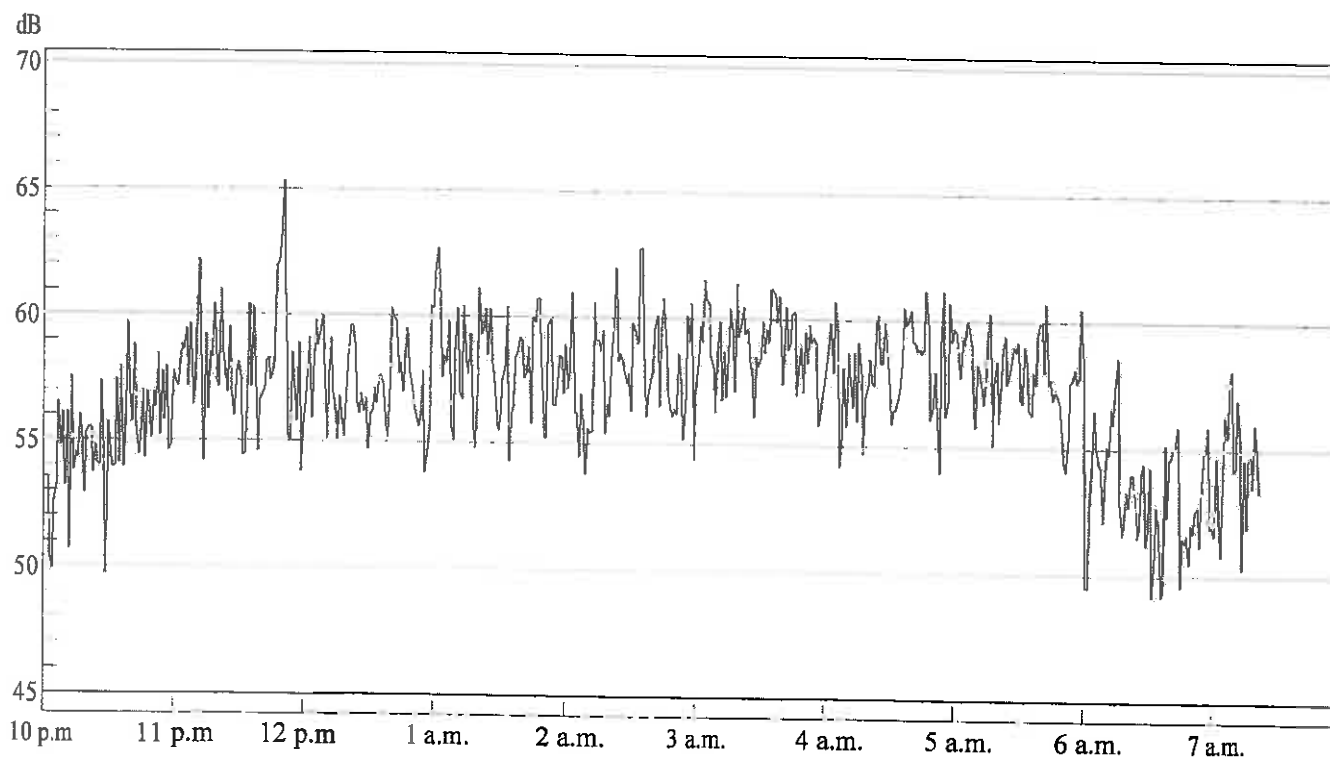
Project Duration: From 25 October 2017 22:00:59 To 26 October 2017 07:23:08

Total Runtime: 0 Day-09h22m09s Leq of Total Runtime: 57.8 dB

Data Summary

Max Level: 65.3 dB at 23:49:59 Min Level: 49.2 dB at 06:32:08

L5: 60.7 L10: 60.1 L50: 57.4 L90: 53.8 L95: 52.0 L99: 49.6



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N3 DAY)

Device Model: ACE 6270+ Device Serial Number: 061075

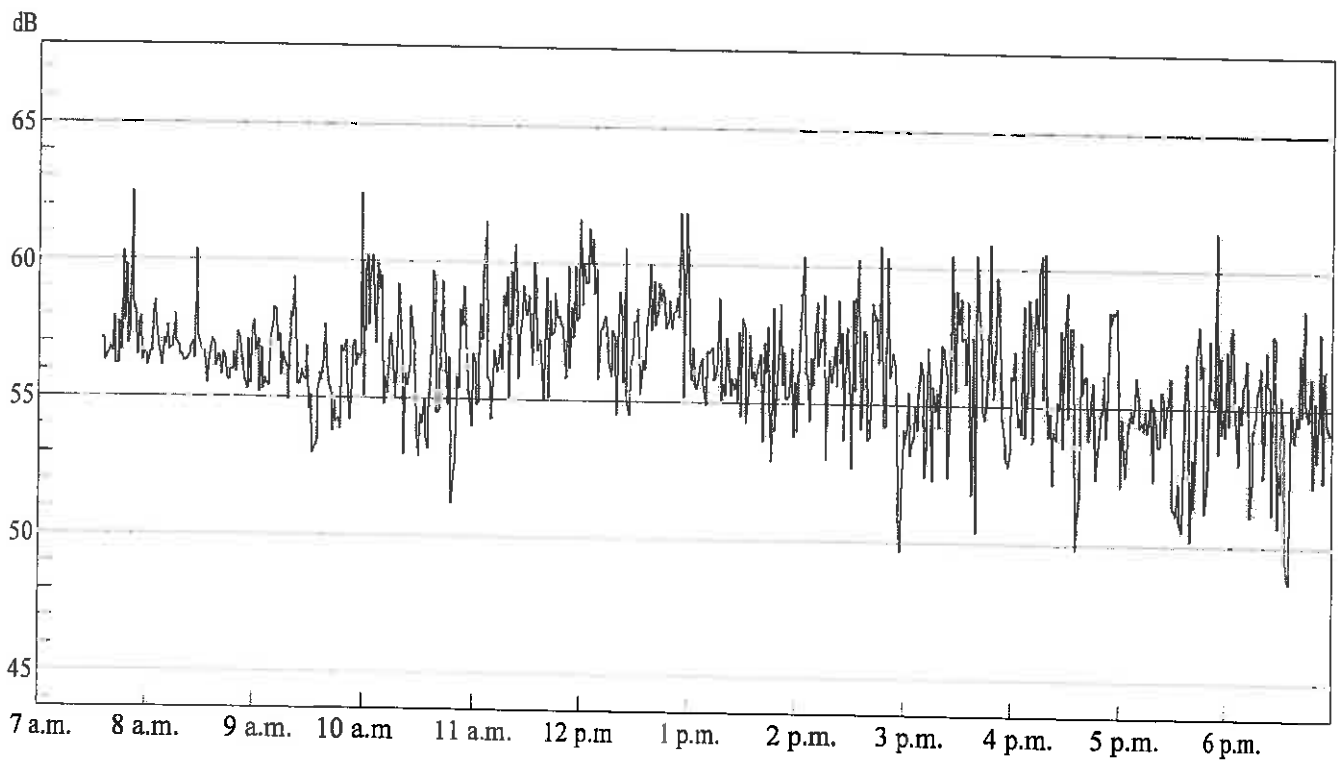
Project Duration: From 26 October 2017 07:35:34 To 26 October 2017 18:59:48

Total Runtime: 0 Day-11h24m14s Leq of Total Runtime: 56.7 dB

Data Summary

Max Level: 62.5 dB at 07:51:34 Min Level: 48.7 dB at 18:35:48

L5: 59.8 L10: 58.9 L50: 56.2 L90: 53.6 L95: 52.4 L99: 50.4



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N3 EVENING)

Device Model: ACE 6270+ Device Serial Number: 061075

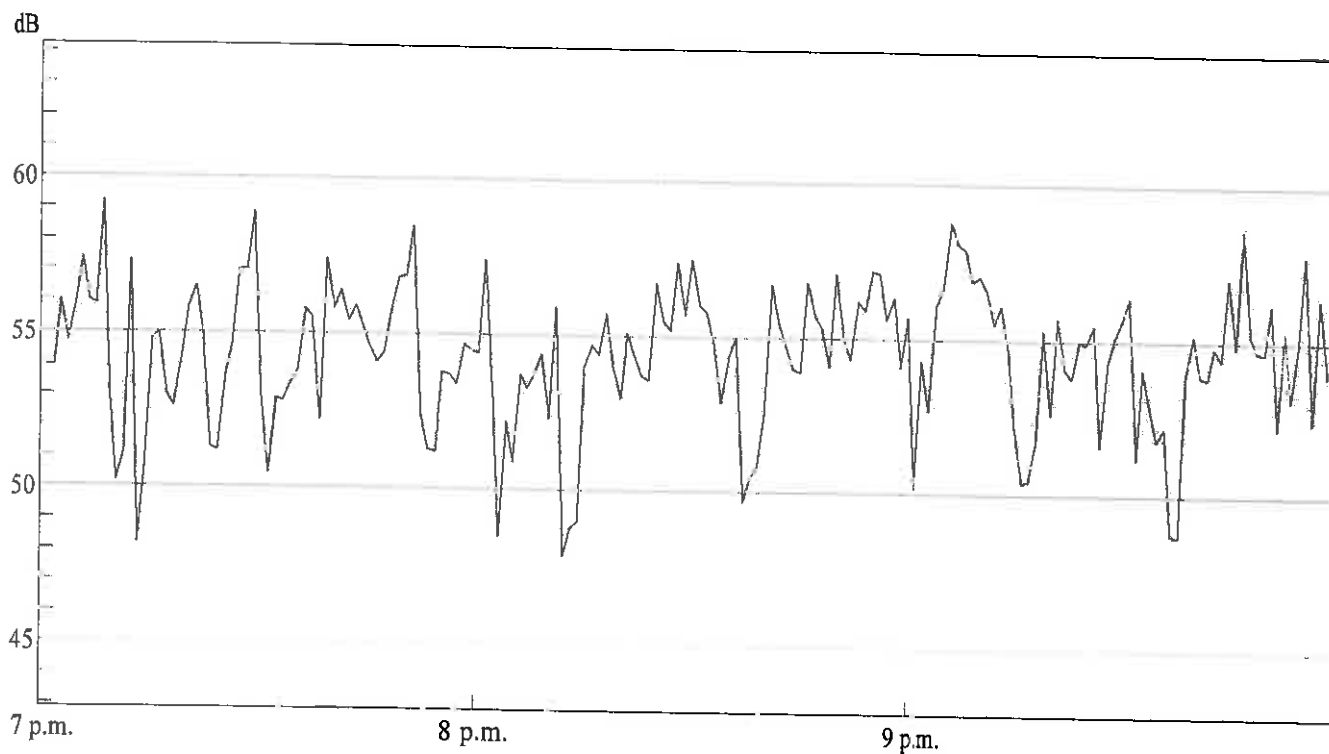
Project Duration: From 26 October 2017 19:00:51 To 26 October 2017 21:59:51

Total Runtime: 0 Day-02h59m00s Leq of Total Runtime: 54.9 dB

Data Summary

Max Level: 59.2 dB at 19:07:51 Min Level: 47.9 dB at 20:11:51

L5: 57.5 L10: 57.0 L50: 54.6 L90: 51.1 L95: 50.2 L99: 48.2



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N3 NIGHT)

Device Model: ACE 6270+ Device Serial Number: 061075

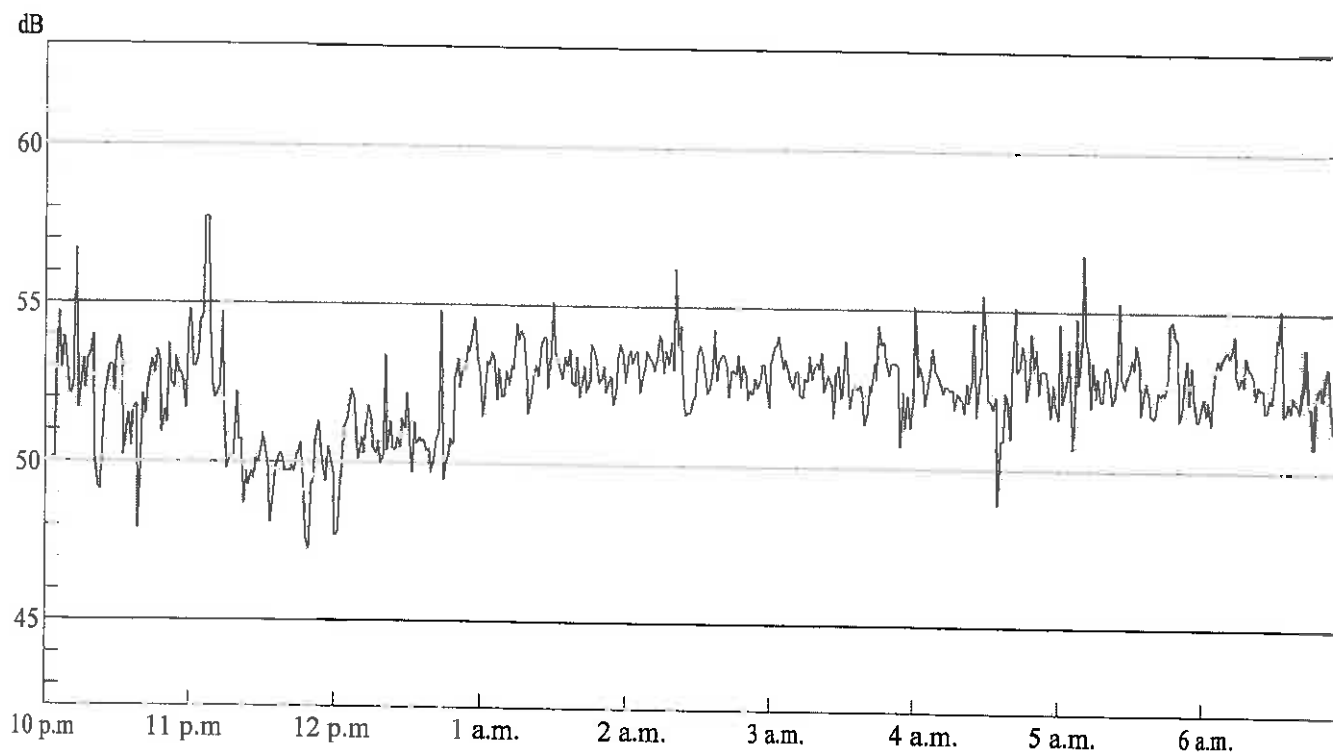
Project Duration: From 26 October 2017 22:02:39 To 27 October 2017 06:57:50

Total Runtime: 0 Day-08h55m11s Leq of Total Runtime: 52.6 dB

Data Summary

Max Level: 57.7 dB at 23:05:39 Min Level: 47.3 dB at 23:48:39

L5: 54.4 L10: 53.9 L50: 52.6 L90: 50.3 L95: 49.7 L99: 48.1



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N4 DAY)

Device Model: ACE 6270+

Device Serial Number: 061075

Project Duration: From 27 October 2017 07:35:45 To 27 October 2017 18:59:58

Total Runtime: 0 Day-11h24m13s

Leq of Total Runtime: 58.4 dB

Data Summary

Max Level: 69.2 dB at 10:06:47

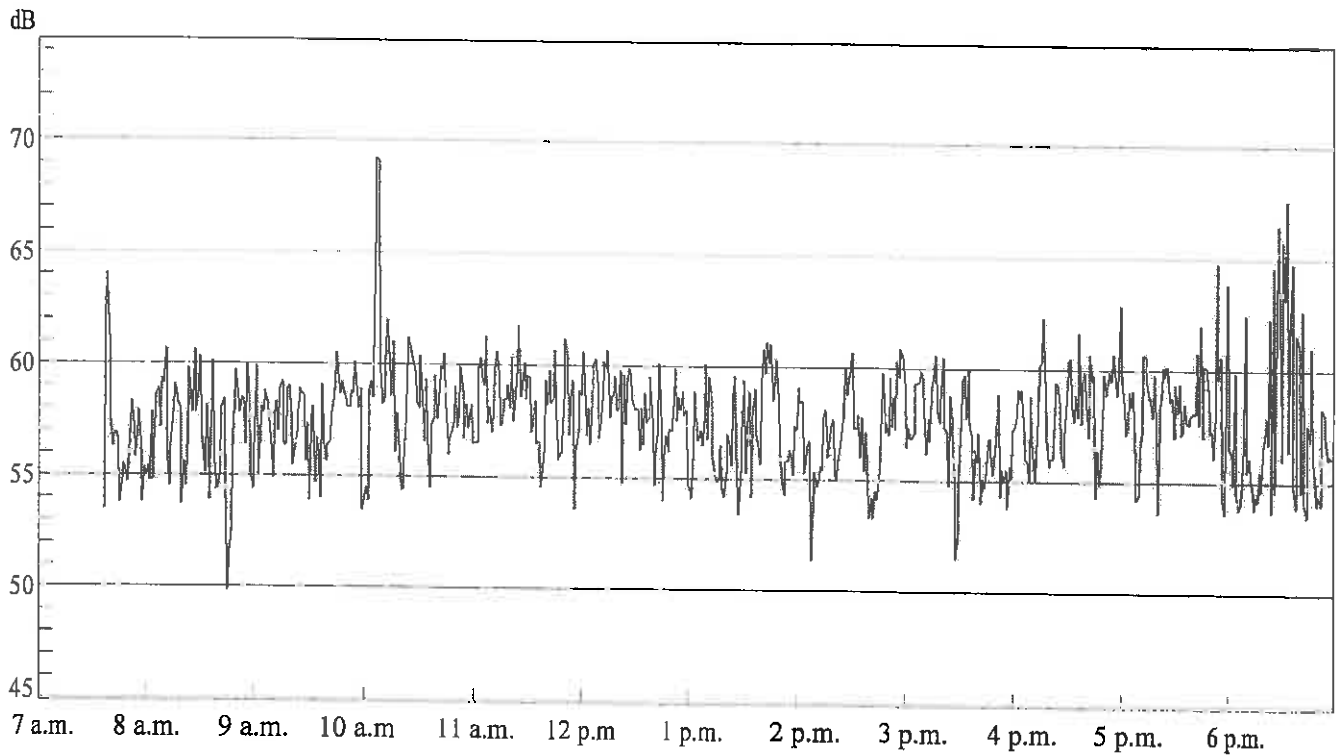
Min Level: 49.9 dB at 08:44:45

L5: 61.0 L10: 60.3 L50: 57.7

L90: 54.7

L95: 54.1

L99: 53.3



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N4 EVENING)

Device Model: ACE 6270+ Device Serial Number: 061075

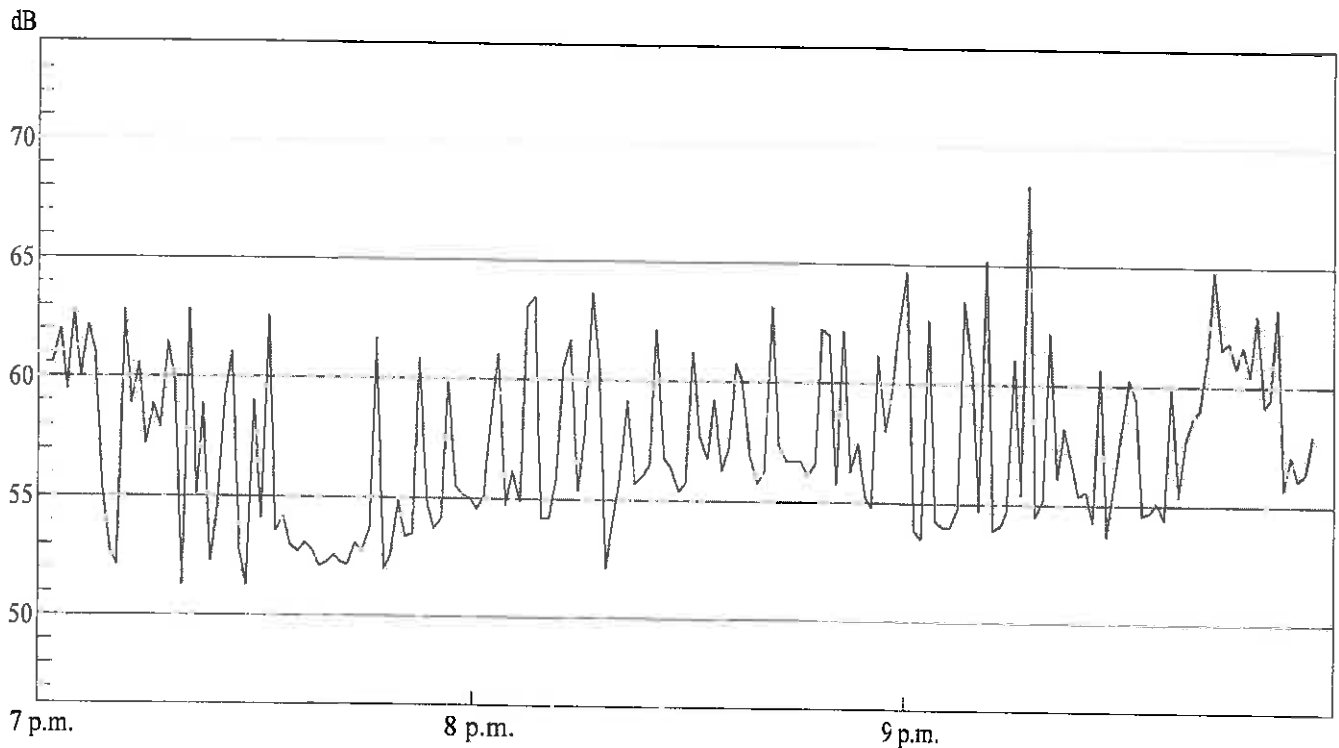
Project Duration: From 27 October 2017 19:01:01 To 27 October 2017 21:58:04

Total Runtime: 0 Day-02h57m03s Leq of Total Runtime: 58.9 dB

Data Summary

Max Level: 68.3 dB at 21:17:04 Min Level: 51.3 dB at 19:19:01

L5: 63.2 L10: 62.3 L50: 56.6 L90: 53.0 L95: 52.3 L99: 51.3



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N4 NIGHT)

Device Model: ACE 6270+ Device Serial Number: 061075

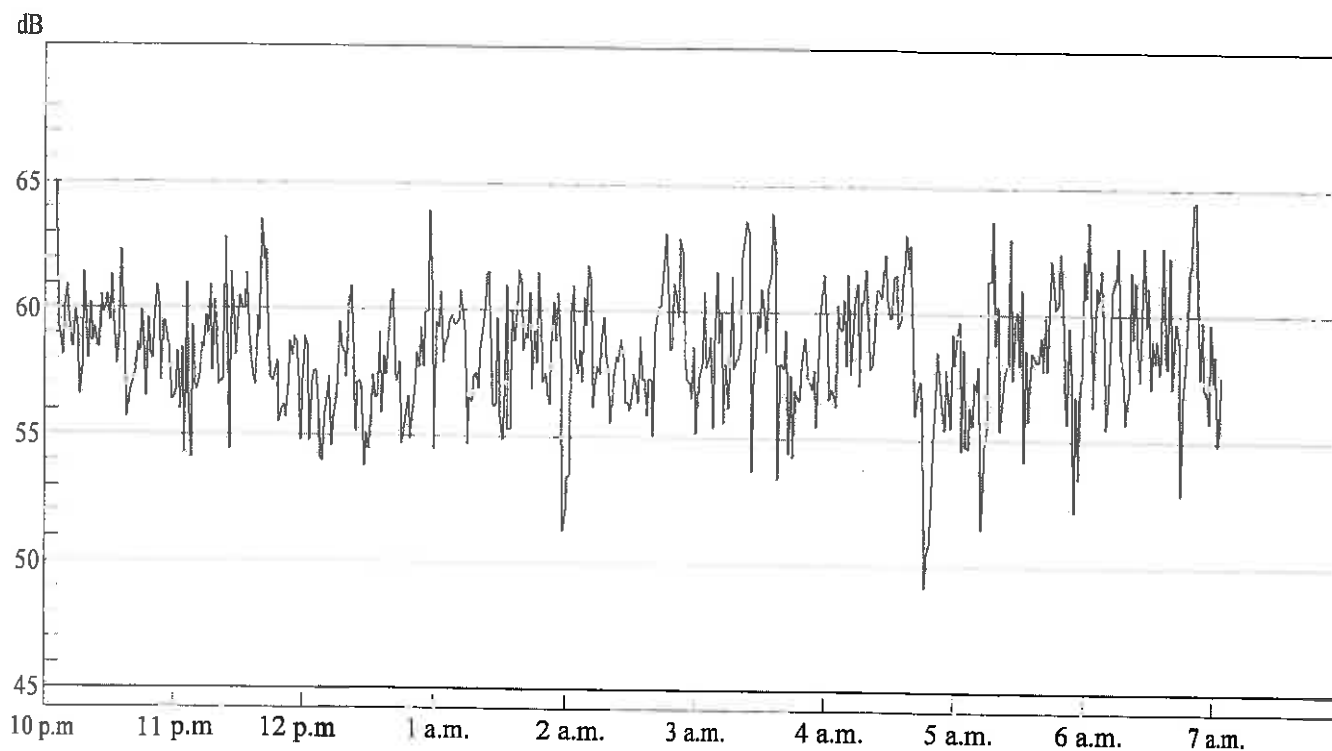
Project Duration: From 27 October 2017 22:04:19 To 28 October 2017 07:05:30

Total Runtime: 0 Day-09h01m11s Leq of Total Runtime: 59.0 dB

Data Summary

Max Level: 65.0 dB at 22:04:19 Min Level: 49.2 dB at 04:46:27

L5: 62.2 L10: 61.4 L50: 58.3 L90: 55.5 L95: 54.6 L99: 52.1



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N5 DAY)

Device Model: ACE 6270+

Device Serial Number: 061075

Project Duration: From 28 October 2017 07:30:28 To 28 October 2017 18:59:42

Total Runtime: 0 Day-11h29m14s

Leq of Total Runtime: 59.2 dB

Data Summary

Max Level: 70.3 dB at 11:56:33

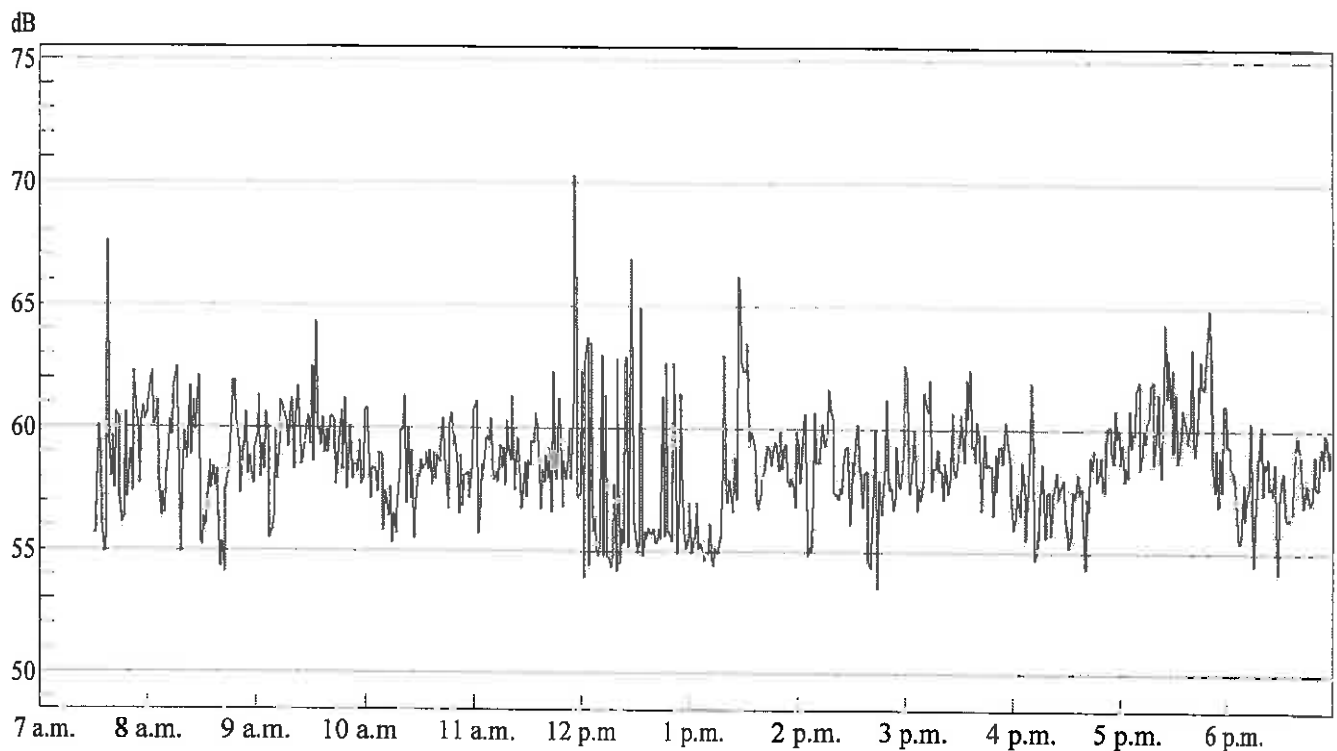
Min Level: 53.5 dB at 14:44:36

L5: 62.4 L10: 61.3 L50: 58.5

L90: 55.6

L95: 55.0

L99: 54.3



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N5 EVENING)

Device Model: ACE 6270+ Device Serial Number: 061075

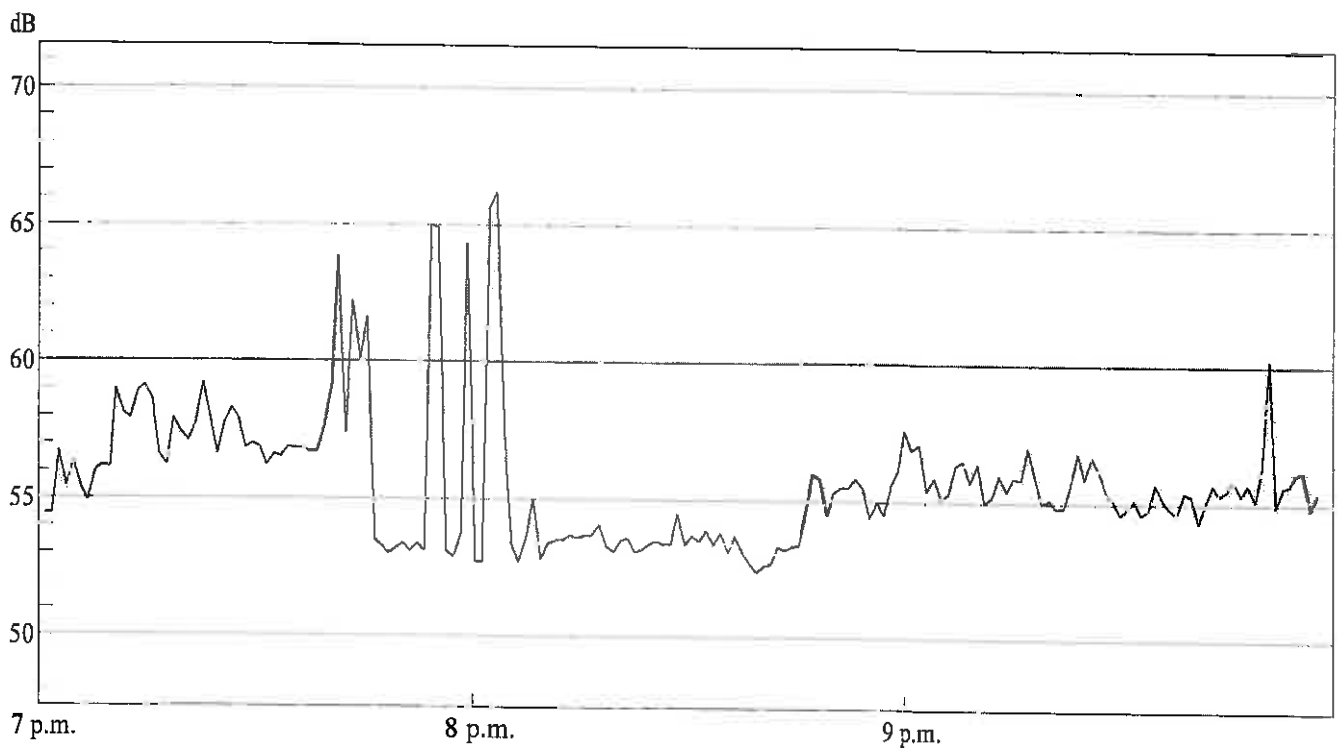
Project Duration: From 28 October 2017 19:00:45 To 28 October 2017 21:58:47

Total Runtime: 0 Day-02h58m02s Leq of Total Runtime: 56.8 dB

Data Summary

Max Level: 66.2 dB at 20:02:45 Min Level: 52.4 dB at 20:38:45

L5: 60.2 L10: 58.1 L50: 55.4 L90: 53.2 L95: 52.9 L99: 52.6



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N5 NIGHT)

Device Model: ACE 6270+ Device Serial Number: 061075

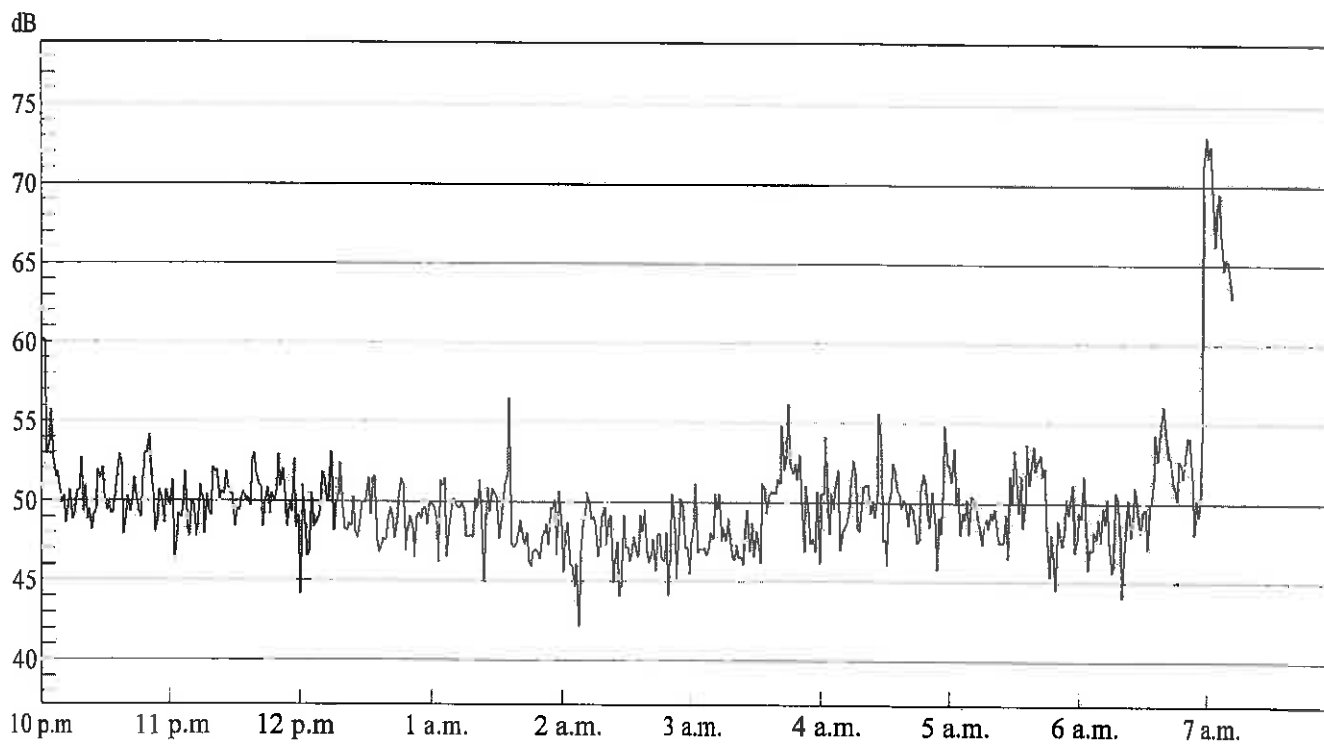
Project Duration: From 28 October 2017 22:00:33 To 29 October 2017 07:13:43

Total Runtime: 0 Day-09h13m10s Leq of Total Runtime: 54.9 dB

Data Summary

Max Level: 73.1 dB at 07:00:43 Min Level: 42.2 dB at 02:07:38

L5: 54.1 L10: 52.6 L50: 49.5 L90: 46.8 L95: 46.2 L99: 44.6



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N6 DAY)

Device Model: ACE 6270+

Device Serial Number: 061075

Project Duration: From 29 October 2017 07:39:15 To 29 October 2017 18:59:29

Total Runtime: 0 Day-11h20m14s

Leq of Total Runtime: 52.6 dB

Data Summary

Max Level: 69.8 dB at 08:04:15

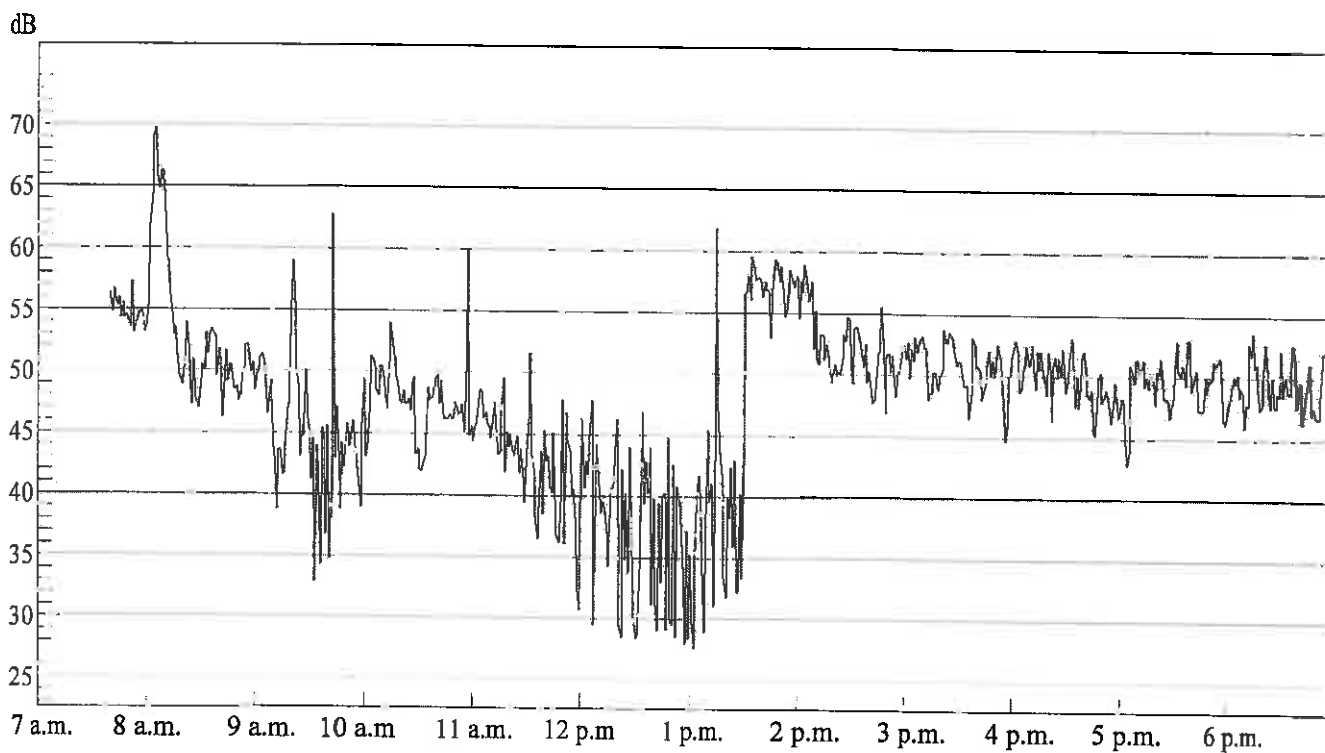
Min Level: 27.6 dB at 13:02:20

L5: 57.5 L10: 54.7 L50: 49.0

L90: 39.6

L95: 34.8

L99: 28.7



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N6 EVENING)

Device Model: ACE 6270+ Device Serial Number: 061075

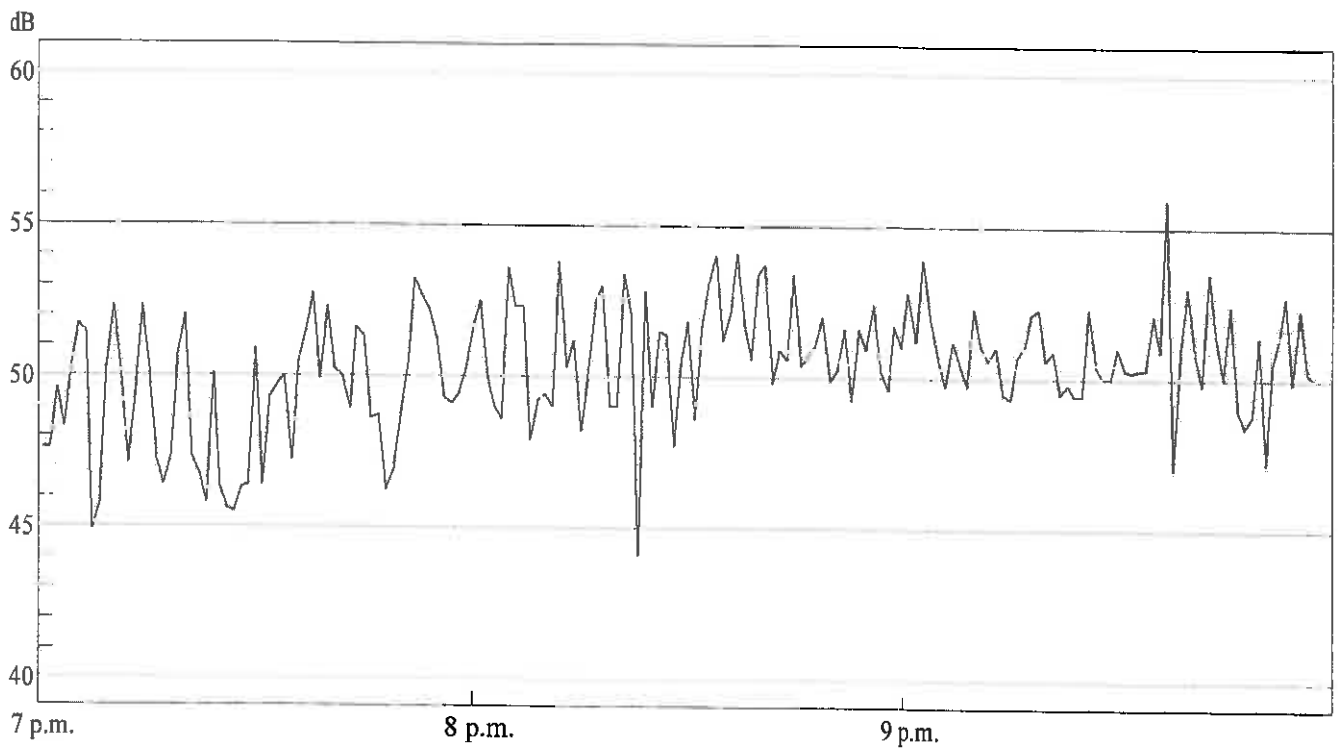
Project Duration: From 29 October 2017 19:00:32 To 29 October 2017 21:58:35

Total Runtime: 0 Day-02h58m03s Leq of Total Runtime: 50.8 dB

Data Summary

Max Level: 55.9 dB at 21:36:35 Min Level: 44.1 dB at 20:22:32

L5: 53.4 L10: 52.7 L50: 50.4 L90: 47.2 L95: 46.3 L99: 44.9



Company Name: DHI WATER ENVIRONMENT SDN. BHD.

Project Name: ENVIRONMENTAL NOISE MONITORING - KUALA TERENGGANU (N6 NIGHT)

Device Model: ACE 6270+ Device Serial Number: 061075

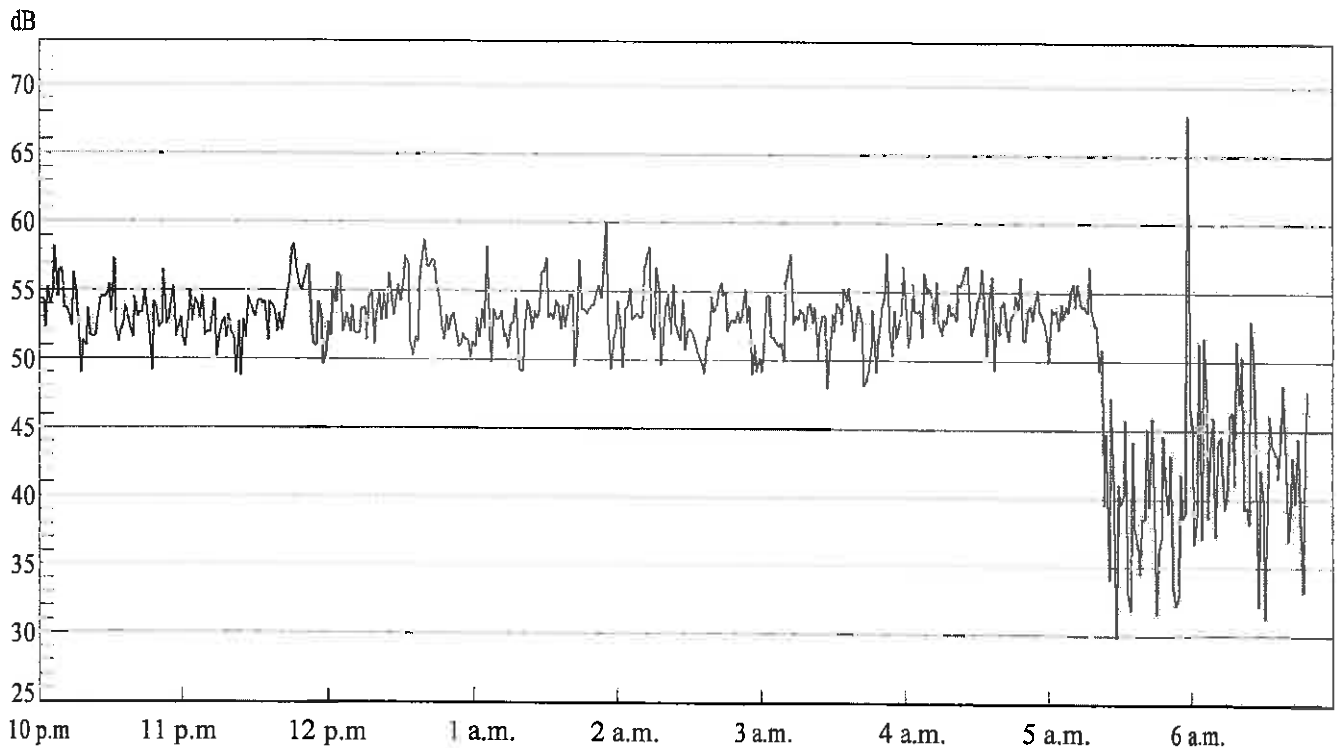
Project Duration: From 29 October 2017 22:00:33 To 30 October 2017 06:50:43

Total Runtime: 0 Day-08h50m10s Leq of Total Runtime: 53.3 dB

Data Summary

Max Level: 67.9 dB at 05:58:40 Min Level: 29.9 dB at 05:28:40

L5: 56.7 L10: 55.6 L50: 52.8 L90: 43.4 L95: 38.6 L99: 32.2



Appendix G

MOM for Agencies Consultations

Annex A

Department of Environment Malaysia

Jabatan Alam Sekitar
Kementerian Tenaga, Sains, Teknologi, Alam Sekitar & Perubahan Iklim
Aras 3, Podium 3, Wisma Sumber Asli
No. 25, Persiaran Perdana, Presint 4
62574 Putrajaya



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UP: Puan Hajjah Rohimah Ayub, *Pengarah Bahagian Penilaian*

Rujukan:
62801461-LET-029

Tarikh:
11 April 2019

Proposed Reclamation and Development of the Sunrise City Mixed Development at Mukim Seberang Takir, District of Kuala Nerus, Kuala Terengganu, Terengganu – *Nota Perbincangan*

Puan Rohimah,

Perbincangan di antara pihak Jabatan Alam Sekitar (JAS) Putrajaya dan DHI Water & Environment (M) Sdn. Bhd. bagi menerangkan status terkini mengenai laporan EIA Jadual Kedua bagi projek yang dinyatakan di atas pada 18 Mac 2019 di JAS Putrajaya adalah dengan segala hormatnya dirujuk.

Berikut adalah perkara-perkara yang telah dibincangkan:

1. Laporan terma rujukan (TOR) bagi laporan EIA Jadual Kedua telah disahkan oleh JAS Putrajaya melalui surat (Ruj.: JAS.50/013/100/082(14)) bertarikh 24 Ogos 2017.
 - a. Pertukaran Kerajaan Negeri Terengganu selepas Pilihan Raya Umum (PRU) Ke-14 pada Mei 2018 telah menyebabkan projek ditangguhkan bagi mendapatkan sokongan dari Kerajaan Negeri yang baharu.
 - b. Tempoh sah laporan TOR ini telah dilanjutkan sehingga 3 September 2019 (Ruj.: JAS.50/013/100/082(26)) oleh pihak JAS Putrajaya.
2. Skop kajian laporan EIA Jadual Kedua yang telah diperincikan di dalam laporan TOR yang telah disahkan hanyalah melibatkan aktiviti penambakan (*reclamation*) dan pengerukan induk (*capital dredging*).
 - a. Sisa pengerukan induk tidak akan dilupuskan kerana ia akan digunakan semula sebagai bahan penambakan.
 - b. Impak disebabkan oleh pembangunan *topside* di atas tanah penambakan tidak akan dikaji dan tertakluk kepada peruntukan kajian EIA Jadual Pertama yang berada di bawah bidang kuasa JAS Negeri Terengganu.
 - c. Sumber pasir akan diperolehi daripada kawasan yang telah diluluskan yang terletak di luar pesisir pantai Kijal, Terengganu.
3. Oleh kerana projek ini melibatkan aktiviti penambakan laut, ia perlu dirujuk kepada Majlis Perancangan Fizikal Negara (MPFN). Seperti yang telah diperincikan di dalam surat PLANMalaysia (Ruj.: JPBD.Tr.02/4740) bertarikh 14 Februari 2018, salah satu syarat untuk projek ini diangkat ke MPFN adalah kelulusan laporan EIA dan laporan hidraulik perlu diperolehi terlebih dahulu.
4. Hasil penemuan kajian EIA perlu dibentangkan pada sesi *townhall* dan ringkasan sesi ini perlu direkodkan di dalam laporan EIA.
 - a. Sesi *townhall* perlu melibatkan penyertaan dari semua pihak-pihak berkepentingan yang berkaitan (*relevant stakeholders*).
 - b. Sesi *townhall* perlu menekankan bahawa projek ini merupakan projek yang disokong oleh Kerajaan Negeri Terengganu.

5. Hasil penemuan kajian *Marine Risk Assessment (MRA)* perlu diringkaskan di dalam laporan EIA.
 - a. Maklumat kajian *baseline* bagi keadaan trafik marin sediaada di sekitar kawasan kajian dan penambahan bilangan kapal-kapal yang terlibat di dalam sebarang aktiviti di peringkat pembinaan projek perlu diperincikan di dalam laporan EIA.
 - b. Maklumat-maklumat seperti jenis-jenis kapal, laluan perkapalan dan jarak perjalanan dari kawasan sumber pasir ke kawasan projek perlu diterangkan di dalam laporan EIA.
 - c. Isu-isu berkaitan dengan impak kepada nelayan disebabkan oleh pelebaran had perlabuhan sediaada yang mungkin berlaku perlu diperincikan di dalam laporan EIA.
6. Hasil penemuan kajian *Social Impact Assessment (SIA)* perlu diringkaskan di dalam laporan EIA.
 - a. Kelulusan laporan ini dari pihak PLANMalaysia Terengganu adalah tidak diperlukan sebelum laporan EIA diserahkan kepada pihak JAS Putrajaya.
 - b. Impak projek kepada kawasan rekreasi di sepanjang Pantai Teluk Ketapang haruslah diperincikan di dalam laporan SIA.
7. Hasil penemuan kajian *Fisheries Impact Assessment (FIA)* perlu diringkaskan di dalam laporan EIA.
 - a. Kelulusan laporan ini dari pihak Jabatan Perikanan Putrajaya adalah tidak diperlukan sebelum laporan EIA diserahkan kepada pihak JAS Putrajaya.

Kami mohon kepada pihak Puan untuk mengesahkan perkara-perkara yang telah diperincikan di atas. Kerjasama pihak Puan kami dahului dengan ucapan jutaan terima kasih.

Yang benar,

DHI Water & Environment (M) Sdn. Bhd.



Tania Golingi
Ketua Pasukan EIA

Annex B

PLANMalaysia

