Quarterly Environmental Quality Monitoring Report for the Landslide Disaster Protection Project Of the National Road Network Package -1 (JICA Format) Report No-08 (September 2019)

(NOISE LEVEL MONITORING)

Mitigation Measures

Noise

1. Construction Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National standards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	66.4	71	50/75	55	Diyagala	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		45.4	48	40/50	45	Diyagala			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off - site receptor

Mitigation Measures

Noise

1. Construction Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National standards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	69.7	70	50/75	55	Nawalapitiya	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		46.2	51	40/50	45	Nawalapitiya			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

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Mitigation Measures

Noise

1. Operation Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National standards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	71.0	72	50/75	55	Kothmalegama-1	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		48.9	49	40/50	45	Kothmalegama-1			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

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Noise

1 Operation Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National standards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	64.1	67	50/75	55	Kothmalegama-2	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		43.1	47	40/50	45	Kothmalegama-2			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off - site receptor

Noise

1. Operation Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National standards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	68.1	71	50/75	55	Ramboda	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		45.6	52	40/50	45	Ramboda			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off - site receptor

1. Operation Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National standards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	65.8	69	50/75	55	Toppass	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		47.1	52	40/50	45	Toppass			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off - site receptor

1. Operation Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National standards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	68.9	72	50/75	55	Keppetipola	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		45.3	47	40/50	45	Keppetipola			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off - site receptor

Mitigation Measures

Noise

1. Operation Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National standards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	70.9	73	50/75	55	Ginigathhena	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		64.7	66	40/50	45	Ginigathhena			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off - site receptor

Noise

1 Operation Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National stadards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	69.8	72	50/75	55	Pitawala	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		45.4	48	40/50	45	Pitawala			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

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Mitigation Measures

Noise

1. Operation Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National stadards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	69.8	72	50/75	55	Pitawala	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		45.4	48	40/50	45	Pitawala			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off - site receptor

Noise

1. Construction Stage

Item	One hour Laeq	Unit	Measured Value (Mean)	Measured Value (Max)	National stadards (Max) *1	World Bank Guidelines * 2	Remarks			
							Location	Frequency	Implementation	Supervisor
Noise *1	Day time (7:00 - 22:00)	dB(A)	70.1	71	50/75	55	Theligama	Construction Stage : 4 times / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	Night time (22:00 - 7:00)		46.6	48	40/50	45	Theligama			

*1 : National Environmental (Protection & Quality) Regulations, CEA (2008)

*2 : Residential area IFC EHS general guideline, for General Health and safety (EHS) Guidelines (2007)

Noise should not exceed the levels presented in Table 3 or result in a maximum increase in background levels of 3dBA at the nearest off - site receptor

Quarterly Environmental Quality Monitoring Report for the Landslide Disaster Protection Project National Road Network Package -1 (JICA Format) Report No-08 (September 2019)

(AIR QUALITY MONITORING)

	Time	Unit	Measured value (mean)	Measured value (max) *1	National standards	WHO Guidelines*2	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		Design Stage 1 time as a baseline data Construction Stage: 4 time / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hour		24	27	200	-	Diyagala			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hour		18.3	21	250	200	Diyagala			
	1year				-	40				
CO	8 hours	µg/m³			10000	10000				
	1 hour		3136	3318	30000	30000	Diyagala			
O_3	8 hours	µg/m³			-	100				
	1 hour		5.4	6	200	-	Diyagala			
Lead compounds	24 hours	µg/m³	0.2	0.2	2	-				
	1 year				0.5	0.5				
PM_{10}	24 hours	µg/m³				20				
	3 hours		23.2	28.2						
SPM	1 hour	µg/m³			500	-				
	3 hours		142.5	151.4	450	-	Diyagala			
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-				

*1: National Ambient Air Quality (NAAQS) of Sri Lanka (2009)

*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

		Unit	Measured value (mean)	Measured value (max) *1	National standards	WHO Guidelines*2	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		Design Stage 1 time as a baseline data Construction Stage: 4 time / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hour		13.7	15.8	200	-	Nawalapitiya			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hour		15.1	17.1	250	200	Nawalapitiya			
	1year				-	40				
CO	8 hours	µg/m³			10000	10000				
	1 hour		1431	1516	30000	30000	Nawalapitiya			
O_3	8 hours	µg/m³			-	100				
	1 hour		5	6	200	-	Nawalapitiya			
Lead compounds	24 hours	µg/m³		<0.1	2	-				
	1 year				0.5	0.5				
PM_{10}	24 hours	µg/m³				20				
	3 hours		38.3	37.9			Nawalapitiya			
SPM	1 hour	µg/m³			500	-				
	3 hours		132.8	141.5	450	-	Nawalapitiya			
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-				

*1: National Ambient Air Quality (NAAQS) of Sri Lanka (2009)

*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

							Remarks		
					80	20	Location	Frequency	Implementation	Supervision
	1 hour		18.7	21.3	120	-				
NO_2	24 hours	µg/m³			200	-	Kothmalegama-1			
	8 hours				100	-				
	1 hour		18.1	20	150	-				
	1year				250	200	Kothmalegama-1			
CO	8 hours	µg/m³			-	40				
	1 hour		1211	1261	10000	10000				
O_3	8 hours	µg/m³			30000	30000	Kothmalegama-1			
	1 hour		5.4	5.7	-	100				
Lead compounds	24 hours	µg/m³	0.1	0.1	200	-	Kothmalegama-1			
	1 year				2	-				
PM_{10}	24 hours	µg/m³			0.5	0.5				
	3 hours		36.5	37.4		20				
SPM	1 hour	µg/m³					Kothmalegama-1			
	3 hours		129.3	147.3	500	-				
	8 hours				450	-	Kothmalegama-1			
	24 hours				350	-				
	1 year				300	-				
					100	-				

Design Stage
1 time as a baseline data

Construction Stage:
4 time / year for 2 years

Constructer through approved monitoring agency

RDA/ESD

*1: National Ambient Air Quality (NAAQS) of Sri Lanka (2009)

*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

	Time	Unit	Measured value (mean)	Measured value (max) *1	National Standards	WHO Guidelines*2	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	$\mu g/m^3$			80	20		Design Stage 1 time as a baseline data Construction Stage: 4 time / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hour		13.1	14.5	200	-	Kothmalegama-2			
NO_2	24 hours	$\mu g/m^3$			100	-				
	8 hours				150	-				
	1 hour		16.4	17.1	250	200	Kothmalegama-2			
	1year				-	40				
CO	8 hours	$\mu g/m^3$			10000	10000				
	1 hour		1568	1602	30000	30000	Kothmalegama-2			
O_3	8 hours	$\mu g/m^3$			-	100				
	1 hour		4	5	200	-	Kothmalegama-2			
Lead compounds	24 hours	$\mu g/m^3$	0.1	0.1	2	-				
	1 year				0.5	0.5				
PM_{10}	24 hours	$\mu g/m^3$				20				
	3 hours		31.1	37.4						
SPM	1 hour	$\mu g/m^3$			500	-				
	3 hours		121.7	132.5	450	-	Kothmalegama-2			
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-				

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*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

		Unit	Measured value (mean)	Measured value (max) *1	National standards	WHO Guidelines*2	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		Design Stage 1 time as a baseline data Construction Stage: 4 time / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hour		17.3	19.8	200	-	Ramboda			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hour		14	16	250	200	Ramboda			
	1year				-	40				
CO	8 hours	µg/m³			10000	10000				
	1 hour		1134	1152	30000	30000	Ramboda			
O_3	8 hours	µg/m³			-	100				
	1 hour		4.1	5.5	200	-	Ramboda			
Lead compounds	24 hours	µg/m³	0.1	0.1	2	-				
	1 year				0.5	0.5				
PM_{10}	24 hours	µg/m³				20				
	3 hours		27.6	29.1			Ramboda			
SPM	1 hour	µg/m³			500	-				
	3 hours		111.3	120.4	450	-	Ramboda			
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-				

*1: National Ambient Air Quality (NAAQS) of Sri Lanka (2009)

*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

							Remarks			
		Unit	Value (mean)	Maximum value (max) *1	National Standards	WHO Guidelines*2	Location	Frequency	Implementation	Supervision
SO_2	24 hours	$\mu g/m^3$			80	20		Design Stage 1 time as a baseline data Construction Stage: 4 time / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hour		17	20	200	-	Toppass			
NO_2	24 hours	$\mu g/m^3$			100	-				
	8 hours				150	-				
	1 hour		17.4	20.1	250	200	Toppass			
	1year				-	40				
CO	8 hours	$\mu g/m^3$			10000	10000				
	1 hour		1184	1201	30000	30000	Toppass			
O_3	8 hours	$\mu g/m^3$			-	100				
	1 hour		6.6	7.1	200	-	Toppass			
Lead compounds	24 hours	$\mu g/m^3$		<0.1	2	-				
	1 year				0.5	0.5				
PM_{10}	24 hours	$\mu g/m^3$				20				
	3 hours		24.4	27.2	-					
SPM	1 hour	$\mu g/m^3$			500	-				
	3 hours		119.9	125.1	450	-	Toppass			
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-				

*1: National Ambient Air Quality (NAAQS) of Sri Lanka (2009)

*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

		Unit	Measured value (mean)	Measured value (max) *1	National standards	WHO Guidelines*2	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		Design Stage 1 time as a baseline data Construction Stage: 4 time / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hour		17.1	19.2	200	-	Keppetipola			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hour		16.7	18	250	200	Keppetipola			
	1year				-	40				
CO	8 hours	µg/m³			10000	10000				
	1 hour		2635	2677	30000	30000	Keppetipola			
O_3	8 hours	µg/m³			-	100				
	1 hour		5	5	200	-	Keppetipola			
Lead compounds	24 hours	µg/m³		<0.1	2	-				
	1 year				0.5	0.5				
PM_{10}	24 hours	µg/m³				20				
	3 hours		26.2	29.3			Keppetipola			
SPM	1 hour	µg/m³			500	-				
	3 hours		158	162	450	-	Keppetipola			
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-				

*1: National Ambient Air Quality (NAAQS) of Sri Lanka (2009)

*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

Item	Averaging Time	Unit	Measured value (mean)*1	Measured value (max)*1	National standards	WHO Guidelines*2	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		Design Stage 1 time as a baseline data Construction Stage: 4 time / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hour		24.2	26	200	-	Ginigathhena			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hour		18.7	21	250	200	Ginigathhena			
	1year				-	40				
CO	8 hours	µg/m³			10000	10000				
	1 hour		1622	1669	30000	30000	Ginigathhena			
O_3	8 hours	µg/m³			-	100				
	1 hour		5.1	6	200	-	Ginigathhena			
Lead compounds	24 hours	µg/m³	0.2	0.2	2	-				
	1 year				0.5	0.5				
PM_{10}	24 hours	µg/m³				20				
	3 hours		33.4	42			Ginigathhena			
SPM	1 hour	µg/m³			500	-				
	3 hours		161	184	450	-	Ginigathhena			
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-				

*1: National Ambient Air Quality (NAAQS) of Sri Lanka (2009)

*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

			Measured value (mean)	Measured value (max)*1	National standards	WHO Guidelines*2	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		Design Stage 1 time as a baseline data Construction Stage: 4 time / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hour		18.5	21	200	-	Pitawala			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hour		21.3	22	250	200	Pitawala			
	1year				-	40				
CO	8 hours	µg/m³			10000	10000				
	1 hour		2214	2256	30000	30000	Pitawala			
O_3	8 hours	µg/m³			-	100				
	1 hour		5	5	200	-	Pitawala			
Lead compounds	24 hours	µg/m³	0.1	0.1	2	-				
	1 year				0.5	0.5				
POM_{10}	24 hours	µg/m³				20				
	1 year					50				
SPM	1 hour	µg/m³			500	-				
	3 hours		145.2	177.1	450	-	Pitawala			
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-				

*1: National Ambient Air Quality (NAAQS) of Sri Lanka (2009)

*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

Mitigation Measures

			[illegible] value (mean)	[illegible] value (max) *1	National standards	WHO Guidelines *2	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		Design Stage 1 time as a baseline data Construction Stage: 4 time / year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours									
	1 hour				120	-				
NO_2	24 hours	µg/m³	34.9	36	200	-	Theligama			
	8 hours				100	-				
	1 hour				150	-				
	1year		27.1	29	250	200	Theligama			
CO	8 hours	µg/m³			-	40				
	1 hour		2144	2175	10000	10000				
O_3	8 hours	µg/m³			30000	30000	Theligama			
	1 hour		6.4	7.3	-	100				
Lead compounds	24 hours	µg/m³			200	-	Theligama			
	1 year			<0.1	2	-				
POM_{10}	24 hours	µg/m³	29.1	33.4	0.5	0.5				
	3 hour					20				
SPM	1 hour	µg/m³				50				
	3 hours				500	-				
	8 hours		153.4	187.2	450	-	Theligama			
	24 hours				350	-				
	1 year				300	-				
					100	-				

*2: WHO Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

Quarterly Environmental Quality Monitoring Report for the Landslide Disaster Protection Project National Road Network Package -1 (JICA Format) Report No-08 (September 2019)

(VIBRATION LEVEL MONITORING)

*1: National Environmental (Protection & Quality) Regulations, CEA (2008), Category of the structure - "Type C" , Type of Vibration - "Intermittent".
*2: The distance from the source (radious / width of corridor) shall be decided by the constructor and RDA.

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0			Every 6 months during the construction stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.54	0.60	4.0		Diyagala			

*1: National Environmental (Protection & Quality) Regulations, CEA (2008), Category of the structure - "Type C" , Type of Vibration - "Intermittent".
*2 : The distance from the source (radious / width of corridor) shall be decided by the constructor and RDA.

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0			Every 6 months during the construction stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.53	0.58	4.0		Nawalapitiya			

*2 : The distance from the source (radious/ width of corridor) shall be decided by the constructor and RDA.

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0			Every 6 months during the construction stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.61	0.66	4.0		Kothmalegama-1			

Protection & Quality) Regulations, CEA (2008), Category of the structure - "Type C" , Type of Vibration - "Intermittent".

Distance from the source (radious /width of corridor) shall be decided by the constructor and RDA.

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0		Kothmalegama-2	Every 6 months during the construction stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.54	0.55	4.0					

* 1 : National Environmental (Protection & Quality) Regulations, CEA (2008), Category of the structure - "Type C" , Type of Vibration - "Intermittent".
* 2 : The distance from the source (radious / width of corridor) shall be decided by the constructor and RDA.

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0			Every 6 months during the construction stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.51	0.58	4.0		Ramboda			

1. Operation Stage

* 1 : National Environmental (Protection & Quality) Regulations, CEA (2008), Category of the structure - "Type C" , Type of Vibration - "Intermittent".
* 2 : The distance from the source (radious / width of corridor) shall be decided by the constructor and RDA.

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0			Every 6 months during the construction stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.61	0.64	4.0		Toppass			

1 : National Environmental (Protection & Quality) Regulations, CEA (2008), Category of the structure - "Type C" , Type of Vibration - "Intermittent".
2 : The distance from the source (radious / width of corridor) shall be decided by the constructor and RDA.

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0			Every 6 months during the construction stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.55	0.57	4.0		Keppetipola			

*1: National Environmental (Protection & Quality) Regulations, CEA (2008), Category of the structure - "Type C" , Type of Vibration - "Intermittent".
* 2 : The distance from the source (radious / width of corridor) shall be decided by the constructor and RDA.

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0			Every 6 months during the construction stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.56	0.61	4.0		Ginigathhena			

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0		Pitawala	Every 6 months during the stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.48	0.51	4.0					

* 1 : National Environmental (Protection & Quality) Regulations, CEA (2008), Category of the structure - "Type C" , Type of Vibration - "Intermittent".

* 2 : The distance from the source (radious / width of corridor) shall be decided by the constructor and RDA.

Mitigation Measures

Vibration

1. Construction Stage

Item	Unit	Frequency Band	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max.)	International Guidelines	Remarks			
							Location*2	Frequency	implementation	Supervision
Vibration	mm/sec	0-10 Hz			1.0		Theligama	Every 6 months during the stage, and on complain at the construction site	Constructor through approved monitoring agency	RDA/ESD
		10-50 Hz			2.0					
		Over 50 Hz	0.45	0.52	4.0					

* 1 : National Environmental (Protection & Quality) Regulations, CEA (2008), Category of the structure - "Type C" , Type of Vibration - "Intermittent".
* 2 : The distance from the source (radious / width of corridor) shall be decided by the constructor and RDA.

Quarterly Environmental Quality Monitoring Report for the Landslide Disaster Protection Project National Road Network Package -1 (JICA Format) Report No-08 (September 2019)

(WATER QUALITY MONITORING)

Construction Stage

Site Location: Kothmalegama-1 (A005-043)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.029	0.041	-	-	kothmalegama-1	Design Stage: 1 time as a baseline data. Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	6.8	6.9	6.0-8.5	6-9 *2				
DO	(mg/L)	10.7	12.2	-	-				
Turbidity	(mg/L)	0.14	0.19		<0.2 *3				
TSS	(mg/L)	12.44	27	50	50 *2				
BOD_5	(mg/L)	0.88	1.27	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detected	0.1	0.01				
Oil & grease	(mg/L)	0	0	10	10 *2				
Coliform	MPN/100mL	26	30	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage – "All nondrinking water uses"

Site Location: Diyagala (A007-057)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.014	0.021	-	-	Diyagala	Design Stage: 1 time as a baseline data Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	7.2	7.6	6.0-8.5	6-9 *2				
DO	(mg/L)	9.40	9.65	-	-				
Turbidity	(mg/L)	0.16	0.19		<0.2 *3				
TSS	(mg/L)	4.32	10.7	50	50 *2				
BOD_5	(mg/L)	0.27	0.39	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detected	0.1	0.01				
Oil & grease	(mg/L)	0	0	10	10 *2				
Coliform	MPN/100mL	30	33	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage – "All nondrinking water uses"

Site Location: Kothmalegama- 02 (A005-044)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.017	0.024	-	-	Kothmalegama 02	Design Stage: 1 time as a baseline data Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	7.2	7.4	6.0-8.5	6-9 *2				
DO	(mg/L)	8.80	9.65	-	-				
Turbidity	(mg/L)	0.17	0.19		<0.2 *3				
TSS	(mg/L)	7.21	11.5	50	50 *2				
BOD_5	(mg/L)	0.36	0.45	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detected	0.1	0.01				
Oil & grease	(mg/L)	0	0	10	10 *2				
Coliform	MPN/100mL	25	28	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage – "All nondrinking water uses"

Site Location: Ramboda (A005-046)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.049	0.051	-	-	Ramboda	Design Stage: 1 time as a baseline data Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	6.4	7.1	6.0-8.5	6-9 *2				
DO	(mg/L)	11.4	12.2	-	-				
Turbidity	(mg/L)	0.16	0.18		<0.2 *3				
TSS	(mg/L)	15.1	27	50	50 *2				
BOD_5	(mg/L)	1.2	2.2	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detected	0.1	0.01				
Oil & grease	(mg/L)	1.0	1.6	10	10 *2				
Coliform	MPN/100mL	36	38	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage – "All nondrinking water uses"

Construction Stage

Site Location: Toppass (A005-063)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.084	0.120	-	-	Toppass	Design Stage: 1 time as a baseline data Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	6.7	7.1	6.0-8.5	6-9 *2				
DO	(mg/L)	9.24	11.2	-	-				
Turbidity	(mg/L)	0.15	0.18		<0.2 *3				
TSS	(mg/L)	0.47	0.58	50	50 *2				
BOD_5	(mg/L)	1.31	1.52	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detected	0.1	0.01				
Oil & grease	(mg/L)	0	0	10	10 *2				
Coliform	MPN/100mL	30	33	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage – "All nondrinking water uses"

Site Location: Keppetipola (A005-091)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.21	0.31	-	-	Keppetipola	Design Stage: 1 time as a baseline data. Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	6.7	7.2	6.0-8.5	6-9 *2				
DO	(mg/L)	12.34	14.15	-	-				
Turbidity	(mg/L)	0.04	0.08		<0.2 *3				
TSS	(mg/L)	7.11	8.84	50	50 *2				
BOD_5	(mg/L)	3.69	5.5	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detected	0.1	0.01				
Oil & grease	(mg/L)	0.04	0.11	10	10 *2				
Coliform	MPN/100mL	28	30	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage – "All nondrinking water uses"

Site Location: Nawalapitiya (A113-015)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.04	0.06	-	-	Nawalapitiya (A113-015)	Design Stage: 1 time as a baseline data Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	7.4	7.7	6.0-8.5	6-9 *2				
DO	(mg/L)	13.25	14.93	-	-				
Turbidity	(mg/L)	0.13	0.16		<0.2 *3				
TSS	(mg/L)	8.1	11	50	50 *2				
BOD_5	(mg/L)	0.51	0.69	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detected	0.1	0.01				
Oil & grease	(mg/L)	0.26	0.41	10	10 *2				
Coliform	MPN/100mL	35	39	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage – "All nondrinking water uses"

Site Location: Ginigathhena (A007-054)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.128	0.155	-	-	Ginigathhena (A007-054)	Design Stage: 1 time as a baseline data Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	7.0	7.2	6.0-8.5	6-9 *2				
DO	(mg/L)	3.2	3.6	-	-				
Turbidity	(mg/L)	0.11	0.14		<0.2 *3				
TSS	(mg/L)	0.57	0.76	50	50 *2				
BOD_5	(mg/L)	1.61	1.85	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detected	0.1	0.01				
Oil & grease	(mg/L)	0	0	10	10 *2				
Coliform	MPN/100mL	35	37	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage – "All nondrinking water uses"

Water Quality (Effluent/Wastewater)

1) Construction Stage

Site location: Theligama (A007-031)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.044	0.062	-	-	Theligama (A007-031)	Design Stage: 1 time as a baseline data Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	6.9	7.1	6.0-8.5	6-9 *2				
DO	(mg/L)	2.54	3.19	-	-				
Turbidity	(mg/L)	0.13	0.17		<0.2 *3				
TSS	(mg/L)	3.5	4.9	50	50 *2				
BOD_5	(mg/L)	0.39	0.54	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detected	0.1	0.01				
Oil & grease	(mg/L)	0.5	0.9	10	10 *2				
Coliform	MPN/100mL	34	36	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

1) Construction Stage

Site location: Pitawala (A007-045)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.14	0.16	-	-	Pitawala (A007-045)	Design Stage: 1 time as a baseline data Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	6.6	7.1	6.0-8.5	6-9 *2				
DO	(mg/L)	2.3	3.9	-	-				
Turbidity	(mg/L)	0.11	0.14		<0.2 *3				
TSS	(mg/L)	1.29	1.62	50	50 *2				
BOD_5	(mg/L)	1.9	2.2	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detecetd	0.1	0.01				
Oil & grease	(mg/L)	1.1	2.4	10	10 *2				
Coliform	MPN/100mL	34	38	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage "All nondrinking water uses"

[illegible]/Wastewater)

1) Construction Stage

Site location: Pitawala (A007-045)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	National Standards (Max) *1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	(S/m)	0.14	0.16	-	-	Pitawala (A007-045)	Design Stage: 1 time as a baseline data Construction stage : 4 times/year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH	-	6.6	7.1	6.0-8.5	6-9 *2				
DO	(mg/L)	2.3	3.9	-	-				
Turbidity	(mg/L)	0.11	0.14		<0.2 *3				
TSS	(mg/L)	1.29	1.62	50	50 *2				
BOD_5	(mg/L)	1.9	2.2	30	30 *2				
Lead	(mg/L)	Not Detected	Not Detecetd	0.1	0.01				
Oil & grease	(mg/L)	1.1	2.4	10	10 *2				
Coliform	MPN/100mL	34	38	40	400 *2				

*1: National Environmental (Protection & Quality) Regulations, CEA (2008)

*2: IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB Guidelines & Standards in Relation to Wastewater Reuse (2011), Main usage "All nondrinking water uses"

Quarterly Environmental Quality Monitoring Report for the Landslide Disaster Protection Project of the National Road Network

Package 2- JICA Format

Report No-09 (September 2019)

2). Design and Construction Stage

Item	Averaging Time	Unit	Measured Value (mean)	measured value (max)*1	National standards (max)*1	WHO Guidelines *2	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		Design Stage 1 time as a baseline data Constriction stage: 4 time /year for 2 years	Constructer through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hour		10	11	200	-	Walhaputenna-03			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hour		11	12	250	200	Walhaputenna-03			
	1 year				-	40				
CO	8 hours	µg/m³			10000	10000				
	1 hour		2046	2068	30000	30000	Walhaputenna-03			
O_3	8 hours	µg/m³			-	100				
	1 hours		3	4	200	-	Walhaputenna-03			
Lead Compounds	24 hours	µg/m³			2	-	Walhaputenna-03			
	1 year				0.5	0.5				
PM_{10}	24 hours	µg/m³	31	31.6	100	20	Walhaputenna-03			
	1 year				50	50				
SPM	1 hour	µg/m³			500	-				
	3 hours		21.3	22.2	450	-	Walhaputenna-03			
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-				

*1: national Ambient Air Quality (NAAQS) of Sri Lanka (2009)

*2: Who Air Quality guideline for particular matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

Air Quality (Ambient Air Quality)
(2) Operation Stage

Item	Average Time	Unit	Measured Value (mean)	measured value (max)*1	National standards (Max.)*1	WHO Guidelines	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		2 time/year for 2 years	RDA through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hours		17.6	21	200	-	Lunugala			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hours		15	20	250	200				
	1 year				-	40	Lunugala			
CO	8 hours	µg/m³			10000	10000				
	1 hours		2043.3	2096.6	30000	30000	Lunugala			
O_3	8 hours	µg/m³			-	100				
	1 hours		3.6	5	200					
Lead Compounds	24 hours	µg/m³			2					
	1 year				0.5	0.5	Lunugala			
PM_{10}	24 hours	µg/m³	55.7	56.2	100	20				
	1 year				50	50	Lunugala			
SPM	1 hours	µg/m³			500	-				
	3 hours		120.2	125.2	450	-				
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-	Lunugala			

*1: national Ambient Air Quality (NAAQS) of Sri Lanka (2009)
*2: Who Air Quality guideline for particular matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

2). Operation Stage

Item	Average Time	Unit	Measured Value (mean)	measured value (max)*1	National standards (Max.)*1	WHO Guidelines	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		2 time/year for 2 years	RDA through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hours		15	16	200	-	Imbulpe			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hours		12	15	250	200				
	1 year				-	40	Imbulpe			
CO	8 hours	µg/m³			10000	10000				
	1 hours		2190	2246.6	30000	30000	Imbulpe			
O_3	8 hours	µg/m³			-	100				
	1 hours		3	5	200		Imbulpe			
Lead Compounds	24 hours	µg/m³			2					
	1 year				0.5	0.5	Imbulpe			
PM_{10}	24 hours	µg/m³	31.4	32.4	100	20				
	1 year				50	50	Imbulpe			
SPM	1 hours	µg/m³			500	-				
	3 hours		115.3	115.6	450	-				
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-	Imbulpe			

*1: national Ambient Air Quality (NAAQS) of Sri Lanka (2009)
*2: Who Air Quality guideline for particular matter, ozone, nitrogen dioxide and sulfur dioxide (2006)

2). Operation Stage

Item	Average Time	Unit	Measured Value (mean)	measured value (max)*1	National standards (Max.)*1	WHO Guidelines	Remarks			
							Location	Frequency	Implementation	Supervision
SO_2	24 hours	µg/m³			80	20		2 time/year for 2 years	RDA through approved monitoring agency	RDA/ESD
	8 hours				120	-				
	1 hours		14	16	200	-	Pussalla			
NO_2	24 hours	µg/m³			100	-				
	8 hours				150	-				
	1 hours		10	11	250	200				
	1 year				-	40	Pussalla			
CO	8 hours	µg/m³			10000	10000				
	1 hours		2633	3013	30000	30000	Pussalla			
O_3	8 hours	µg/m³			-	100				
	1 hours		3	6	200		Pussalla			
Lead Compounds	24 hours	µg/m³			2					
	1 year				0.5	0.5	Pussalla			
PM_{10}	24 hours	µg/m³	34.3	37.6	100	20				
	1 year				50	50	Pussalla			
SPM	1 hours	µg/m³			500	-				
	3 hours		144.5	146.2	450	-				
	8 hours				350	-				
	24 hours				300	-				
	1 year				100	-	Pussalla			

*1: national Ambient Air Quality (NAAQS) of Sri Lanka (2009)
*2: Who Air Quality guideline for particular matter, ozone, nitrogen dioxide, and sulfur dioxide (2006)

[illegible] (Effluent/Wastewater)

1). Design and Construction Stage

Item	Unit	measured value (mean)	measured value (max)*1	National Standards (max)*1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	S/m	0.12	0.140	-	-	Walhaputenna-03	Design Stage 1 time as a baseline data Constriction stage: 4 time /year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH		6.7	6.8	6-8.5	6-9*2	Walhaputenna-03			
DO	mg/L	9.1	9.4	-	-	Walhaputenna-03			
Turbidity	mg/L	0.14	0.25	-	0.2*3	Walhaputenna-03			
TSS	mg/	Not Detected	Not Detected	50	50*3	Walhaputenna-03			
BOD_5	mg/L	1.31	1.62	30	30*3	Walhaputenna-03			
Lead	mg/L	Not Detected	Not Detected	0.1	0.01*2	Walhaputenna-03			
Oil and grease	mg/L	Not Detected	Not Detected	10	10*2	Walhaputenna-03			
Coliform	MPN/100	Not Detected	Not Detected	40	400*2	Walhaputenna-03			
E-coli	MPN/100	Not Detected	Not Detected			Walhaputenna-03			

1). Design and Construction Stage

Item	Unit	measured value (mean)	measured value (max)*1	National Standards (max)*1	international Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	S/m	0.113	00.119	-	-	Ambepussa	Design Stage 1 time as a baseline data Constriction stage: 4 time /year for 2 years	Constructer through approved monitoring agency	RDA/ESD
pH		7.03	7.1	6-8.5	6-9*2	Ambepussa			
DO	mg/L	9.9	10.4	-	-	Ambepussa			
Turbidity	mg/L	0.33	0.52	-	0.2*3	Ambepussa			
TSS	mg/L	10	13	50	50*3	Ambepussa			
BOD_5	mg/L	2.43	3	30	30*3	Ambepussa			
Lead	mg/L	Not Detected	Not Detected	0.1	0.01*2	Ambepussa			
Oil and grease	mg/L	Not Detected	Not Detected	10	10*2	Ambepussa			
Coliform	MPN/100	47	120	40	400*2	Ambepussa			
E-coli	MPN/100	Not Detected	Not Detected			Ambepussa			

Mitigation Measures

Water Quality (Effluent/Wastewater)

02). Operation Stage

Item	Unit	measured value (mean)	measured value (max)*1	National Standards (max)*1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	S/m	0.065	0.0.073	-	-	Lunugala	2 times/year for 2 year	RDA though approved monitoring agency	RDA/ESD
pH		6.8	7	6-8.5	6-9*2	Lunugala			
DO	mg/L	8.6	9.1	-	-	Lunugala			
Turbidity	mg/L	0.27	0.54	-	0.2*3	Lunugala			
TSS	mg/L	3.3	08	50	50*3	Lunugala			
BOD_5	mg/L	0.56	1	30	30*3	Lunugala			
Lead	mg/L	Not Detected	Not Detected	0.1	0.01*2	Lunugala			
Oil and grease	mg/L	Not Detected	Not Detected	10	10*2	Lunugala			
Coliform	MPN/100	Not Detected	Not Detected	40	400*2	Lunugala			
E-coli	MPN/100	Not Detected	Not Detected			Lunugala			

02). Operation Stage

Item	Unit	measured value (mean)	measured value (max)*1	National Standards (max)*1	international Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	S/m	0.045	0.054	-	-	Imbulpe	2 times/year for 2 year	RDA though approved monitoring agency	RDA/ESD
pH		6.5	6.7	6-8.5	6-9*2	Imbulpe			
DO	mg/L	9.15	9.6	-	-	Imbulpe			
Turbidity	mg/L	0.04	0.06	-	0.2*3	Imbulpe			
TSS	mg/L	Not Detected	Not Detected	50	50*3	Imbulpe			
BOD_5	mg/L	0.4	0.47	30	30*3	Imbulpe			
Lead	mg/L	Not Detected	Not Detected	0.1	0.01*2	Imbulpe			
Oil and grease	mg/L	Not Detected	Not Detected	10	10*2	Imbulpe			
Coliform	MPN/100	Not Detected	Not Detected	40	400*2	Imbulpe			
E-coli	MPN/100	Not Detected	Not Detected			Imbulpe			

*1: National Environmental (protection and Quality) Regulation, CEA (2008)

*2:IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB guideline and standards in relation to waste water Reuse (2011), Main usage- "All nondrinking water uses

Mitigation Measures

Water Quality (Effluent/Wastewater)

02). Operation Stage

Item	Unit	measured value (mean)	measured value (max)*1	National Standards (max)*1	International Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	S/m	0.065	0.0.073	-	-	Lunugala	2 times/year for 2 year	RDA though approved monitoring agency	RDA/ESD
pH		6.8	7	6-8.5	6-9*2	Lunugala			
DO	mg/L	8.6	9.1	-	-	Lunugala			
Turbidity	mg/L	0.27	0.54	-	0.2*3	Lunugala			
TSS	mg/L	3.3	08	50	50*3	Lunugala			
BOD_5	mg/L	0.56	1	30	30*3	Lunugala			
Lead	mg/L	Not Detected	Not Detected	0.1	0.01*2	Lunugala			
Oil and grease	mg/L	Not Detected	Not Detected	10	10*2	Lunugala			
Coliform	MPN/100	Not Detected	Not Detected	40	400*2	Lunugala			
E-coli	MPN/100	Not Detected	Not Detected			Lunugala			

02). Operation Stage

Item	Unit	measured value (mean)	measured value (max)*1	National Standards (max)*1	international Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	S/m	0.045	0.054	-	-	Imbulpe	2 times/year for 2 year	RDA though approved monitoring agency	RDA/ESD
pH		6.5	6.7	6-8.5	6-9*2	Imbulpe			
DO	mg/L	9.15	9.6	-	-	Imbulpe			
Turbidity	mg/L	0.04	0.06	-	0.2*3	Imbulpe			
TSS	mg/L	Not Detected	Not Detected	50	50*3	Imbulpe			
BOD_5	mg/L	0.4	0.47	30	30*3	Imbulpe			
Lead	mg/L	Not Detected	Not Detected	0.1	0.01*2	Imbulpe			
Oil and grease	mg/L	Not Detected	Not Detected	10	10*2	Imbulpe			
Coliform	MPN/100	Not Detected	Not Detected	40	400*2	Imbulpe			
E-coli	MPN/100	Not Detected	Not Detected			Imbulpe			

*1: National Environmental (protection and Quality) Regulation, CEA (2008)

*2:IFC EHS general guideline, for Sanitary Sewage Discharge (2007)

*3: ADB guideline and standards in relation to waste water Reuse (2011), Main usage- "All nondrinking water uses

02). Operation Stage

Item	Unit	measured value (mean)	measured value (max)*1	National Standards (max)*1	international Guidelines	Remarks			
						Location	Frequency	Implementation	Supervision
EC	S/m	0.138	0.194	-	-	Pussalla	2 times/year for 2 year	RDA though approved monitoring agency	RDA/ESD
pH		6.75	6.8	6-8.5	6-9*2	Pussalla			
DO	mg/L	9.85	10.1	-	-	Pussalla			
Turbidity	mg/L	0.15	0.19	-	0.2*3	Pussalla			
TSS	mg/L	34.5	46	50	50*3	Pussalla			
BOD_5	mg/L	0.06	0.09	30	30*3	Pussalla			
Lead	mg/L	Not Detected	Not Detected	0.1	0.01*2	Pussalla			
Oil and grease	mg/L	1.05	2	10	10*2	Pussalla			
Coliform	MPN/100	1800	1800	40	400*2	Pussalla			
E-coli	MPN/100	Not Detected	Not Detected			Pussalla			

*1: National Environmental (protection and Quality) Regulation, CEA (2008)
*2:IFC EHS general guideline, for Sanitary Sewage Discharge (2007)
*3: ADB guideline and standards in relation to waste water Reuse (2011), Main usage- "All nondrinking water us

Mitigation Measures

Noise

1). Design and construction Stage

Item	One hour Laeq	Unit	Measured value (mean)	measured value (max)*1	National Standards(max)*1	World Bank Guideline*2	Remarks			
							Location	Frequency	Implementation	Supervision
Noise*1	Day time (7.00-22.00) Design/Construction	db(A)	69	72	50/75	55	Walhaputenna-03	Design Stage 1 time as a baseline data Constriction stage: 4 time /year for 2 years	Constriction through approved monitoring stage	RDA/ESD
	Night time (22.00-7.00) Design/Construction		No work	No work	40/50	45	Walhaputenna-03			

1). Design and construction Stage

Item	One-hour Laeq	Unit	measured value (mean)	measured value (max)*1	National Standards(max)*1	World Bank Guideline*2	Remarks			
							Location	Frequency	Implementation	Supervision
Noise*1	Day time (7.00-22.00) Design/Construction	db(A)			50/75	55		Design Stage 1 time as a baseline data Constriction stage: 4 time /year for 2 years	Constriction through approved monitoring stage	RDA/ESD
	Night time (22.00-7.00) Design/ Construction		No work	No work	40/50	45				

*1: National Environmental (protection and Quality) Regulation, CEA (2008)

*2: Residential area IFC EHS general guideline, for general health and Safety (EHS) guideline (2007')

2). Operation Stage

Item	One-hour Laeq	Unit	Measured value (mean)	measured value (max)*1	National Standards(max)*1	World Bank Guideline*2	Remarks			
							Location	Frequency	Implementation	Supervision
Noise*1	Day time (7.00-22.00)	db(A)	65	66	50/75	55	Lunugala	2 times/year for 2 year	RDA though approved monitoring agency	RDA/ESD
	Night time (22.00-7.00)		No work	No work	40/50	45				

2). Operation Stage

Item	One-hour Laeq	Unit	Measured value (mean)	measured value (max)*1	National Standards(max)*1	World Bank Guideline*2	Remarks			
							Location	Frequency	Implementation	Supervision
Noise*1	Day time (7.00-22.00)	db(A)	45.34	70	50/75	55	Imbulpe	2 times/year for 2 year	RDA though approved monitoring agency	RDA/ESD
	Night time (22.00-7.00)		No work	No work	40/50	45				

*1: National Environmental (protection and Quality) Regulation, CEA (2008)
*2: Residential area IFC EHS general guideline, for general health and Safety (EHS) guideline (2007)

2). Operation Stage

Item	One-hour Laeq	Unit	Measured value (mean)	measured value (max)*1	National Standards(max)*1	World Bank Guideline*2	Remarks			
							Location	Frequency	Implementation	Supervision
Noise*1	Day time (7.00-22.00)	db(A)	66.3	68	50/75	55	Pussalla	2 times/year for 2 year	RDA though approved monitoring agency	RDA/ESD
	Night time (22.00-7.00)		No work	No work	40/50	45				

*1: National Environmental (protection and Quality) Regulation, CEA (2008)
*2: Residential area IFC EHS general guideline, for general health and Safety (EHS) guideline (2007)

Mitigation Measures

Vibration

1). Design Stage

Item	Unit	Frequency Band	Measured Value (mean)	measured value (max)	National Standards(max)*1	international Guidelines	Remarks			
							Location	Frequency	Implementation	Supervision
Vibration	mm/sec	0-10Hz			1			1 time with identification of noise barriers requirement location	Constructer through approved monitoring agency	RDA/ESD
		10-50Hz			2					
		Over 50Hz			4					

2). Construction Stage

Item	Unit	Frequency Band	Measured Value (mean)	measured value (max)	National Standards(max)*1	international Guidelines	Remarks			
							Location	Frequency	Implementation	Supervision
vibration	mm/sec	0-10Hz			1			Every 6 months during stage, and on complain at the construction site	Constructer through approved monitoring agency	RDA/ESD
		10-50Hz			2					
		Over 50Hz	0.66	0.72	4		Walhaputenna-03			

*1: National Environment (Protection and quality) Regulations, CES (2008), Category of the Structure: - "Type C" Type of Vibration- "intermittent"

*2: The distance from the source (radius/width of corridor) shall be decided by the constructor and RDA

2). Construction Stage

Item	Unit	Frequency Band	Measured Value (mean)	measured value (max)	National Standards(max)*1	international Guidelines	Remarks			
							Location	Frequency	Implementation	Supervision
vibration	mm/sec	0-10Hz			1			Every 6 months during stage, and on complain at the construction site	Constructer through approved monitoring agency	RDA/ESD
		10-50Hz			2					
		Over 50Hz	0.48	0.62	4		Ambepussa			

3). Operation Stage

Item	Unit	Frequency Band	Measured Value (mean)	measured value (max)	National Standards(max)*1	international Guidelines	Remarks			
							Location	Frequency	Implementation	Supervision
vibration	mm/sec	0-10Hz			1			Every 6 months during stage, and on complain at the construction site	RDA through approved monitoring agency	RDA/ESD
		10-50Hz			2					
		Over 50Hz	0.47	0.52	4		Lunugala			

3). Operation Stage

Item	Unit	Frequency Band	Measured Value (mean)	measured value (max)	National Standards(max)*1	international Guidelines	Remarks			
							Location	Frequency	Implementation	Supervision
vibration	mm/sec	0-10Hz			1			Every 6 months during stage, and on complain at the construction site	RDA through approved monitoring agency	RDA/ESD
		10-50Hz			2					
		Over 50Hz	0.5	0.54	4		Imbulpe			

*1: National Environment (Protection and quality) Regulations, CES (2008), Category of the Structure: - "Type C" Type of Vibration- "intermittent"

*2: The distance from the source (radius/width of corridor) shall be decided by the constructor and RDA

Mitigation Measures

Vibration

3). Operation Stage

Item	Unit	Frequency Band	Measured Value (mean)	measured value (max)	National Standards(max)*1	international Guidelines	Remarks			
							Location	Frequency	Implementation	Supervision
vibration	mm/sec	0-10Hz			1			Every 6 months during stage, and on complain at the construction site	RDA through approved monitoring agency	RDA/ESD
		10-50Hz			2					
		Over 50Hz	0.60	0.66	4		Pussalla			

***1: National Environment (Protection and quality) Regulations, CES (2008), Category of the Structure: - "Type C" Type of Vibration- "intermittent"**

***2: The distance from the source (radius/width of corridor) shall be decided by the constructor and RDA**

Mitigation Measures

4.Groundwater Level

Item	Unit	Stage	Measured Value	Measured value (Max)	Remarks			
					Location	Frequency	Implementation	Supervision
Ground Water Level	m	Design Stage			Walhaputhenna 3	2 times during dry and wet season	Constriction through approved monitoring stage	RDA/ESD
		Construction Stage				On Complain		
		Operation Stage				2 times with an interval of 6 months for 3-year time	DRA through approved monitoring agency	

Item	Unit	Stage	Measured Value	Measured value (Max)	Remarks			
					Location	Frequency	Implementation	Supervision
Ground Water Level	m	Design Stage			Ambepussa	2 times during dry and wet season	Constriction through approved monitoring stage	RDA/ESD
		Construction Stage				On Complain		
		Operation Stage				2 times with	DRA through approved monitoring agency	

						an interval of 6 months for 3 year time		
Item	**Unit**	**Stage**	**Measured Value**	**Measured value (Max)**	**Remarks**			
					Location	**Frequency**	**Implementation**	**Supervision**
Ground Water Level	m	Design Stage				2 times during dry and wet season	Constriction through approved monitoring stage	RDA/ESD
		Construction Stage				On Complain		
		Operation Stage			Lunugala	2 times with an interval of 6 months for 3 year time	DRA through approved monitoring agency	

Item	**Unit**	**Stage**	**Measured Value**	**Measured value (Max)**	**Remarks**			
					Location	**Frequency**	**Implementation**	**Supervision**
Ground Water Level	m	Design Stage				2 times during dry and wet season	Constriction through approved monitoring stage	RDA/ESD
		Construction Stage				On Complain		
		Operation Stage			Imbulpe	2 times with an interval of 6 months for 3 year time	DRA through approved monitoring agency	

Item	Unit	Stage	Measured Value	Measured value (Max)	Remarks			
					Location	Frequency	Implementation	Supervision
Ground Water Level	m	Design Stage				2 times during dry and wet season	Constriction through approved monitoring stage	RDA/ESD
		Construction Stage				On Complain		
		Operation Stage			Pussalla	2 times with an interval of 6 months for 3 year time	DRA through approved monitoring agency	

Waste/Spoil Disposals

Monitoring Item	Monitoring Result during Report Period
Adequateness of slope drainage design	As per the approved Design
Protection of drainage outline against score and erosion	Drainage paths were covered by tarpaulin or disturbed by aggregates where possible.
Complaints on land acquisition and resettlement issue	No Complaints and issues
Disruption of drinking or irrigation water	Earth works were mostly carried out in dry period. Erosion, canal bank erosion and sedimentation of surface water bodies were minimized through water pooling, silt traps and temporary drains. Tarpaulin sheets were used for cover the soil when heavy rains occurred. Spills of oil and chemicals from machines and vehicles were avoided through proper and timely maintenance.
Adequateness of spoil tipping away	Earth removed is used for backfilling and soil that cannot be reused were disposed in an approved disposal yard. Adequate facilities available for quick removal of soil.