第 8 章

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Standard 0066

SRI LANKA STANDARD 614 : 2013

UDC 663.6

SPECIFICATION FOR
POTABLE WATER

(First Revision)

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard
SPECIFICATION FOR POTABLE WATER
(First Revision)

SLS 614 : 2013

Gr. 6

SRI LANKA STANDARDS INSTITUTION
17, Victoria Place
Elvitigala Mawatha
Colombo – 08
Sri Lanka

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

Sri Lanka Standard
SPECIFICATION FOR POTABLE WATER
(First Revision)

FOREWORD

This standard was approved by the Sectoral Committee on Agricultural and Food Products and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2013-08-28.

This standard is intended mainly to guide food processing industry in judging the suitability of a particular supply/source of water for that industry and in planning the type of treatment required for available supplies/sources of water.

This standard was first published in 1983 as two parts; namely; Part 1-Physical and chemical requirements and Part 2 - Bacteriological requirements. While reviewing this standard, it was considered desirable to amalgamate both parts into one comprehensive standard, for ease of reference to users.

This revision has been undertaken to take into account the uptodate information available about the nature and effect of various contaminants and also the new techniques for identifying and determining their concentrations.

In this revision, additional requirements for sodium, nickel and for biological requirements have been incorporated while the requirements for other parameters have been modified considering the results of water quality surveillance done in Sri Lanka and also the WHO Guidelines, wherever applicable. Details on methods of sampling and testing have been removed from this standard and are now covered in separate standards, reference to which have been made at appropriate places.

While revising this standard, the Committee had taken note of the limited testing facilities available in the country. Therefore, requirements specified in 4.2 and 4.4 should be examined either when a doubt arises or the potability of water from a new source is to be established.

Routine surveillance of drinking water supplies should be carried out by the relevant authorities to monitor the risk of specific pathogens and to define proper control procedures. The WHO Guidelines for Drinking Water Quality (latest edition) may be referred for specific recommendations on using a water safety approach incorporating risk identification. Precautions / care should be taken to prevent contamination of drinking water from chlorine resistant parasites such as *Cryptosporidium* species and *Giardia* species.

This standard is subject to the restrictions imposed under the Sri Lanka Food Act No. 26 of 1980 and the regulations framed thereunder, wherever applicable.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis shall be rounded off in accordance with **SLS 102**. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

In revising this standard, the assistance derived from the World Health Organization's (WHO) Guidelines for drinking water quality (Fourth edition, 2011) and Guidelines for United States Environmental Protection Agency (USEPA) is gratefully acknowledged.

1 SCOPE

This standard prescribes the requirements, test methods and sampling procedure for ascertaining the suitability of water for drinking, culinary and food industry purposes irrespective of the water source, treatment or distribution system whether it is from a public or private supply.

2 REFERENCES

Analytical methods for drinking water and ground water US Environmental Protection Agency (USEPA)
SLS 102 Rules for rounding off numerical values
SLS 1461 Microbiological test methods for water
Part 1 Detection and enumeration of *Eschrichia coli* and coliform bacteria
Section 1 Membrane filtration method
Section 2 Most probable number method
Section 3 Reference method
SLS 1462 Methods for Sampling of water
Part 1 Guidance on the design of sampling programmes and sampling techniques
Part 2 Preservation and handling of water samples
Part 3 Guidance on sampling from lakes, natural and man- made
Part 4 Guidance on sampling of rivers and streams
Part 5 Guidance on sampling of drinking water from treatment works and piped distribution system
Part 6 Guidance on sampling of ground waters
Part 7 Guidance on the design and installation of groundwater monitoring points
Part 8 Guidance on sampling of drinking water distributed by tankers or means other than distribution pipes.
Part 9 Guidance on passive sampling in surface waters
Part10 Sampling for microbiological analysis
Standards Methods for the Examination of Water and Wastewater, 21st edition (2005) published by American Public Health Association, USA (APHA).

3 DEFINITIONS

For the purpose of this standard, the following definitions shall apply :

3.1 cyanobacteria: Bacteria containing chlorophyll and phycobilins, commonly known as "blue green algae."

3.2 cyanotoxin : A toxin secreted by certain cyanobacteria.

3.3 potable water : Water from any source with or without treatment complying with the requirements specified in this standard.

3.4 raw water : Water which has received no treatment whatsoever, or water entering a plant for treatment or further treatment.

4 REQUIREMENTS

4.1 Physical, organoleptic and chemical requirements

Potable water shall conform to the requirements given in Table **1, 2** and **3,** when tested in accordance with the methods given in the Columns **4** or **5** of relevant tables.

Table 1- Physical and organoleptic requirements

SI No. (1)	**Characteristic** (2)	**Requirement** (3)	**Method of test** (4)
i)	Colour, Hazen Units, (max.)	15	APHA 2120 B
ii)	Odour	Unobjectionable	Sensory evaluation [a)]
iii)	Taste	Unobjectionable	Sensory evaluation [b)]
iv)	Turbidity, NTU,* (max.)	2	APHA 2130 B
v)	pH at 25 $^{O}C \pm 2\ ^{O}C$	6.5 to 8.5	APHA 4500-H^{+}B

[a)] *Test cold and when heated; Test at several dilutions (Alternative method -Threshold odour test,* APHA 2150 B*)*

[b)] *Test to be conducted only after safety has been established (Alternative method* APHA 2160 B, C*)*

* NTU *Nephelometric Turbidity Units*

Table 2- Chemical requirement

SI No.	Substance or Characteristic	Requirement mg/l (maximum)	Method of test	
			Referee method	Alternative method
(1)	(2)	(3)	(4)	(5)
i)	Aluminium (as Al)	0.2	APHA 3113 B	-
ii)	Ammonia;			
	Free ammonia (as NH_3)	0.06	Appendix A	-
	Albuminoid ammonia	0.15	Appendix A	-
iii)	Anionic detergents (as MBAS)	0.2	APHA 5540 C	-
iv)	Calcium (as Ca)	100	APHA 3500 Ca B	-
v)	Chloride (as Cl^-)	250	APHA 4500-Cl B	APHA 4110 B
vi)	Chemical Oxygen Demand (COD)	10	APHA 5220 B	-
vii)	Copper (as Cu)	1.0	APHA 3111 B	ICP-MS (APHA 3125,EPA 200.8)
viii)	Fluoride (as F^-)	1.0	APHA 4500-F^- C	APHA 4110 B
ix)	Free residual chlorine	1	APHA 4500-Cl G	-
x)	Iron (as Fe) [c]	0.3	APHA3500-Fe B	APHA 3111B
xi)	Magnesium (as Mg)[d]	30	APHA 3500-Mg B	-
xii)	Manganese (as Mn)[c]	0.1	APHA 3111 B	ICP-MS (APHA 3125,EPA 200.8)
xiii)	Nitrate (as NO_3^-)	50	APHA 4500 -NO_3^- E	APHA 4110 B
xiv)	Nitrite (as NO_2^-)	3	APHA 4500 -NO_2^- B	APHA 4110 B
xv)	Nickel (as Ni)	0.02	APHA 3113 B	ICP-MS (APHA 3125,EPA 200.8)
xvi)	Oil and grease	0.2	APHA 5520 B	-
xvii)	Phenolic compounds (as C_6H_5OH)	0.001	APHA 5530 B & D	-
xviii)	Sodium (as Na)	200	APHA 3111 B	-
xix)	Sulphate (as SO_4^{2-})	250	APHA 4500 SO_4^{2-} E	APHA 4110 B
xx)	Total alkalinity (as $CaCO_3$)	200	APHA 2320 B	-
xxi)	Total dissolved solids, mg/l, (max.)	500	APHA 2540-C	-
xxii)	Total hardness (as $CaCO_3$), mg/l, (max.)	250	APHA 2340-C	-
xxiii	Total phosphates (as PO_4^{3-})	2.0	APHA 4500-PC	APHA 4110 B
xxiv)	Zinc (as Zn)	3.0	APHA 3111 B	-

[c] *Total concentration of Manganese (as Mn) and Iron (as Fe) shall not exceed 0.3 mg/l*

[d] *Not more than 30 mg/l, if there is 250 mg/l sulphate. If there is less sulphate, magnesium upto 150 mg/l may be allowed*

Table 3- Limits for toxic substances

SI No.	Characteristic	Limit mg/l (maximum)	Method of test	
			Referee method	Alternative method
(1)	(2)	(3)	(4)	(5)
i)	Arsenic (as As)	0.01	APHA 3114C	ICP-MS(APHA 3125, EPA 200.8)
ii)	Cadmium (as Cd)	0.003	APHA 3113B	ICP-MS(APHA 3125, EPA 200.8)
iii)	Chromium(as Cr)	0.05	APHA 3114C	ICP-MS(APHA 3125, EPA 200.8)
iv)	Cyanide (as CN)	0.05	APHA (4500-CN C; EPA 335.4)	APHA 4500-CN G APHA 4500-CN H
v)	Lead(as Pb)	0.01	APHA 3113B	ICP-MS(APHA 3125, EPA 200.8)
vi)	Mercury (as Hg)	0.001	APHA 3111B	ICP-MS(APHA 3125, EPA 200.8)
vii)	Selenium (as Se)	0.01	APHA 3114C	ICP-MS(APHA 3125, EPA 200.8)

4.2 Pesticide residues

Pesticide residues shall not exceed the guideline values specified in WHO Guidelines for Drinking Water Quality*. The analysis of pesticide residues shall be conducted preferably by an accredited laboratory using internationally established test methods (see **6**).

* *The latest edition should be used.*

NOTE : *Tests for Pesticide residues may not be necessary for routine analysis and carried out only if required or requested.*

4.3 Bacteriological requirements

The bacteriological requirements for potable water are based on the examination of several samples taken from the supply source under different conditions. The samples obtained as prescribed in 5, when examined by the methods given in **SLS 1461 Part 1/ Section 1 or Section 2 or Section 3**, shall comply with the following requirements:

4.3.1 *Treatment works and piped distribution systems*

4.3.1.1 *E. coli* or thermotolerant coliform bacteria** shall not be detectable in any 100 ml sample.

4.3.1.2 Total coliform bacteria shall not exceed 3 in any 100 ml sample.
Total coliform bacteria shall not be detectable in 100 ml of any two consecutive samples.

4.3.1.3 In the case of large supplies, where sufficient samples are examined total coliform bacteria shall not be present in 95 per cent of samples taken throughout any 12 month period.
In the remaining 5 per cent sample total coliform bacteria shall not exceed 10 per 100 ml.

4.3.2 ***Individual or small community supplies****

4.3.2.1 *E.coli* or thermotolerant coliform bacteria** shall not be detectable in any 100 ml sample.

4.3.2.1 Total coliform bacteria shall not exceed 10 in any 100 ml sample.

** *Although E.coli is the more precise indicator of faecal pollution, the count of thermotolerant coliform bacteria is an acceptable alternative. If necessary, proper confirmatory tests must be carried out.*
*** *Individual or small community supplies include wells, bore holes and springs.*

NOTE : *Immediate investigation action must be taken if E. coli are detected.*

4.4 Biological requirements

4.4.1 The potable water shall be free from microscopic organisms such as algae, zooplanktons, flagellates, parasites and toxin producing organisms.

4.4.2 ***Cylindrospermopsin******

Based on health considerations, the concentration of anatoxin-a(S) in potable water shall not exceed 0.002 mg/l.

Referee method - LC-MS (Eaglesham et al 1999; Dell'Aversano et al 2004).
Alternative method - HPLC-PDA (Harada et al 1994; Torokne et al 2004).

4.4.3 ***Microcystins******

Based on health considerations, the concentration of microcystins (measured as MC-LR toxicity equivalents) in potable water shall not exceed 0.001mg/l.

Referee method - HPLC-UV/PDA (Lawton et al 1994: Meriluoto 1997).
Alternative methods - LC –MS (Zweigenbaum et al 2000; (Barco et al 2002; (Spoof et al 2003), ADDA – ELISA (Fisher et al 2001).

**** *Toxins of Cyanobacteria*

NOTE : *Examination for biological requirements may not be necessary for routine analysis and carried out only if required or requested.*

5 SAMPLING

5.1 For physical, organoleptic and chemical requirements

Representative samples of potable water shall be drawn as prescribed in **SLS 1462.**

The recommendations given in Part **1** of **SLS 1462** shall be used as the basis for a sampling programme, and the recommendations given in Part **2, 3, 4, 5, 6, 7, 8** and **9** of **SLS 1462** shall be used as the basis for implementing the sampling programme.

NOTE: *Sampling frequency should be increased at times of flooding or emergency operations and following repair work or interruptions to supply.*

5.2 For bacteriological and biological requirements

5.2.1 Representative samples of water shall be drawn as prescribed in Part **1** and Part **10** of **SLS 1462**.

5.2.2 In addition, the recommended minimum number of samples to be examined each month are given in Table **4**.

Table 4- Frequency of sampling for distribution networks

Type of water supply and population	Total number of samples per month
Point sources	Progressive sampling of all sources over 3- to 5- year cycles (maximum)
Piped supplies	
< 5000	01
5000-100 000	01 per 5000 population
>100 000 – 500 000	01 per 10 000 population plus an additional 10 samples
>500 000	01 per 50 000 population plus an additional 50 samples

5.2.3 Sample bottles for bacteriological testing shall be brought to the laboratory for testing within 12 h of sampling. If this is not possible, the samples shall be stored below 10 °C and transported to the testing laboratory within 24 hours.

6 METHODS OF TEST

6.1 Samples obtained as described in **5** shall be tested for the relevant requirements of this standard as prescribed in following publications and also in Appendix **A**.

1 Standards Methods for the Examination of Water and Wastewater , 21st edition (2005) published by the American Public Health Association, USA (APHA).
2 Analytical methods for drinking water and ground water US Environmental Protection Agency (USEPA) 2003.

6.2 Bacteriological tests shall be carried out according to methods given in sections **1**, **2** and **3** of **SLS 1461** Part **1**.

7 CRITERIA FOR CONFORMITY

The sample of potable water obtained for testing shall be considered as conforming to the requirements of this standard, when tested as in **6,** satisfies all the relevant requirements.

APPENDIX A
DETERMINATION OF FREE AMMONIA AND ALBUMINOID AMMONIA

A.1 REAGENTS

A.1.1 *Magnesium carbonate,* solid

A.1.2 *Permanganate solution,* alkaline

A.1.2.1 Dissolve 8 g potassium permanganate in distilled water, add 200 g of sodium hydroxide, dissolve and make up to one litre. Before using the solution, add an equal volume of distilled water, and then boil until the solution is restored to its original volume.

A.1.3 *Mercuric iodide,* alkaline solution (Nessler reagent)

A.1.3.1 Prepare a cold saturated solution of mercuric chloride – (a). Dissolve 35 g of potassium iodide in 100 ml, of distilled water – (b). Pour (a) into (b) until, after thorough agitation, a slight red precipitate remains permanent. Now add 120 g of sodium hydroxide and, when dissolved, dilute to one litre. Finally, add a little more of the mercuric chloride solution to produce a red colour. Set aside to clear.

A.1.3.2 The delicacy of the reagent appears to be increased by keeping for a few weeks before use, and it should be shaken occasionally.

A.1.4 *Distilled water,* ammonia - free

A.1.4.1 This can be prepared by re-distillation of distilled water after the addition of a few drops of dilute sulphuric acid. Alternatively, free ammonia may be removed by passing the distilled water through a bed of suitable ion-exchange resin (strong cation exchanger); if this method is adopted it is desirable to use an analytical grade of resin (a mixed cation and anion exchange resin is recommended) or a commercial deionization apparatus may be employed.

A.1.4.2 A further alternative is to treat the distilled water with sufficient hypochlorite to oxidize the ammonia (use an available chlorine base equal to at least 10 times the ammoniacal nitrogen content): excess of chlorine may then be dissipated by allowing the water to stand in direct sunlight. This method, while satisfactory, has the disadvantage that, even in strong sunlight, the excess of chlorine may persist for over a week.

A.1.5 *Ammonium chloride,* standard solution

A.1.5.1 Dissolve 3.82 g of ammonium chloride, dried at 100 °C, in distilled ammonia-free water and make up to one litre.
Dilute 10 ml, with ammonia-free water to 1 000 ml when required for use.

$$1 \text{ ml} = 0.01 \text{ mg N}$$

A.2 PROCEDURE

A.2.1 General procedure for determination of ammoniacal nitrogen by nesslerization

A.2.1.1 For the determination of ammonia by Nesslerization, 50-ml, Nessler cylinders of colourless glass and of uniform height of graduation are required.

A.2.1.2 To prepare standards place appropriate amounts of dilute standard ammonium chloride solution within the range of 0.3 ml to 3.0 ml into 50-ml Nessler cylinders and dilute to the mark with ammonia-free distilled water.

A.2.1.3 Place 50 ml of the unknown solution into a Nessler cylinder, add 2 ml of Nessler reagent and mix well. At the same time add 2 ml of Nessler reagent to each of the standards. Allow to stand 5 minutes and match.

A.2.1.4 Alternatively, permanent colour standards in a suitable colorimeter may be employed, provided such standards are checked frequently, using the dilute standard ammonium chloride solution to ascertain any correction which must be applied owing to variations in the Nessler reagent.

A.2.1.5 In all determinations of ammoniacal and albuminoid nitrogen care must be taken to avoid contamination of the solutions and the apparatus by fumes of ammonia derived from other operations in the laboratory.

A.2.1.6 The results calculated in terms of ammonia :

$$NH_3 = N \times 1.216$$

A.2.2 Determination of free ammonia

A.2.2.1 Use a 1ℓ distillation flask with a suitable condenser. Ensure that it is free from ammonia by distilling a little water in it until the distillate is ammonia-free.

A.2.2.2 Empty the flask and add 500 ml of the sample followed by approximately 0.2 g of magnesium carbonate. Distil over four 50-ml portions, commencing the distillation slowly. Add Nessler reagent to the portions and match as described above. If the content of free ammonia is expected to be high, however, collect the first 100 ml of distillate, mix and take an aliquot portion for ammonia determination ; and subsequent 50-ml portions of the distillate should then be tested according to the general procedure.

A.2.2.3 If the fourth 50-ml portion contains ammonia, distil over further portions until it is absent, and finally add ammonia-free distilled water to make up the volume of residue in the distillation flask to 300 ml.

A.2.3 Determination of albuminoid ammonia

A.2.3.1 Add 25 ml of alkaline permanganate solution to the 300 ml of boiling water left after the distillation of free ammonia. If desired, add some coarsely-ground ignited pumice to avoid bumping. Distil over four 50-ml portions, the total time of distillation being not less than 15 minutes or more than 25 minutes. Determine the ammonia in each portion as previously described.

A.2.3.2 If the content of albuminoid nitrogen is considerable it is more convenient to collect the first 100 ml of distillate and take an aliquot portion for ammonia determination, subsequent 50 ml portions of the distillate then being tested according to the general procedure.

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Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

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SRI LANKA STANDARDS INSTITUTION

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The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

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In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of Standardization as are of special interest to Sri Lanka.

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Wahalkada Raw - Water Quality Report

No	Region	Sample location	Date	Color (HAZAEN UNIT)	Turbity (NTU/FTU)	pH	Electrical conductivity at 25 (µs/cm)	Chloride (as Cl) - mg/L	Total Alkaliniity (as $CaCO_3$) -mg/L	Total Hardness (as $CaCO_3$)- mg/L	Nitrate (as N) -mg/L	Nitrite (as N) -mg/L	Sulphate (as So_4)- mg/L	Flouride (as F) - mg /L	Phosphate (as PO_4^{3-}) -mg/L	Total Iron (as Fe) -mg/L	Total Coliform at 35 C /100 ml	Escherichia Coli at 44 C /100 mL
1	Anuradhapura	Wahalkada wewa	2012.06.19	<20	33.80	8.52	270	28	92	112	1.10	-	2	0.30	0.21	0.00	10	Nil
2	Anuradhapura	Wahalkada wewa	2012.07.05	<20	4.94	8.31	280	20	110	110	4.80	0.026	2	0.26	0.31	0.24	20	4
3	Anuradhapura	Wahalkada wewa	2012.08.14	<20	18.88	8.48	300	32	100	96	0.20	0.005	1	0.43	0.23	0.07	8	Nil
4	Anuradhapura	Wahalkada wewa	2012.09.13	<20	29.70	8.32	290	36	104	100	0.40	0.004	1	0.44	0.13	0.07	10	Nil
5	Anuradhapura	Wahalkada wewa	2012.10.10	<20	29.00	8.00	280	20	80	100	NT	0.001	NT	0.31	NT	0.13	Nil	Nil
6	Anuradhapura	Wahalkada wewa	2012.11.13	17	7.57	7.74	210	32	88	68	NT	0.008	NT	0.18	NT	0.05	Nil	Nil
7	Anuradhapura	Wahalkada wewa	2012.12.05	17	7.48	7.23	200	28	84	100	NT	0.004	NT	0.15	NT	0.04	30	Nil
8	Anuradhapura	Wahalkada wewa	2013.01.07	19	3.01	7.53	200	24	96	100	0.30	0.003	8	0.15	0.89	0.04	18	4
9	Anuradhapura	Wahalkada wewa	2013.02.13	28	5.63	7.64	210	24	92	96	3.00	0.002	NT	0.12	0.18	0.72	18	6
10	Anuradhapura	Wahalkada wewa	2013.03.01	28	2.47	7.60	230	60	76	48	0.40	0.001	1	0.35	0.38	0.03	Nil	Nil
11	Anuradhapura	Wahalkada wewa	2013.04.10	36	7.63	7.45	220	56	80	60	0.50	0.001	2	0.36	0.40	0.04	10	Nil
12	Anuradhapura	Wahalkada wewa	2013.05.17	29	5.84	7.41	230	44	88	72	0.60	0.001	1	0.34	0.48	0.04	28	6
13	Anuradhapura	Wahalkada wewa	2013.06.03	29	20.60	7.69	220	36	100	88	0.10	0.002	01	0.26	0.26	0.06	Nil	Nil
14	Anuradhapura	Wahalkada wewa	2013.07.03	29	10.45	8.37	240	20	96	72	0.10	0.002	04	0.24	0.43	0.07	40	Nil
15	Anuradhapura	Wahalkada wewa	2013.08.06	15	9.99	7.72	260	32	100	80	0.20	0.003	02	0.18	0.47	0.22	40	Nil
16	Anuradhapura	Wahalkada wewa	2013.09.08	16	9.69	7.88	270	30	96	88	0.10	0.003	03	0.15	0.40	0.02	56	Nil
17	Anuradhapura	Wahalkada wewa	2013.10.15	38	8.90	7.71	290	20	96	92	0.30	0.002	02	0.25	0.20	0.02	14	Nil
18	Anuradhapura	Wahalkada wewa	2013.11.26	80	17.77	8.02	230	28	96	68	0.60	0.001	05	0.14	0.38	0.14	180	6
19	Anuradhapura	Wahalkada wewa	2013.12.26	80	12.95	7.39	250	24	68	80	0.50	0.004	04	0.26	0.11	0.17	38	Nil
20	Anuradhapura	Wahalkada wewa	2014.01.20	83	8.84	7.32	260	60	88	72	0.10	0.002	01	0.36	0.17	0.05	66	40

TNTC - Too Numerous to count NT - Not tested

Wahalkada Raw - Water Quality Report

No	Region	Sample location	Date	Color (HAZAEN UNIT)	Turbity (NTU/FTU)	pH	Electrical conductivity at 25 (µs/cm)	Chloride (as Cl) - mg/L	Total Alkaliniity (as $CaCO_3$) -mg/L	Total Hardness (as $CaCO_3$)- mg/L	Nitrate (as N) -mg/L	Nitrite (as N) -mg/L	Sulphate (as So_4)- mg/L	Flouride (as F) - mg /L	Phosphate (as PO_4^{3-}) -mg/L	Total Iron (as Fe) -mg/L	Total Coliform at 35 C /100 ml	Escherichia Coli at 44 C /100 mL
21	Anuradhapura	Wahalkada wewa	2014.02.08	68	14.96	7.58	271	24	80	84	0.30	0.004	01	0.30	0.18	0.10	66	0
22	Anuradhapura	Wahalkada wewa	2014.03.19	38	14.04	7.95	260	20	92	70	<0.1	<0.001	1	0.19	0.10	0.05	94	30
23	Anuradhapura	Wahalkada wewa	2014.04.21	22	7.06	7.76	270	20	80	100	0.10	0.009	2	0.30	0.20	0.06	120	0
24	Anuradhapura	Wahalkada wewa	2014.05.25	28	9.49	8.23	280	28	100	130	0.20	0.001	02	0.20	0.21	0.10	86	6
25	Anuradhapura	Wahalkada wewa	2014.06.16	14	3.12	8.17	290	28	100	100	<0.1	<0.001	02	0.28	0.17	0.08	110	0
26	Anuradhapura	Wahalkada wewa	2014.07.08	35	18.30	8.67	300	36	80	100	0.10	0.001	03	0.32	0.32	0.06	400	30
27	Anuradhapura	Wahalkada wewa	2014.08.15	28	10.98	7.44	360	44	80	110	0.20	0.001	04	0.36	0.32	0.08	60	12
28	Anuradhapura	Wahalkada wewa	2014.09.13	18	4.28	7.60	310	40	110	110	0.20	0.002	04	0.34	0.17	0.02	186	82
29	Anuradhapura	Wahalkada wewa	2014.10.12	60	57.60	8.43	300	24	100	100	<0.1	0.002	05	0.30	0.07	0.17	392	176
30	Anuradhapura	Wahalkada wewa	2014.11.16	50	24.30	7.09	270	24	90	110	0.60	0.003	05	0.39	0.21	0.07	0	0
31	Anuradhapura	Wahalkada wewa	2014.12.23	30	11.33	6.73	180	12	80	90	0.20	0.004	07	0.33	0.19	0.99	820	0
32	Anuradhapura	Wahalkada wewa	2015.01.11	21	6.81	7.16	180	12	60	90	0.20	0.004	05	0.21	0.19	0.98	300	104
33	Anuradhapura	Wahalkada wewa	2015.02.25	13	2.95	7.17	190	12	90	80	0.70	0.004	<01	0.18	0.28	0.08	432	212
34	Anuradhapura	Wahalkada wewa	2015.03.31	15	5.56	8.18	280	24	180	110	0.60	0.052	01	0.28	0.38	0.28	TNTC	296
35	Anuradhapura	Wahalkada wewa	2015.04.29	65	53.60	7.88	220	20	120	130	0.10	0.002	01	0.24	0.40	0.02	550	64
36	Anuradhapura	Wahalkada wewa	2015.05.26	28	18.34	8.45	230	25	100	80	1.76	0.017	01	0.27	0.60	0.01	100	0
37	Anuradhapura	Wahalkada wewa	2015.06.29	20	10.07	8.11	250	20	90	80	3.52	0.300	01	0.22	0.31	0.01	TNTC	TNTC
38	Anuradhapura	Wahalkada wewa	2015.07.22	22	15.41	8.29	260	40	100	120	3.52	0.030	01	0.22	0.33	0.06	348	148
39	Anuradhapura	Wahalkada wewa	2015.08.19	21	12.90	7.89	270	30	140	182	0.88	0.003	01	0.32	0.26	0.10	84	0
40	Anuradhapura	Wahalkada wewa	2015.09.28	20	14.24	8.35	308	32	100	88	0.88	0.013	01	0.24	0.16	0.07	432	60
41	Anuradhapura	Wahalkada wewa	2015.10.28	18	11.25	7.90	228	28	110	92	0.00	0.020	00	0.34	0.05	0.13	184	60

TNTC - Too Numerous to count NT - Not tested

ශ්‍රී ලංකා ප්‍රජාතාන්ත්‍රික සමාජවාදී ජනරජයේ ගැසට් පත්‍රය

අති විශෙෂ

The Gazette of the Democratic Socialist Republic of Sri Lanka

EXTRAORDINARY

අංක 1887/20 - 2014 නොවැම්බර් මස 05 වැනි බදාදා - 2014.11.05

No. 1887/20 - WEDNESDAY, NOVEMBER 05, 2014

(Published by Authority)

PART I : SECTION (I) — GENERAL

Government Notifications

L .D. B. 4/81(II).

NATIONAL ENVIRONMENTAL ACT, No. 47 OF 1980

REGULATIONS made by the Minister of Environment and Renewable Energy under Section 32 of the National Enviornmental Act, No. 47 of 1980 read with Section 23J and 23K of the aforesaid Act.

SUSIL PREMAJAYANTHA,
Minister of Enviornment and Renewable Energy.

Colombo,
17th October 2014.

Regulations

The National Enviornmental (Air Emission, Fuel and Vehicle Importation Standards) Regulations No. 01 of 2003, published in the Gazette Extraordinary No. 1295/11 and dated June 30, 2003 as amended by the regulations published in the Gazette Extraordinary No. 1557/14 dated July 09, 2008, are hereby amended as follows :–

(1) by the repeal of paragraphs (1) and (2) of regulation 4 thereof, and the substitution therefor of the following :-

"4. (1) The Commissioner General of Motor Traffic and the Director General of the Central Enviornmental Authority shall, for the purpose of these regulations, authorize any vehicle emission testing center to be an accredited vehicle emission testing center for the purpose of testing and certifying the vehicular exhaust emission levels of any motor vehicle.

(2) No person shall operate a vehicle emission testing centre without a valid Environmental Protection License obtained under Section 23A of the National Environmental Act, No. 47 of 1080." ;

(2) by the repeal of Schedule I thereof and the substitution therefor of the following :–

"FIRST SCHEDULE

(A) Petrol Vehicles

Type of Vehicle	Emission Standards		Remarks
	Carbon Monoxide CO (%V/V)	Hydrocarbon HC (ppm V/V)	
Petrol Vehicles other than Motor Cycles and Motor Tricycles	3.0	1000	Both Idling and 2500 RPM/no load
Petrol Motor Cycles	4.0	6000	Both Idling and 2500 RPM/no load
Petrol Motor Tricycles	4.0	6000	Both Idling and 2500 RPM/no load

Abbreviations :

% V/V - percent by volume

ppm V/V - parts per million by volume

RPM - Revolutions per minute

(B) Diesel Vehicles

Type of Vehicle	Emission Standards /K Factor (m^{-1}) based on Smoke Opacity	Remarks
Diesel Vehicles	4.0	On Snap Acceleration

Abbreviations :

K factor - Absorption Coefficient
Snap Acceleration - Has the same meaning as defined in SAE RECOMMENDED PRACTICE J 1667".

11- 560

PRINTED AT THE DEPARTMENT OF GOVERNMENT PRINTING, SRI LANKA.

25 2013

මධ්‍යම පරිසර අධිකාරිය
மத்திய சுற்றாடல் அதிகாரசபை
Central Environmental Authority

ඔබේ යොමුව
உமது தொடர்பு
Your Ref.

අපේ යොමුව
எமது தொடர்பு
Our Ref. NCPO/AD/08/07/48/2015-L

දිනය
திகதி
Date 2015-09-23

පරිසර පියස , 104, ඩෙන්සිල් කොබ්බෑකඩුව මාවත, බත්තරමුල්ල, ශ්‍රී ලංකාව.
"பரிசர பியச", 104, டென்சில் கொப்பேகடுவ மாவத்தை, பத்தரமுல்லை, இலங்கை.
"Parisara Piyasa", 104, Denzil Kobbekaduwa Mawatha, Battaramulla, Sri Lanka.
Web : www.cea.lk

North Central Provincial office,
No.388/40,
Harishchandra mawatha,
Anuradhapura

Chairmen,
Horowpothana Pradeshiya Sabha,
Horowpothana.

Dear Sir,

Obtaining Enviromental Recommendation From The Central Enviromental Authority For The Water Purification Plant At Wahalkada North Water Supply Project Phase 2 Proposed By The National Water Supply And Drainage Board

This has reference to National Water Supply and drainage board application dated 31st August 2015 regarding the above matter.

This is to inform you that this authority recommended granting approval to establish the above proposed water Purification plant at the above location subject to the following conditions. Which should strictly adhered by the developer to abate Environmental impact likely to arise from the construction of the said activities.

CONDITION

01 1.1 The location of the proposed activities at the above site should conform to the zoning plan of the area.

1.2 Consent from the land owner should be obtained in prior to commence any activity within the site.

1.3 The ownership consent of the relevant land of this project shall be confirmed to this Authority by the project proponent before commencing the construction activities.

1.4 No construction activity either temporary or permanent will be allowed in the reservation area. Landscaping could be carried out to enhance the Visual Environmental of the area.

02 2.1 Noise levels at the boundary of the project premises should be maintained at or below 55 dB (A) during day (between 6.00 hrs to 18.00 hrs) and at or below 45 dB(A) during the night time (between 18.00 hrs to 06.00 hrs)

2.2 Noise levels at the boundary of the project activities during the construction stage should be maintained at or below 75 dB (A) during day (between 6.00 hrs to 21.00 hrs) and at or below 50 dB (A) during the night time (between 21.00 hrs to 06.00 hrs)

2.3 Operation of the excessive noise generating activities should be carried out in the enclosed area.

2.4 Installations of excessive noise and vibration generation activities shall be installed on a resilient foundation.

2.5 If you use the electricity generators, they should be installed in an enclosed area such a way to maintain the noise levels at the boundary as given in the No 2.1.

03 Adequate soil conservation & drainage management measures should be taken during construction and operation in consultation with the department of Agriculture, department of Irrigation & relevant Local Authority of the area.

04 4.1 Effluent arising from the domestic activities shall be released into a proper designed Septic tank / soakage pit.

4.2 Waste water (treated or untreated) should not be discharged into irrigation canals or Tanks.

4.3 Oil or grease should not be discharged into surface water drainage or on the ground.

05 5.1 The method of disposal of solid waste should be intimated to the relevant local authority and approval obtained.

5.2 Solid waste arising from the project activities should not be allowed to stagnate within the premises or dumped in neighboring lands and should not be disposed into any water body.

5.3 Solid waste should not be burnt in the open at any time.

5.4 Necessary arrangements should be provided to segregate the waste at the point of generation..

5.5 All recyclable solid waste such as polythene, Plastic, Glass Metal and Paper should be collected separately and dispatched to recycling centers periodically.

5.6 Solid waste, which cannot be used for recycling should be disposed in consultation with the Horowpothana Pradeshiya Sabha.

5.7 Effort should be taken to reduce the use of polythene, plastic, water bottles and cans etc.

5.8 Necessary guidelines for proper management of solid waste could be obtained from the solid waste Management division of the Central Environmental Authority.

06 Polythene or any polythene product of 20µm (20 microns) or below thickness shall not be used for the activity of the industry or domestic purposes.

07 The use of roads for transport particularly for heavy loads should be in agreement with the conditions stipulated by the respective Local Authority.

08 Suitable native tree species should be planted by the operator to minimize wind erosion and to enhance the aesthetic quality of the surroundings.

09 Any type of construction shall not be done within 100m limit from the full supply level of the tank of Wahalkada.

10 Prior approval of the Central Environmental Authority shall be obtained for installation or operation of any machinery other than those stated in the application dated 31-08-2015.

11 Prior approval of the Central Environmental Authority shall be obtained for any expansions, extensions or changes to the industry process or operation stated in the application dated 31-08-2015.

12 Any additional condition stipulated by the Central Environmental Authority as and when required for controlling any kind of pollution created by the operations of this project shall be strictly adhered to.

13 Good house keeping practices shall be adopted at every time.

14 The developer should obtain an Environmental Protection License in terms of the National Environmental (Protection and quality) Regulations No. 01 of 1990 published in the gazette Extra-Ordinary No 1533/16 dated 2008-01-25 from the Central Environmental Authority. three months prior to operation of the project and terms and conditions there in should be strictly adhere to.

15 This approval letter issued in relation to the above project should in no way be considered as a final approval granted for the sitting of the said project at this location. In order for this project to be established at the proposed location the written approval of the Horowpothana Pradeshiya Sabha is required.

16 This Environmental Recommendation letter is valid only for one-year period from the date of issue.

Yours faithfully,

G.M.K. Perera,
Deputy Director,
Central Environmental Authority,
North Central Provincial office.

Cc :

1. Divisional Secretary, Divisional Secretariat Office, Horowpothana. - For your Information Please.
2. Director, Department of Irrigation, Anuradhapura. - For your Information Please.
3. District Forest Officer, District Forest Office, Anuradhapura. - For your Information Please
4. Deputy Director General (EM&A), Central Environmental Authority, Battaramulla - For your Information Please
5. Chief Engineer, Regional support Center, National Water Supply & Drainage Board, Godage Mawatha, Anuradhapura. - For your Information Please.

Tele: 025 – 7877282 ***Fax: 025 – 2225999***

ප්‍රාදේශීය මහ ලේකම් කාර්යාලය - මිහින්තලය
Divisional Secretariat – Mihinthalaya
பிரதேச செயலகம் - மிகிந்தலய

1363

Fax - 025 – 2266658/ 025-2266872 E – mail:- dsmihintale@sltnet.lk

ප්‍රාදේශීය ලේකම්	සහකාර ප්‍රාදේශීය ලේකම්	ගණකාධිකාරී	සහකාර සැලසුම් අධ්‍යක්ෂ	කාර්යාල
Divisional Secretary	Asst. Divisional Secretary	Accountant	Asst. Director of Planning	Office
பிரதேச செயலாளர்	உதவி பிரதேச செயலாளர்	கணக்காளர்	உதவித் திட்டமிடல் பணிப்பாளர்	அலுவலகம்
025-2266660	025-2266915	025-2266872	025-2266026	025-2266658

මගේ අංකය : My No எனது இல

ඔබේ අංකය : Your No உமது இல

දිනය : ~~2014.12.29~~ Date திகதி 2015/04/06

ANWSP Account Section RECEIVED 23 APR 2015 NWS & DB

ANWSP RECEIVED 08 APR 2015 NWS & DB

ව්‍යාපෘති අධ්‍යක්ෂ,
උතුරු ජල සම්පාදන ව්‍යාපෘතිය,
ජල සම්පාදන හා ජලාපවහන මණ්ඩලය,
390-හරිස්චන්ද්‍ර මාවත,
අනුරාධපුර.

ජී.එම්.ආර්.පී.බී. ඒකනායක
ප්‍රාදේශීය ලේකම්
මිහින්තලේ

NWSDB ANWSP Account Section 23 APR 2015 PAID

ඉදිකිරීම් කටයුතු ආරම්භ කර ඇති නිවසේ අවසාන කොටස් ගෙවීම සම්බන්ධවයි

උක්ත කරුණ සම්බන්ධව යාය **01** වම ඉවුර මහකනදරාව යන ලිපිනයේ පදිංචි ඔ.ඒ අනුරසිරි මයාගේ නිවස පිහිටි ඉඩම ඔබ ආයතනයේ උතුරු ජල සම්පාදන ව්‍යාපෘතියේ ඉදිකිරීම් කටයුතු වලට පවරාගෙන ඇති බැවින් ඔබ ආයතනය මගින් ඔහුගේ නව නිවස ඉදිකිරීමට ලබා දී ඇති රු. **2,000,000.00** ප්‍රතිපාදන මුදලින් අවසාන කොටස් ගෙවීම ලෙස රු.**500,000.00** මුදලක් ලබාදෙන ලෙස ඉල්ලීමක් සිදුකර ඇත.

ඒ අනුව මිහින්තලේ ප්‍රාදේශීය ලේකම් කාර්යාලයේ කාර්මික නිළධාරි වරයාගේ ක්ෂේත්‍ර පරීක්ෂාවෙන් පසු පෙනීගොස් ඇත්තේ ඇස්තමේන්තු ප්‍රකාරව පලමු අදියර,දෙවන අදියර සහ තෙවන අදියරේ ඉදිකිරීම් කටයුතු අවසන්ව ඇති බවයි.එබැවින් අවසාන කොටස් ගෙවීම වන රු.**500,000.00** ලබාදීම නිර්දේශ කරමි.

④ PD
Payment of Rs 500,000/= as the last payment recommended on appl
22/04

① Eng(P)
Pl. check & recommend for appl.
08/04/2015

ප්‍රාදේශීය ලේකම්,
මිහින්තලේ
ජී.එම්.ආර්.පී.බී. ඒකනායක
ප්‍රාදේශීය ලේකම්
මිහින්තලේ.

Recommended

③ Add GM (WSP) / DGM (PE)
Recommended to Pay Rs. 500,000/= as last installment (4th installment) and forwarded for your approval Pl.
21/04/2015

② PE(ANWSP)
Recomended and forwarded to pay Rs 500,000.00 for last installment (4th) to Resetlement house owner O.A Anurasiri
.04.2015

⑤ Proj. Acct
Pl. effect the payment approved by Add GM (WSP)

එම්.එම්.ආර්.යූ. කුමාර
ව්‍යාපෘති ඉංජිනේරු
අ.ද.ප්.ස.ව්‍යාපෘතිය
2015.04.21

ව්‍යාපෘති ඉංජිනේරු
ඒ.පී.බී. පද්මසිරි මයා මගින්,

NWS & DB
ANWSP
Account Section
23 APR 2015
PAID

ව්‍යාපෘතිඅධ්‍යක්ෂ
අ.ද.ප්.ස.ව්‍යාපෘතිය

ඕ.ඒ. අනුරසිරි මහතාට කරුණා සහගත මුදල් ගෙවීම සම්බන්ධයෙසි

ඕ.ඒ. අනුරසිරි මහතා විසින් ඉදිකරමින් පවතින නව නිවසේ III අදියරේ ඉදිකිරීම් අවසන්ව ඇති බවත්, ඔහු පදිංචිව සිටි අනුරාධපුර උතුර ජලසම්පාදන ව්‍යාපෘතියේ ජල පිරිපහදුව, පොම්පාගාරය සහ නිල නිවාස ඉදිකිරීමට යෝජිත ඉඩමේ පිහිටි නිවසින් ඔහු ඉවත්ව ගොස් ඇති බවත් මා විසින් 2015.04.21 වන දින සිදු කරන ලද ක්ෂේත්‍ර පරීක්ෂාවේදී නිරීක්ෂණය කරන ලද බව දන්වා සිටිමි.

ඉදිකරමින් පවතින නව නිවසේ හා අ.ද.ප්.ස.ව්‍යාපෘතියේ ජල පිරිපහදුව ඉදිකිරීමට යෝජිත ඉඩමේ පිහිටි කඩා ඉවත් කරන ලද නිවසේ ඡායාරූප මේ සමඟ අමුණා එවමි.

එම්.එම්.ආර්.යූ. කුමාර
ව්‍යාපෘති ඉංජිනේරු

Project Director

North water supply Project

NWS&DB

890-Harishandra Mw

Anuradhapura

Payment of the final instalment of the house already commenced the construction work

We have been requested to make the final instalment of Rs.500,000 out of the provisional money of Rs.2,000,000 which is provided to build up a new house of Mr. Anurasiri whose land with his house at the Yaya 1 ,left Ivura, Mahakanadarawa which has been assigned for construction work of North water supply Project.

After several field visits of the technical officer of Mihinthale divisional secretariat, it has been proved that 1st 2nd and 3rd phases of the construction have been completed successfully. Therefore I recommend the final instalment of Rs.500,000 for the payment.

Divisional secretariat

…….

Mihinthale.

M.M.R.U Kumara

Project Engineer

Anuradhapura North Water Supply Project

2015.04.21

Through

Project Engineer

A.G.B Padmasiri

Project Director

Anuradhapura North Water Supply Project

Compensation for O.A Anurasiri

I have been observed that Mr.O.A Anurasiri has been evacuated from his land which was assigned to build up water treatment plant, pumping station and quarters for Anuradhapura North water Supply Project.

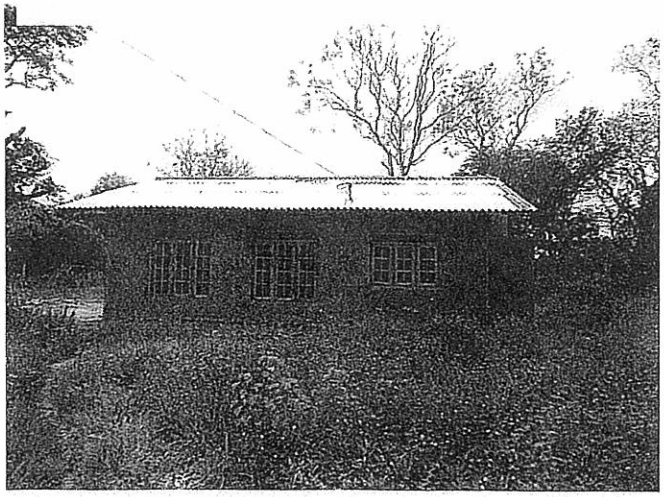
I have attached herewith the photos of his new house which is being constructing at the moment and the debris of his old house in the proposed land for water treatment plant, pumping station and quarters of Anuradhapura North water Supply Project.

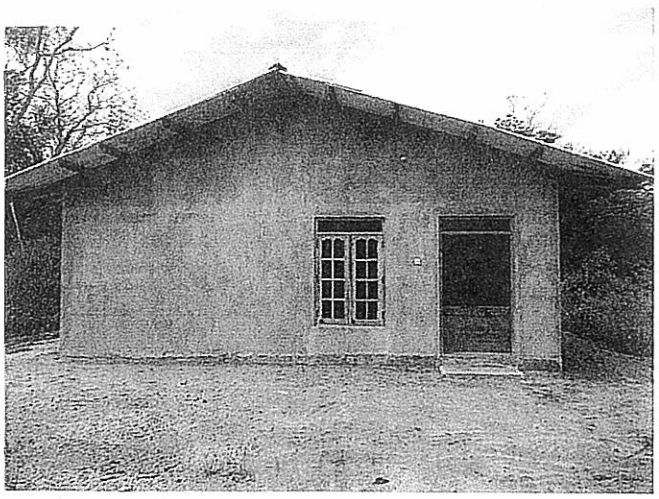
…….

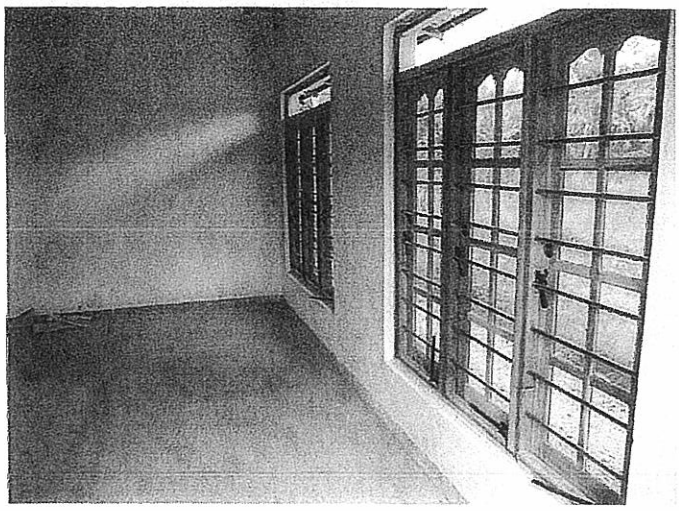
M.M.R.U Kumara

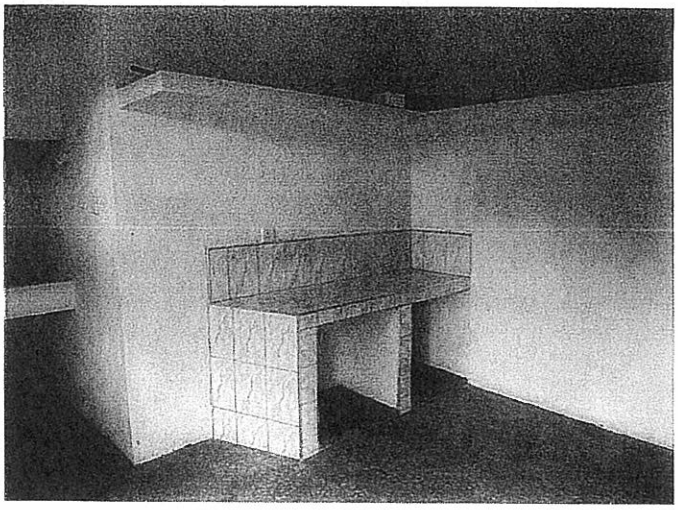
Project Engineer.

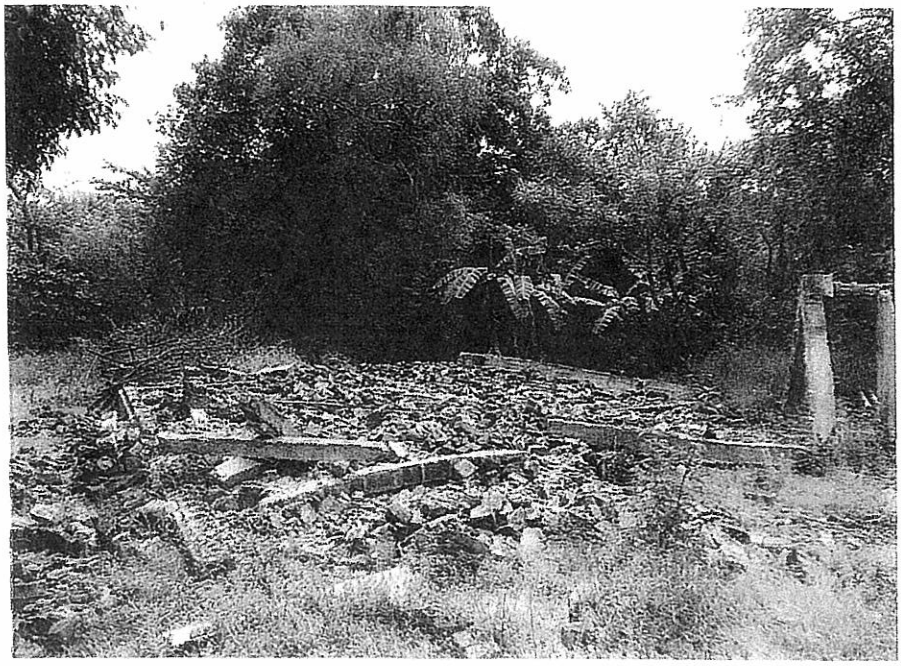
ඉදිකරමින් පවතින නව නිවස











NWS & DB
ANWSP
Account Section
23 APR 2015

කඩා ඉවත් කරන ලද නිවස

Oath by House owner

දිව්රුම් ප්‍රකාශයයි.

අනුරාධපුර දිස්ත්‍රික්කයේ, මිහින්තලේ ප්‍රාදේශීය ලේකම් කොට්ඨාශයේ මහකනදරාව වම් ඉවුර යාය 01 පදිංචි ඔත්නාපිටිය ආචාරිගේ අනුරසිරි (ජා.හැ. අංකයඃ 663193619v) නමැති මම සිංහල බෞද්ධාගමිකයෙකු ලෙස පහත සඳහන් පරිදි අවංක ලෙසත්, සත්‍ය ලෙසත් ප්‍රතිඥා දී ප්‍රකාශ කර සිටිමි.

1. මා විසින් මහකනදරා වාරි රක්ෂිතයට අයත් ඉඩමේ ස්ථිර නිවසක් සාදාගෙන මේ වනවිට වසර 10ක පමණ කාලයක් තිස්සේ පදිංචි වී සිටිමි.

2. මෙම ඉඩම සම්බන්ධයෙන් මා හට නීත්‍යානුකූල බලපත්‍රයක් ලැබී නොමැති අතර ඉඩම සම්බන්ධයෙන් නීතිමය අයිතියක් නොමැති බව දනිමි.

3. මෙම නිවසේ මා සමඟ මාගේ බිරිඳ වන හෙට්ටිආරච්චිගේ ශිරානි යන අය පදංචි වී සිටින අතර මා හට දරුවන් නොමැත.

4. මා පදිංචිව සටින නිවස ඇතුළත් වාරි රක්ෂිතයට අයත් ඉඩම අනුරාධපුර උතුර ජල සම්පාදන ව්‍යාපෘතියේ ජල පවිත්‍රාගාරය, පොම්පාගාරය සහ නිල නිවස ඉදි කිරීම සඳහා තෝරාගෙන ඇති බව හොඳාකාරව දන්නා අතර ඒ පිළිබඳව මාගේ විරුද්ධත්වයක් නොමැති බව ප්‍රකාශ කරමි.

5. මා පදිංචිව සිටින නිවස වෙනුවෙන් අනුරාධපුර උතුර ජල සම්පාදන ව්‍යාපෘතිය මඟින් ලැබෙන රුපියල් ලක්ෂ විස්සක (රු. 2,000,000.00) කරුණා සහගත දීමනා මුදලින්, මිහින්තලේ ප්‍රාදේශීය ලේකම්තුමා විසින් මාගේ නව නිවස ඉදිකිරීම සඳහා හඳුනාගෙන ඇති මහකනදරාව, යාය 01, ජනපද නිලධාරි කාර්යාලයට යාබදව පිහිටි රජයේ පොදු කටයුතු සඳහා වෙන්කර ඇති ඉඩමෙන් පර්චස් 20 ක් වූ කොටසෙහි අංග සම්පූර්ණ නව නිවසක් මා විසින් තනා නිමකර ගන්නා බව ප්‍රකාශ කරමි.

6. මා දැනට පදිංචිව සිටින නිවස වෙනුවෙන් ලැබෙන රුපියල් ලක්ෂ විස්සක (රු.2,000,000.00) කරුණා සහගත දීමනා මුදල රුපියල් ලක්ෂ පහක් (රු.500,000.00) බැගින් වූ වාරික 4 කට ලබා ගැනීමට එකඟත්වය ප්‍රකාශ කරමි.

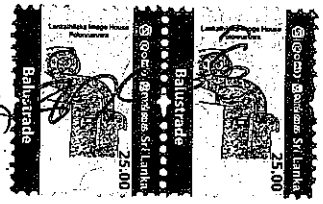
7. පළමු වාරිකය අත්තිකාරම් මුදලක් ලෙස ලබා ගන්නා අතර ඉතිරි සෑම වාරිකයක්ම ලබා ගැනීමට පෙර, පෙර ලබා ගත් මුදල් වලින් ඊට අදාල වැඩ කොටස නිමකර ඊළඟ වාරිකය ඉල්ලුම් කරන බවටද පොරොන්දු වෙමි.

ඵ.ඵ. ඉස්මායිල්
සාමවිනිසුරු (මුළු දිවයින)
52, කුසුම, හාලිවාදූව
අනුරාධපුරය.
අ.අ.අ.03/10/ලෙ/මුද්‍/ව/21

8. සෑම වාරිකයක් සඳහාම මිහින්තලේ ප්‍රාදේශිය ලේකම්තුමාගේ නිර්දේශය සහිතව අනුරාධපුර උතුර ජල සම්පාදන ව්‍යාපෘති අධ්‍යක්ෂ තුමාගෙන් ලිඛිත ඉල්ලීමක් කිරීමට එකඟ වෙමි.

9. මා විසින් තනා ගැනීමට නියමිත නව නිවස 2015 මාර්තු 01 දිනට පෙර තනා නිමකර එහි පදිංචි වන බවටත්, මා දැනට පදිංචිව සිටින, අනුරාධපුර උතුර ජල සම්පාදන ව්‍යාපෘතියේ ජල පවිත්‍රාගාරය ඉදිකිරීමට යෝජිත මහකනදරාව, වම් ඉවුර යාය 01 ඉඩමේ පිහිටි නිවසින් 2015 මාර්තු 01 දින හෝ ඊට පෙර දිනක ඉවත් වීමටත්, කොන්දේසි විරහිතව එකඟ වෙමි.

10. ඉහත කරුණු සියල්ල නිවැරදි බවත්, සත්‍ය බවත්, අවංක ලෙසත් ප්‍රතිඥා දී ප්‍රකාශ කරමි.



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Translation of Oath of Mr. Anurasiri (Project Affected Person)

I, O.A Anurasiri bearing NIC No.663193619V , residing at Yaya 1,Left Ivura, Mahakandarawa, Mihinthala declare and certify that below particulars given by me are true and correct.

1. I have been residing at above address for about 10 years with permanently built up house.
2. I know that I have no legal document (deed) for the ownership of this land or I have not received any such legal license regarding this land.
3. I have been living with my wife in the above address and I have no children depend on.
4. I am aware that this land has been selected to build up treatment plant, pump station and quarters for ANWSP and I have no objection regarding that.
5. I will make a new house from the land of 20 perches of Yaya1, Mahakanadarawa adjoining Janapada Officer's office which is identified by Divisional Secretary of Mihintale, from the money (Rs.2,000,000) which will be provided by ANWSP.
6. I agree to receive Rs. 2,000,000 as gratitude, by 4 instalments being Rs.500, 000 each.
7. I agree to finish the work done by each instalment, prior to request the next instalment being keeping the 1st instalment as advance.
8. I will make a written request from the PD of ANWSP for each instalment, through Divisional Secretary of Mihintale.
9. I will agree to evacuate from the house which I am residing now before 1st March 2015 and to settle down in the new place before 1st March 2015.
10. I declare that all particulars given above are true and correct.

I, O Anurasiri, residing at Yaya 1, Left Ivura, Mahakandarawa, Mihinthale given the above statements and signed in front of me.

Justice of Peace.

H.M Ismail (All Island)

Anuradhapura.

Anuradhapura North Integrated Water Supply Project

ENVIRONMENTAL MANAGEMENT PLAN

Prepared By:

EML Consultants (Pvt.) Ltd
www.emlconsultants.com

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1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

1.1 INTRODUCTION

An EMP is an activity specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation. The EMP defines the mitigation measures for significant impacts, responsibility of implementation of mitigation measures, monitoring of environmental compliance and effects.

This Environmental Management Plan (EMP) is also developed to provide guidance to the Contractor to develop his/her Environmental Management Implementation Plan (EMIP). The EMIP shall be a comprehensive proposal by the Contractor explaining his/her plans to ensure that the key environmental objectives as outlined in here are achieved during construction. It will also help the contractor to assign sufficient resources to carry out necessary environmental and social safeguards and actions. The information contained in the EMP is a guideline and the Contractor is fully responsible for meeting the national environmental policies, standards, laws and regulations as well as obtaining the necessary permits and approvals.

1.2 OBJECTIVES OF THE EMP

This EMP expects to guide the project so it;

- Applies good environmental management practices through planning and commitment to environmental issues.
- Complies with national environmental policies, regulations, standards and guidelines in all activities associated with the work including all supporting activities.
- Incorporates mitigation measures to minimize disturbances of the natural environment.
- Adopts best practices to prevent or minimize adverse environmental impacts; develop waste management practices within the project.
- Achieves a safe and healthy environment for workers and the public during construction and minimizes risk through planning and implementation of specific safeguards.
- Employs and trains staff and sub-contractors to be aware of the environmental obligations under this contract.
- Carries out monitoring and reporting of environmental performances on behalf of the stakeholders.
- Has a good Environmental Management System in place to guide the contractors.

2 BRIEF DESCRIPTION OF THE PROJECT ENVIRONMENT

2.1 PURPOSE AND OBJECTIVES OF THE PROPOSED PROJECT

The implementation of this project will provide safe drinking water in the northern part of Anuradhapura district in Sri Lanka. The current main water source in this area is groundwater, usually supplied by small scale piped water supply systems or from individual wells.

The proposed project will establish a water supply system in the area using water from a surface water body. The planned project is expected to create a positive impact on people in the area by improving their living standards.

2.2 PROJECT IMPLEMENTATION

The project consists of a water treatment plant (WTP), storage/pumping facilities and a network of transmission lines which connect the WTP and the storage facilities. The WTP; originally planned to extract water direct from the Mahakanadarawa tank. However, later the water intake was changed to the main irrigation canal and the location is now outside the tank. Locations of the water treatment plant and intake point are at a distance of about 100m from the bund of the tank, thus keeping a safe buffer between the tank and the WTP. The Google map showing the locations of the proposed water intake (marked as a star) and the WTP (located in 8°23'36.6"N 80°31'41.3"E) (marked as a square) and the proposed point of discharge (marked in red) are given in the Figure 1.

FIGURE 1 GOOGLE MAP OF PROPOSED WATER INTAKE AND THE WTP

The Estimated requirement for distribution under the first phase of the project is 9,900m^3 per day and this will rise to about 19,000m^3 per day by 2020, when the project reaches its third phase.

The treatment facility will have intake, clarifiers, filters, run thru settlement ponds and chemical treatment (alum and chlorine) before pumping out. There will be an emergency retention pond, discharge outlets, and required buildings including a workshop, pump and generator house on the 6 acres of land on the left bank of a canal adjacent to the Mahakandarawa tank.

The effluent released after treatment is to be discharged into a small natural drainage canal on right bank which has an active flow only during the wet season. It currently is overgrown with plants and serves as a path for overflowing water from the irrigation canal during rainy seasons.

A list of storage and pump locations to be constructed under this project is given in Table 1.

TABLE 1 LIST OF SITES INCLUDED IN THIS PROJECT (MAHAKANADARAWA SCHEME)

Name of project Location	Code	Main Habitat/ Vegetation Types
Mahakanadarawa Water Treatment Plant Location	(M1)	Dry area with associated vegetation, Home garden, Secondary forests, Scrublands, and a small patch of wetland vegetation
Rambewa Sump & Water Tank Location	(M2)	Home garden
Medawachchiya Sump Location	(M3)	Secondary forest
Isenbessagala Water Tank Location	(M4)	Abandoned land, secondary shrub land
Ethakada Water Tank Location	(M5)	Abandoned land, Secondary forest
East Rambewa Water Tank Location	(M6)	Secondary forest

Source: Preparatory Survey on Anuradhapura North Integrated Water Supply Project [Final Report]

2.3 PROPOSED WATER SUPPLY SYSTEM

The Irrigation Department, as the management entity for the Mahakanadarawa tank, has directed that, only the canal intake method can be allowed. As the tank is intended primarily for the purpose of providing irrigation water, the supply of drinking water will be provided based on an agreement on quantities to be supplied; between the Irrigation Department and NWSDB. No residual water after treatment is allowed to be put back into the canal.

2.4 CONSTRUCTION PACKAGING

There will be two main development/construction packages under this project.

1. Intake point and the Water Treatment Plant (WTP)
2. Transmission and distribution system that contains
   - Service stations with storage tanks and pumping stations
   - Main and sub-main Transmission lines

Proposed package for the transmission of water under the Mahakanadarawa Project is given in Annex 1.

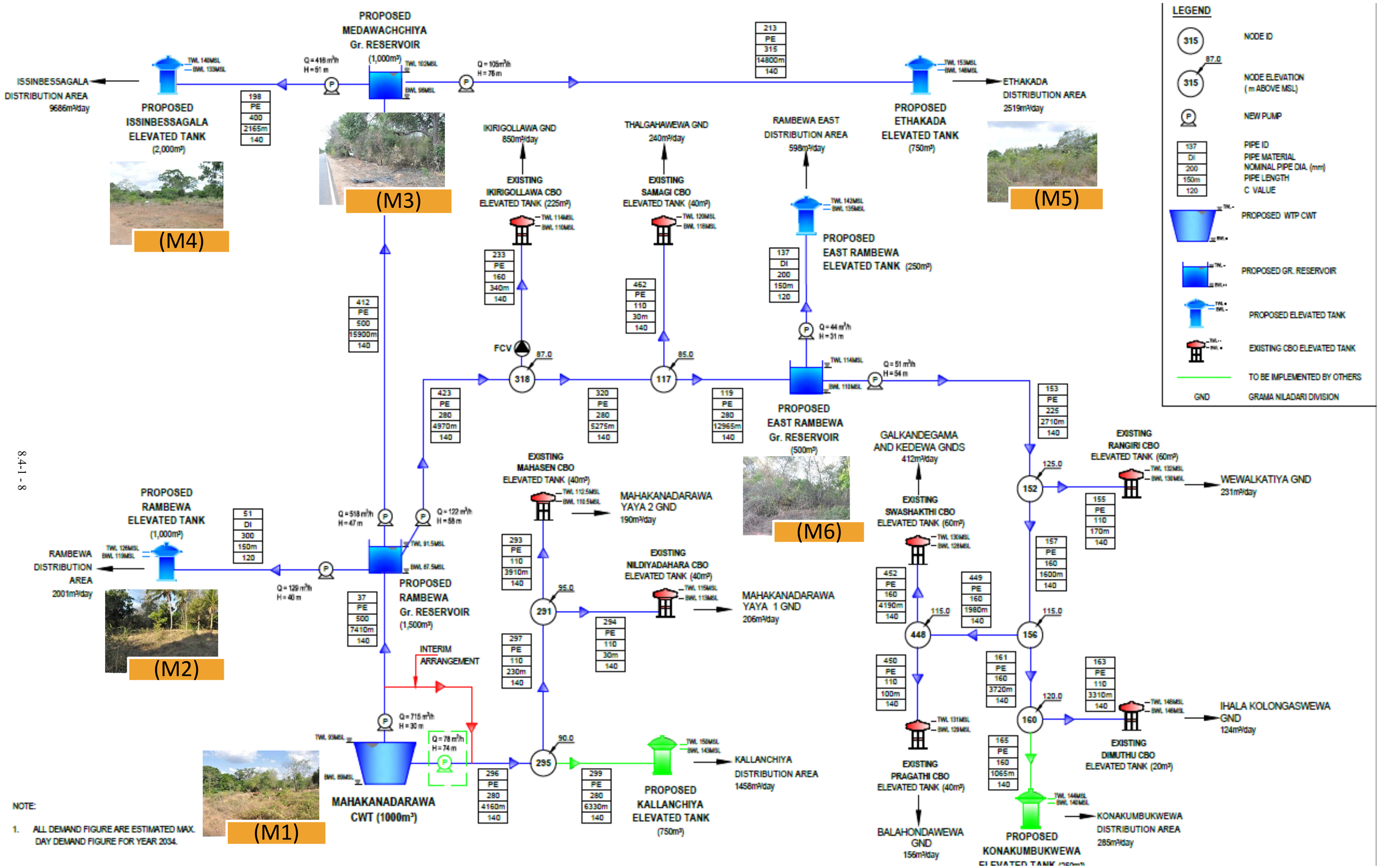
3 TRANSMISSION SYSTEM

There are 56 water supply schemes in total in the project area that include 50 Community Based Organizations (CBO) facilities and 6 NWSDB facilities. The NWSDB systems, covering 25 Grama Niladhari Divisions, are located in the core area(s). Generally, each CBO covers a part of a GND.

The transmission system from the Mahakanadarawa Wewa is named as the Mahakanadarawa System, which will cover the Divisional Secretariat Division (DSD) of Rambewa. The transmission system is composed of a transmission main system and a sub-main system. The main system is formed to cover the entire supply zone from the respective water treatment plant and the sub-system supplements the main system to convey bulk water to the elevated tanks. These elevated tanks are placed at strategic locations to distribute water to the new system of GNDs and transmit bulk water to the existing CBOs.

The transmission main system is composed of transmission mains and service centers where a pumping station and an elevated tank are provided. In addition, booster pump stations are provided at strategic locations. The transmission main route of each system is, in general, selected to run along the main roads mentioned above, from the water treatment plant and between service centers. Elevated tanks are provided at key locations to distribute treated water directly to the new distribution systems of GNDs.

The Transmission key map is given in Annex 2 and the proposed schematic diagram for the “treated water transmission system” and the existing environment of the site locations are given in figure 2.



NOTE:

1. ALL DEMAND FIGURE ARE ESTIMATED MAX. DAY DEMAND FIGURE FOR YEAR 2034.

FIGURE 2 PROPOSED SCHEMATIC DIAGRAM FOR THE "TREATED WATER TRANSMISSION SYSTEM" AND THE EXISTING ENVIRONMENT OF THE SITE LOCATIONS

4 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT

4.1 MAJOR ENVIRONMENTAL POLICIES IN SRI LANKA

Major Environmental Policies in Sri Lanka mainly includes the following (For more details please see Annex 3)

- National Environment Policy – 2003
- National Forestry Policy – 1995
- The National Policy on Wildlife Conservation – 2000
- National Air Quality Management Policy – 2000
- National Watershed Management Policy – 2004
- Cleaner Production Policy – 2004
- National Biosafety Policy – 2005
- National Air Quality Management Policy – 2000
- National Policy on Wetlands – 2005
- National Policy on Sand as a Resource for the Construction Industry – 2006
- National Policy on Elephant Conservation – 2006
- National Policy on Solid Waste Management – 2007

4.2 APPLICABILITY TO THE PROJECT

The National Environmental Act (1980, 1997) is the highest level environmental legal basis in Sri Lanka, and there are enacted regulations under the Act regarding environmental issues such as EIA, natural resource management, waste management, environment protection, environmental qualities and environmental sensitive areas (Annex 4)

According to the regulations stipulated by CEA, following conditions could relate with the project.

- Construction and operation of Water treatment plants of capacity exceeding 500,000 cubic meters per day
- discharged of the effluent waters and
- disposal of sludge

However if the supplementary construction activities such as supply of construction material or disposal of waste involve any of the sensitive areas listed in regulations specified by CEA, an environmental clearance in the form of EIA approval or an Environmental protection license (EPL) is required. Hence the construction contractors must obtain such supply of materials needed; only from sources with required environmental approval and ensure that such demands do not violate environmental regulations.

Following is an indicative list of regulations and laws and the limits where such regulations are applicable. All contracted staff should be aware and comply these provisions during the implementation of the project activities.

1) Any erodible area declared under the Soil Conservation Act (1951, 1953)

2) Any Flood Area declared under the Flood Protection Ordinance (1924, 1955) and any Flood Protection Area declared under the Sri Lanka Land Reclamation and Development Corporation Act (1968, 1982)

3) Any reservation declared or demarcated beyond the Full Supply Level of a reservoir

4) Any archaeological reserve, ancient or protected monument as defined or declared under the Antiquities Ordinance (1965)

5) Any area declared under the Botanic Gardens Ordinance (1928, 1973)

6) Areas within or less than 100m from the boundaries of any area declared under the National Heritage and Wilderness Act (1988): the Forest Ordinance

7) Areas within or less than 100m from the boundaries of any area declared as a protected area under the Fauna and Flora Protection Ordinance (1937)

8) Areas within, or less than 100m from the high flood level contour of a public lake as defined by the Crown Lands Ordinance (1947, 1949, 1956) including those declared under Section 71 of the Ordinance

9) Areas 60m or less from the bank of a public stream as defined in the Crown Lands Ordinance, with a width of more than 25m at any point.

There are several protected areas under the purview of the Forest Department, located within the project area that includes Mihintale, Madawachchiya, Issanbessawewa, Hinna, Etakaduwa and Wesakada. Mahakanadarawa tank and its surrounding area have been declared as one of the protected areas under the purview of the Department of Wildlife Conservation. It has been named as a sanctuary and has an area of 1,679.7 ha. Several archaeological reserves and protected monuments are located within the project area.

However, the planned construction sites are located outside the protected sites. And also the Irrigation Department has set aside reservations for protection and safety of the structural components of all the schemes by the Department Circular No. 10/1986. This will apply to all the schemes managed by the Irrigation Department within the project area. On the other hand, under the law of Urban Development Authority (U.D.A.), Mihintale Pradeshiya Saba and Medawachchiya Pradeshiya Saba have been declared as a development area for the better Physical & Economic utilization of such areas.

5 ENVIRONMENTAL STANDARDS AND CLEARANCE

The specific regulations and standards regarding environment and social consideration that is applicable to the project are given in Annex 5.

Environmental standards : (noise, vibration and Air quality,)

Main expected sources of noise and vibration are due to the operation of vehicles and heavy machinery used for construction work. The permissible noise level for construction work is set by Gazette 924/12 21th May 1996. It is said that noise levels caused by such activity shall not be carried on for a period which in aggregate exceeds three months at any given point, without the written consent of the Authority given in respect of a particular activity. Maximum permissible noise levels at the boundaries during the construction and operational stages are given in Annex 6.

One of the possible causes of air pollution during construction is the dust due to excavations along the transmission lines. This will increase the particulate matter in the air during the dry weather and windy conditions and hence should be prevented thru regular wetting. Another air quality problem that can arise near the WTP area is due to accidental chlorine gas leakage from gas storage place and chlorine injection facility. The discharge standards and air quality standards as well as standards for chlorine emission are also given in Annex 6. In addition to the above possibilities that directly affect the air quality, exhaust gas by vehicles and heavy machineries especially during the construction phase may decrease the air quality in the area surrounding the work sites.

6 ORGANIZATIONAL ARRANGEMENT

6.1 ORGANIZATIONAL ARRANGEMENT FOR THE IMPLEMENTATION OF THE EMP

An effective arrangement must be established by the contractor within the organization to implement the EMIP. The organizational arrangements with clearly defined responsibilities and procedures are important and necessary for the successful implementation of the EMP recommendations. As per the EMP the contractor is expected to appoint an Environmental and Safety Officer (ESO), to be the primary focal point of contact on all environment and safety related issues. This person should be appointed at early stages since many initial activities involving land clearance, training of the deployment of contract staff etc, have to comply with the EMP recommendations. If delayed the damage done to the environment by oversight actions may not be repaired and could be costly. Moreover, considering the extent of the project and for the safety issues the contractor should establish much broader institutional arrangements for EMP implementation not leaving the responsibility only to the Environmental Officer alone. Also the responsibility of compliance with the EMP rests fully with the contractor and his senior management. Proposed organizational arrangement for implementing EMP is given in figure 3.

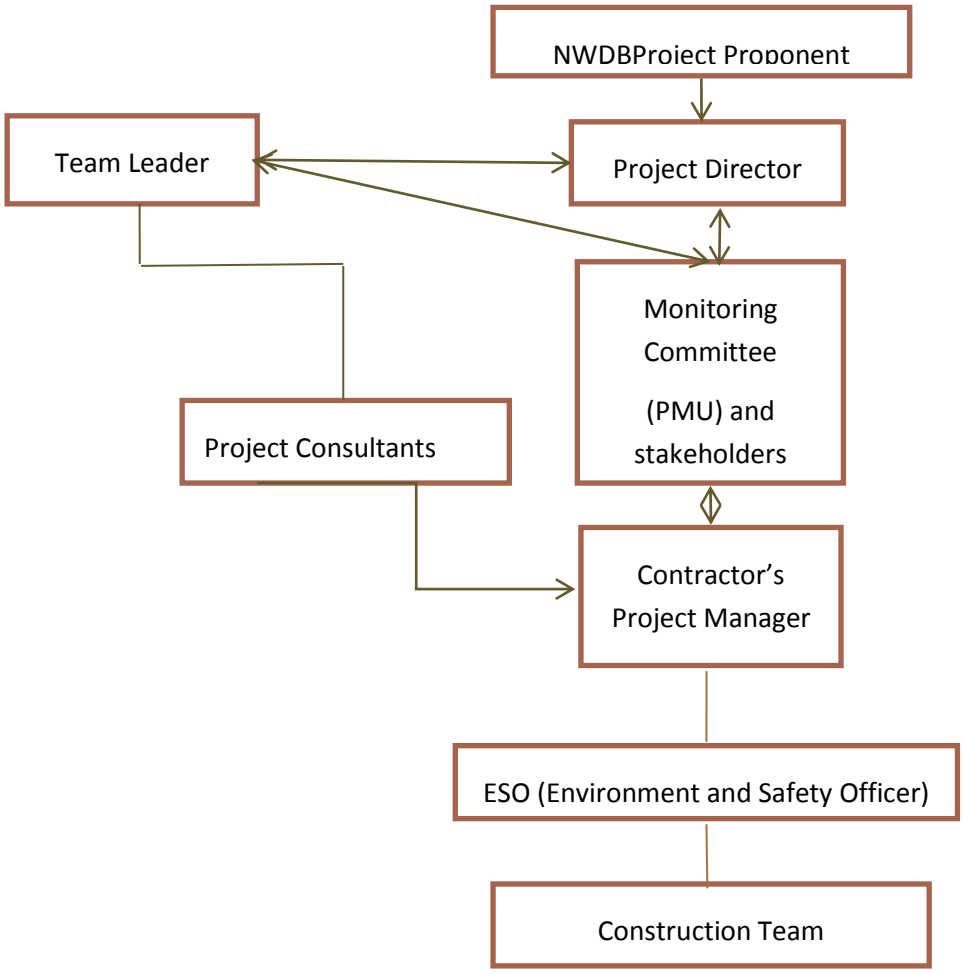


FIGURE 3 PROPOSED ORGANIZATIONAL ARRANGEMENT FOR THE IMPLEMENTATION OF THE EMP

6.2 THE RESPONSIBILITIES OF THE ENVIRONMENTAL TEAM

Environmental team during the construction comprises all the players listed above figure. Once the construction phase is over the responsibility of environmental safeguards and compliance monitoring will stay with the NWSDB and the respective stakeholder organizations having the jurisdiction over subject areas. Hence it is important to fully define the tasks and responsibilities of personnel/organizations involved with the EMP implementation. The tasks assigned to the environmental team in the EMP matrix given in this report can provide guidance in defining the tasks and responsibilities of the staff and organizations.

6.3 RESPONSIBILITY OF CONSTRUCTION TEAM

The implementation of the environmental management plan is a joint responsibility of the project proponent, management and construction teams of the Contractor. The responsibility of implementing regular environmental safeguards and mitigation measures mentioned in the EMP and reflected in the EMIP shall rest with the construction staff. The overall implementation of the EMP/EMIP should therefore form a part of the contract agreement with all the construction companies hired for performing different tasks under the project. Hence the environmental responsibilities entrusted on construction team members shall be included in their job descriptions.

6.4 TRAINING OF PERSONNEL

The contractor shall ensure employees/sub-contractors are adequately experienced and trained to conduct work in a manner to minimize environmental impacts and carry out responsibilities under the EMIP. The following measures but not limiting to following only, are recommended.

- Consider previous experience in environmental management of construction activities when recruiting executive and supervisory level staff and selection of sub-contractors.
- Recruit a suitable candidate or assign task to a person with experience the responsibilities of ESO early on (before deployment of contractor's staff) in the contract implementation.
- Provide construction staff and sub-contractors briefings on environmental management requirements and how they are to be implemented prior to commencement of the works.
- Develop written instructions on the implementation of EMIP measures and provide to relevant staff and display at sites.
- Provide induction and training to relevant employees on implementation of the EMP measures, if necessary using experienced trainers and/or training institutions.
- Those who are deployed for work near or in environmentally protected and/or sensitive areas must be given strict instructions on importance of compliance with the relevant laws and regulations.
- The EMIP should be prepared and approved by the project proponent (NWSDB project office) who shall ensure the adequacy and compliance of the mitigation action proposed by the contractor prior to deployment of the contractor's staff in the field.

6.5 REPORTING

The Contractor will provide the Environment and safety status reports based on the implementation of the EMIP on a monthly basis. First report shall cover the baseline status on the parameters to be monitored. Parameters are given later in this report (section 9) The reports will cover all environmental aspects that include: (a) a construction activity summary for the month; (b) environmental issues that may be encountered; (c) safeguard and mitigation measures implemented; (d) effectiveness of the measures implemented; (e) test or audit results, if any done during the reporting period; (f) visits and recommendations given by inspecting authorities during the reporting period (g) corrective actions taken if any; (h) environmental induction and training provided; (i) a complaints summary; (j) a non-compliance report; (l) a monitoring report; and (m) any other relevant information.

The report of each calendar month shall be submitted by the ESO on an agreed upon date of the month. The ESO should submit the report to Project Director, with his comments thru the Senior Manager of the Project contractor. The Project Director shall share this report with the Team Leader of the Consultants and seek advice as needed to make decisions.

In the event the employee is from a sub-contractor, the main contractor who hires such sub contractors shall be responsible for all the actions and compliance and should have the ESO tasked with monitoring the work of sub contractors (such as labour or transport or machine operator contractors).

6.6 AUDITING

The Contractor shall carry out internal audits to ensure that the EMP is properly implemented. This responsibility will rest with the ESO. The Contractor agrees to provide all necessary support to his Project Manager and ESO in carrying out independent audits on implementation of the EMP. It is recommended that compliance auditing be performed at least once in six months to ensure that the project complies with al recommendations of the EMP.

7 ENVIRONMENTAL MONITORING

Environmental monitoring falls into two areas: i.e. compliance monitoring and effect monitoring. The Contractor shall establish an arrangement for self-monitoring of the environmental performance (compliance and effect) as part of its EMS. The Engineer/Employer will carry out independent supervision and monitoring of the Contractor's environmental performance as is deemed necessary.

7.1 COMPLIANCE MONITORING

The Contractor shall carry out compliance monitoring of: (a) the effectiveness of the EMS installed within its organization; and (b) compliance with the mitigation and safeguard measures during construction.

7.2 EFFECTS MONITORING

Effects monitoring evaluates the residual environmental impacts/effects which could not be contained by the mitigation measures and validity of assessments made in the EMP. This should be carried out by the proponent who may hire consultants or use one of its trained staffs to do this on regular basis. Thus it can also determine the effectiveness of the mitigation measures. This report shall be used by the Project director in making decisions and adjustments to minimize or avoid potential environmental impacts or consult and seek advice from or inform the relevant authorities as necessary. The PD of the PMU may table this report at the monthly progress review meeting of the project as status of Environment safeguard report.

8 PUBLIC CONSULTATION ACIVITIES

The contractor together with ESO shall organize public meetings in collaboration with the project proponents' representatives in the project area. Awareness programs must be carried out in-order to create awareness on project information, requirements of Environmental protection and its guidelines, anticipated impacts during preparation, and about implementation and operation of the project. Notifications should be given to the local communities when project activities are going to take place. In case the operational activities are going to adversely affect the quantity or quality for irrigation or other water uses, a serve notice must be given to the relevant authorities and downstream users of water, sufficiently in advance. Comments given by the public shall be made use to improve the EMIP. A complains/comments book shall be maintained at the site office for public comments from the beginning to the end of the project. Stakeholder consultation is also recommended during the preparation of final monitoring and close out reporting.

9 EMP

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
Pre-construction and land clearance phase	A. Effect on the surrounding environments									
	Clearing land	Destruction of habitats can occur during land clearing activities in pre-construction phase	minor (remote)	Cut and filling of land and cutting trees for clearing the land must be planned to avoid unnecessary destruction of the habitats in and around the work sites or workers camp sites.	Complete Land clearing site inspections and the site baseline report compiled with pictures	All related sites where clearing and land preparations is involved	Before clearing is done	ESO/Contractor supervised by PMU/NWSDB	CEA, FD, and DWLC RDC, ID or any other depending on the area of jurisdiction	No additional Payment
		damage on special habitats if any (rare flora and fauna species) and archeological items in the project site	Medium (medium)	Workers must be made aware of any important flora and fauna inhabiting the sites and adjacent areas be identified if encountered and not to harm them unknowingly.	General ecos system and environmental practices as recommended in code of conduct	Where clearance of land is needed			Wildlife department, CEA	
				The contractor to prepare a code of conduct for the workers which should explain how the workers should react if encountered with rare wildlife, protected archeological reserves etc. If the contractor field staff encounters accidentally or otherwise, any rare or endangered wild species or archeological items they should be instructed to stop work immediately and inform the ESO		Where clearance of land is needed			PMU, Wildlife department, CEA	
	B. Effect due to Noise and Vibration									
	Vibration due to moment of testing and land preparation and from vehicles	Noise and Vibration during land preparation operations may cause damages to the structures and the ambient environment	Minor to major (common)	Due consideration must be paid on vibration impacts on adjoining structures. If any vulnerable structures such as bunts, ancient building are found precautions should be taken to avoid potential damages	Map the vulnerable structure and monitor them before and after situations	Where land clearing is needed		NWSDB, RDC, AD, PCEA	PMU (CEA)	No additional Payment

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
		Parking and maneuvering of heavy land clearance vehicles may interfere with the other day to day activities in the area	Minor to medium and temporary (common)	Adequate notice should be given if access roads are to be blocked or noise and vibration to be created. Especially if schools, hospitals and temples are nearby be mindful of the events taking place and schedule activities accordingly	Map the items to be monitored	Where land clearing is needed		NWSDB, RDC, PCEA	PMU (CEA)	No additional Payment
		Noise will be generated due to improper maintenance of the land machinery.	Minor (common)	All machinery and equipment should be well maintained and fitted with noise reduction devices in accordance with manufacturer's instructions.		Where land clearing is needed		NWSDB, HO		
	Contaminants	Vehicle/Machinery or equipment servicing, maintenance or accidents during pre-construction phase may contaminate soil and nearby water bodies.	Minor (common)	Vehicle/machinery and equipment servicing and maintenance work shall be carried out only in designated locations/ service stations	Vehicle maintenance procedure and road worthiness inspections	Where pre construction activities are taking place	During the usage of vehicles	ESO/Contractor	PMU	No additional Payment
		Contamination of soil can be occurred by fuel and lubrications emitted by vehicles, machinery and equipment	Minor (common)	Waste oil, other petroleum products and untreated wastewater shall not be discharged on ground.						
				Adequate measures shall be taken against pollution of soil by spillage of various contaminants.						
				All contaminants shall be disposed of in accordance with the guidelines issued by the CEA						
	C. Social impacts									
	Unfounded fears and concerns	If the community is not fully aware of the project benefits and proposed activities may stage protests fearing possible land acquisitions or prevention of access to resources	Medium (common)	Discussion and making agreement about construction schedule, procedure and project benefits and impacts should be done through conducting stakeholder meeting	Community views	At all project community interaction locations	During the pre construction phase	NWSDB,	PMU, PCC	No cost

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
			Medium (common)	Public relation activities/ meetings must be held to provide explanations to the local residents and to develop understanding about construction work schedule, expected impacts, mitigation measures, etc. during the initial stages of the project.	Community views	At all project community interaction locations		NWSDB, RSC	PMU,DS	No cost
	Resettlement	Only a one family Resettlement is required to continue with the proposed project at the WTP as of present Other sites are being purchased either from state or private parties on payment of land prices	Minor (common)	A proper resettlement arrangement must be arranged and the progress of resettlement and its fairness should be well-monitored	Resettlement arrangements, compensation payment and house construction	Where such resettlement is needed eg WTP		NWSDB, RSC	PMU, DS	Separate budget allocation is required
	Timing of work on road excavations	The road sides are to be excavated and if not times properly with other road works will inconvenient many road users as the road will be blocked for prolong time periods	Medium (Common)	Proper coordination with the other utilities provided including RDC/PRDC and Local authorities will be useful when scheduling the excavation process to minimize road blockages	No monitoring needed	Along the roads	Na	PMU NWSDB	NA	No cost
	D. Effect due to Solid Waste Generation during land clearance									
	Land clearance waste	If not properly disposed could cause public nuisance during transportation and disposal	Minor (common)	All disposal sites should be approved by relevant local authority/ies. It should not be disposed in any place that may not cause disruption to wildlife or human activities. Temporally dumping area or a pit for the purpose must be secured.	Disposal site	Land clearing sites	During clearing operation	NWSDB, RSC	PMU, DS, CEA	
		Disposal sites may create problems to other land users	Minor and Temp (but common)							
Construction phase	A. Effect on physical environment									
	Exhaust gas	Emission of exhaust gas from the transporting land vehicles will generate air pollutants	Minor (common)	Actions must be taken to ensure the use of vehicles and machineries officially registered, and also the vehicles must be properly maintained.	Inspection of vehicles road worthiness certificate	At the project contractors office	Whenever new vehicle is enlisted	ESO Contractor	PMU	No additional Payment
	Dust	Emission of dust from the site during construction will cause air pollution.	Minor (common)	The earth or dusty materials used during construction must be covered properly stored and handled to reduce dust emission. If needed spray water to prevent dust in sensitive areas where	Dust levels to be monitored visually daily during dry period extending for	Where there is sensitive public buildings or activities	Every week during the dry weather and windy conditions			

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
				public is frequented.	more than one week (5 days) at marked locations					
				Storage locations of sand, cement and metal, soil should be located away from settlements. Cement should be stored safely away from workers quarters and public places	storage practices	Where storage is done and work sites	Monthly			
				Measures must be taken to minimize dust generation during handling of material. Make the workers aware of the health hazards involved and encourage them to use masks	Work sites			ESO/Contractor	PMU	No additional Payment
				All access roads within the storage site and roads used for material transportation should be sprinkled with water for dust suspension.	Road along the pipe laying path					
				To sprinkle water to prevent the dust during dry periods.	Transport routes and excavated areas					
	Leakage of Chlorine gas	Leakage of Chlorine gas can cause adverse effects during construction	Minor (rare)	Guidance of proper installation must be followed						
				Safety training on this matter should be given to laborers						
	Vehicles and machinery	Heavy equipment and trucks for construction will increase noise and vibration	Minor and temporary (common)	It must be ensured that the vehicles and machineries used are officially registered, and properly maintained and carry a road worthiness certificate issued by DoM.	Vehicle road worthiness and drivers licenses and vehicle registrations are valid and current	Work sites	At the time of vehicle enlisting or replacement	ESO/Contractor	PMU	No additional Payment
				All machinery and equipment should be fitted with noise reduction devices in accordance with manufacturer's instructions.						
				Maintenance of vehicles, equipment and machinery shall be regular and proper, to the satisfaction of the relevant						

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
				guidelines, to keep noise from these at a minimum level. Unnecessary idling must not be allowed Route of transportation must be properly and regularly examined to prevent noise or other effect on vicinity.						
	Construction Work	Construction activities will generate noise and vibration	Minor (temporary)	Actions should be taken to avoid noise and vibration generating activities at nighttime and during festival times. If generators are to be used for construction work use sound prof or minimizing devices	Measure Noise levels during construction from the boundary of the sites	Boundary of the sites where construction takes place	When complaints are received when consulted	ESO	PMU	No additional Payment
	Discharge of pollutants and soil to Water bodies	Water source can be polluted due to the mixing of construction debris or oil from the vehicle washing and hence the water quality will be reduced.	Medium (common)	Proper guidelines must be given to contractors and the ESO for protecting water bodies from being polluted Avoid/ minimize construction works near/ at such drainage or water bodies during heavy rain seasons	Water bodies near the construction sites to be inspected on monthly basis. Water quality samples from the water bodies near each construction sites to be taken for measure of COD, BOD and turbidity levels by a reputed laboratory.	Select the main water bodies that are near the construction sites to be predetermined in consultation with the PMU	Before start of the construction activities near main water bodies	ESO/ Contractor	PMU	No additional Payment
		Turbid water can be generated during construction activities due to erosion of soil into the water bodies	Medium (common)	Actions must be taken to prevent the mixing of muddy materials with the clean water in the tank and water canals near the sites and road sides Turbid water generated by earthwork can be leached to water bodies	General practices along the excavation sites and construction sites to be monitored for signs of erosions	Along the transmission excavations and construction sites	Monthly and more often during the rainy seasons	ESO/Contractor	PMU	No additional Payment

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
	Domestic effluent from worker camps	Domestic effluent may be mixed with the water body.	Minor (remote)	The domestic effluent can be treated using the soak pit to reduce the level of pollution due to its mixing with natural water body.				Contractor	PMU	No additional Payment
	Oil and Grease from machines	Oil and grease may be leaked during construction activities	Minor (remote)	Oil and grease should be collected separately in a container.		Work sites	Monthly	Contractor	PMU	No additional Payment
		Contamination of water can occur due to fuel and lubricants emitted during construction and also from transportation vehicles	Minor (remote)	All vehicle and plant maintenance and servicing stations shall be located and operated as per the conditions and /or guidelines stipulated under the EPL issued by CEA.	Vehicle service records from the hired vehicles to be made mandatory for hiring	Work sites	Monthly	Contractor	PMU	No additional Payment
				All vehicles to be services in the certified service stations and avoid doing such services in adhoc manner by the drivers and owners in unauthorized places by insisting on proper service to be done on all vehicles used for the project work (hired or owned)						
	B. Effect due to Solid Waste Generation during construction									
	Construction Waste	Waste materials will be generated during construction and should be disposed properly	Minor (common)	Request that waste reduction plan and disposal method to be proposed in the tender document	Waste generation	Work sites	Monthly	ESO/Contractor	PMU	No additional Payment
				The temporally dumping yard or pits for construction waste must be secured for depositions						
				Segregate waste in order to be used in the recycling purpose. Recyclable material can be transferred to the recycling agents						

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
				Disposal of construction waste and debris must be carefully taken away immediately from the work sites and disposed properly as these could lead to accidents if left on road sides or work sites	Debris on site and road sides	Along the roads and work sites	Monthly and before the release of payments for work completed	ESO/Contractor	PMU	20% of the Payment should be held back until the debris from completed tasks is cleared.
				All disposal sites should be approved by the relevant local authority/ ies.	Disposal sites nominated and to be used	Sites for disposal	Before finalizing the contract	ESO/ Contractor	PMU	No additional Payment
	Domestic Waste generated by the laborer	Domestic waste will be generated by the laborer's activities	Minor (common)	Domestic waste is placed at the temporally dumping yard, and transferred to the officially operated disposal sites. Burning of the waste with the plastics are not advisable and should be avoided. Advise the workers from dumping waste along the road sites indiscriminately while working.	Work camps to be monitored and inspected for hygiene conditions	Work camps and work sites	Regularly	ESO/ Contractor	PMU	A separate payment will be made
	C. Effect on the Ecological systems									
	Contractors may carry out unscheduled activities such as earth cuts and diversion of natural streams, cutting or burning vegetation to facilitate clearing that could have ecological and hydrological consequences	These activities could affect other social and ecological elements in the neighborhood and create problems	Minor (rare)	The activities approved in the construction plan should be strictly adhered to.	General ecos system and environmental practices as recommended in code of conduct	All construction sites and camp sites	Monthly	ESO,Contractor	PMU	No additional Payment
				Training and awareness program for laborer must be done. Scheduled patrol of the site must be done in regular basis and the officer incharge should be held responsible of rules are violated.						
		Trees may be cut in selected areas and hence reduce the habitat diversity	Minor (Common)	Clearing land should be minimized and the large tree must remain as far as possible .						

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
				Prepare a code of conduct for the work forces to avoid accidentally breaching the rules.						
		Adverse effect may be occurs on rare species	Minor (remote)	If the special species found out at the site, it should be reported to NWSDB and the guidance of CEA or Wildlife department must be received before taking actions.				Contractor	PMU, CEA, Wildlife Department	No additional Payment
	D. Archaeological impacts									
	Excavating antiquity	If any sites/places of archaeological importance found in the site there is a possibility of them to be excavated during construction	Medium to high (remote)	If the antiquity will be excavated at the site, report to NWSDB and receive the guidance of Archaeological Department During construction activities all necessary and adequate care should be taken to minimize impacts on cultural properties found on the site and the vicinity. Precaution must be taken to prevent the workmen or any other persons from removing and damaging any such article or thing if found from the site	Daily work practices and reports	All excavated sites	As and when the locations are excavated	Contractor	PMU, Archaeological Department	No additional Payment
	E. Social impacts									
	Social conflict caused by migratory laborers	Conflicts may arise among the workers and the villagers specially if the work force involves migratory labor special attention should be extended to HIV and similar ST diseases that can be introduced to the community	Minor (common)	Training and awareness program for laborer are to be planned and conducted Labour camps should be located in a manner that ongoing settlements activites are not disturbed. Provide sufficient health care and advises to work force resident in the work camps.	Labor camp sanitary facilities and health care	Labor camps	Once In every three months	ESO/Contractor	PMU	No additional Payment
	Inconvenience to livelihood and social activities	Construction activities may impose disturbances to the existing community livelihood by way limiting accessibility (shops and workplaces), noise	Minor and temp (common in townships involved)	Any noise generating activity / high voice which disturb the livelihood should be minimized and reduced to shortest possible time	Measure the noise levels	Noise generating locations	When complaints are received	Contractor	PMU	No additional Payment

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
		generation (teaching), religious and private functions		Pipe laying work on the road is planned carefully to prevent inconvenience as much as possible witout hindering accessibility	Review Construction process	Road sides	When traffic is to be blocked to lay pipelines			
				Refraining from working during peak hours should be done to prevent road traffic blocks	Review Traffic control	Road sides				
				It would be useful if a public notice is given prior to construction						
				The maintenance and rehabilitation of any irrigation canal during construction should not cause inconvenience to the livelihood						
				The maintenance and rehabilitation of any access roads during construction should not cause inconvenience to the livelihood						
	F. Effect on the working condition for the workers									
	Occupational Safety	Workers can be affected by the construction activities	Minor (common)	Workers in vicinity of strong noise, and workers working with or in crushing, compaction, batching or concrete mixing operations shall be provided with protective gear and make it compulsory to wear them.	Issue and Use of safety gear	Work sites	Regularly	Contractor	PMU	No additional Payment
		Workers can be affected by poor sanitary facilities and vector control in workers camps	Minor (common)	Locating, sanitation and waste disposal in construction camps workers camps should be provided with adequate and appropriate facilities for disposal of sewerage and solid waste. The sewage systems shall be properly designed, built and operated so that no pollution to ground or adjacent water bodies/watercourses takes place. Garbage bins shall be provided the camps and regularly emptied. Garbage should be disposed off in a hygienic manner, to the	General sanitary conditions in workers quarters	Workers camps		Senior management/ESO Contractor staff	PMU	No additional Payment

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
				satisfaction of the relevant norms. Compliance with the relevant regulations and guidelines issued by the CEA/LA shall be strictly adhered to.						
				Training and awareness program for laborer should be done	No of training programs and number of workers participated	Work place	When new contract is signed			
				Necessary measures shall be taken to prevent breeding of vectors at work sites	General sanitary conditions					
				If any outbreak of infectious in a labour camp is identified that must be informed to the ESO and the Medical Officer of Health (MOH) or to the Public Health Inspector (PHI) of the area immediately.						
				At every workplace, first aid kit shall be provided as per the regulations. At every workplace an ambulance room containing the prescribed equipment and nursing staff shall be provided.						
				At every workplace and labour camps sufficient number of bathing facilities, latrines and urinals shall be provided in accordance with the Health and Safety regulations. These bathroom and toilet facilities shall be suitably located within the workplace/buildings. Latrines shall be cleaned at least three times daily in the morning, midday and evening and kept in a strict sanitary condition. If women are employed, separate latrines and urinals, screened from those for men and marked in the vernacular shall be provided. There shall be adequate supply of water, within						

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
				and close to latrines and urinals.						
	G. Traffic Control during construction phase									
	Traffic and road blockages and safety issues	Unnecessary traffic will be generated due to unscheduled construction activities If the road work areas are not properly illuminated and warned (signage) can cause accidents.	Minor (common)	Use of flagmen and/or temporary traffic lights to control traffic flows at constricted sites, including safe crossing for pedestrians especially at town areas and near schools. It is important to use adequate back yellow striped safety tapes to demarcate road work areas and warning signage should be in place.	Traffic flow during construction times and adequacy of warning signage	All affected road sides	When needed	NWSDB	NA	No additional Payment
				Special consideration shall be given to schedule the road side works to continue immediately after or before the other road repair or excavation works begin or end to avoid repetitive closure or breaking of roads surfaces and causing inconveniences to public.	No monitoring task	Road sides	Before road work begins at the planning time			
Operational phase	A. Impact on physical environment (air, water and land)									
	Leakage of chlorine gas	chlorine gas of leakage from chlorine gas storage place and chlorine injection facility may generate air pollution	Minor (rare)	It should be monitored that whether the Gas monitor is working always at proper condition or not. Chlorine Gas leakage detectors to be installed	Conditions of the gas storage and its monitoring devises	Storage rooms	During storage	NWSDB,RSC	NWSDB HO	No additional Payment
				Safety training should be given to the laborer						
	Emission of dust	Dust will be emitted during operational activities.	Minor (common)	Storage locations of sand, metal, soil should be located away from settlements and other sensitive receptors and must be covered (with artificial barriers or natural vegetation).				NWSDB,RSC	NWSDB HO	No additional Payment
				Measures should be taken to minimize dust during handling of material during operational phase						

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
				Vehicle speed limits should be enforced and followed to minimize dust generation.						
				The sites which prone to dust emission and the roads used for transportation during operational phase should be sprinkled with water for dust suspension.						
	B. Adverse effects due to noise and vibration									
	Noise generation due to Pump, generator and other noise generating activities	The machinery, equipment and other noise generating activities may cause noise pollution Noise pollution and vibration can occur due to the use of pumps and the generators at site.	Minor (common)	Maintenance of vehicles, equipment and machinery shall be regular and proper, to keep noise from these at a minimum.				NWSDB RSC	NWSDB HO	No additional Payment
				Low noise/ vibration pump and generator must be used as specified in tender document.						
	vibration	Vibration during operations may cause damages to the structures and the environment	Minor (common)	Due consideration must be paid on vibration impacts of blasting on adjoining structures.				NWSDB RSC	NWSDB HO	No additional Payment
	C. Adverse effect on water Quality									
	Discharge water	Water source will be polluted if discharged into potable water sources and hence the water quality will be reduced.	Major (common)	Water from sludge drying bed should be managed to meet the standards before discharging	Water quality standards as specified in CEA regulations	Discharged point of the WTP	Weekly	NWSDB RSC	NWSDB HO	No additional Payment
				Treated effluent to be discharged during operation should be introduced to the sedimentation basin and turbidity must be treated.						
				The effluent discharged should meet the CEA stipulated standards for effluent discharged into inland surface flowing water body						
				In case the operational activities going to adversely affect the quantity or quality of water, a serve notice must be given to the relevant authorities and downstream users of water sufficiently in advance.						

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
				Employees must be made aware on water conservation and waste minimization.						
	Domestic effluent	Domestic waste will be generated by the work force laborer activities	Minor (common)	Effluent should be treated by the soak pit.	Domestic effluent discharge			NWSDB RSC	NWSDB HO	No additional Payment
	Oil and grease	Oil and grease will be added during operational activities	Minor (rare)	Oil and grease must be kept separately in the container				NWSDB RSC	NWSDB HO	No additional Payment
	D. Effect on the environment due to Solid Waste Generation									
	Waste	Domestic waste will be generated during the operational phase that may impact surrounding areas if discharged indiscriminately	Minor (common)	Domestic waste should be placed at the temporally collection place, and transferred to the officially operated disposal field	Domestic garbage disposal	Work sites	Regularly	NWSDB RSC	NWSDB HO	No additional Payment
				Garbage bins must be provided in the work sites and regularly emptied and the garbage disposed off in a hygienic manner.			Regularly			
	Sludge	Sludge will be generated during operational activities	Minor (common)	Sludge should be dried up at the drying bed to reduce its quantity and properly disposed	Sludge produced	Sludge beds in WTP	Regularly	NWSDB RSC	NWSDB HO	No additional Payment
				Dried sludge should be dumped by the contract with the approval of land owner						
	E. Watershed Protection									
	blocking of irrigation canal or disruption to regular irrigation patterns	The proposed system may cause problems with irrigation during dry seasons	Minor	The sources of water (potable or otherwise) used by the settled community must be protected so that continued use of these water sources will not be disrupted by the				NWSDB RSC	NWSDB HO	No additional Payment
				There shall not be any diversion, closure or blocking existing canals and streams in a manner that adversely affect down – stream intakes. If diversion or closure or blocking of canals and streams is required during operational phase of work, relevant approval in writing must be obtained.						

Project Stage	Project Activity/ objects which cause the impacts	Impact	Level of risk and its (possibility)	Mitigation measures	Parameters to be monitored	Location	Frequency	Responsibility in implementation	Responsibility in compliance monitoring and Supervising	Cost estimates
	temporary structures	Existing temporary structures will create problems to the society	Minor	On completion of the works, all temporary obstructions to shall be cleared away.				NWSDB RSC	NWSDB HO	No additional Payment
	F. Environmental Enhancement									
	Destructions to the existing landscape	Roadside Landscape will be affected by operational activities	Minor (common)	Road landscape plantation, re-vegetation of road embankments and other slopes, edge treatment of water bodies shall be established				NWSDB RSC	NWSDB HO	No additional Payment
	G. Effect on the working condition for the workers									
	Safety and health	Workers can be affected by accidents during operational activities	Minor (common)	At every workplace, first aid kit shall be provided as per the regulations. At every workplace an ambulance room containing the prescribed equipment and nursing staff shall be provided.				NWSDB RSC	NWSDB HO	No additional Payment
				In every workplace and labour camps portable water shall be available throughout the day in sufficient quantities.						

ANNEX 1 PROPOSED CONTRACT PACKAGES FOR MAHAKANADARAWA PROJECT

Package	Components	Cost (million Yen)	Period (month)	Procurement
Package 1	Intake, WTP, Ground Sumps and Elevated Tanks	1,712	30	ICB
Package 2	Transmission/Distribution Mains	1,263	33	ICB
Package 3	Distribution Sub-System	534	27	LCB
Package 4	O&M Goodss	68	12	LCB
Package 5	Installation of Distribution Sub-System and House Connections	56	27	-

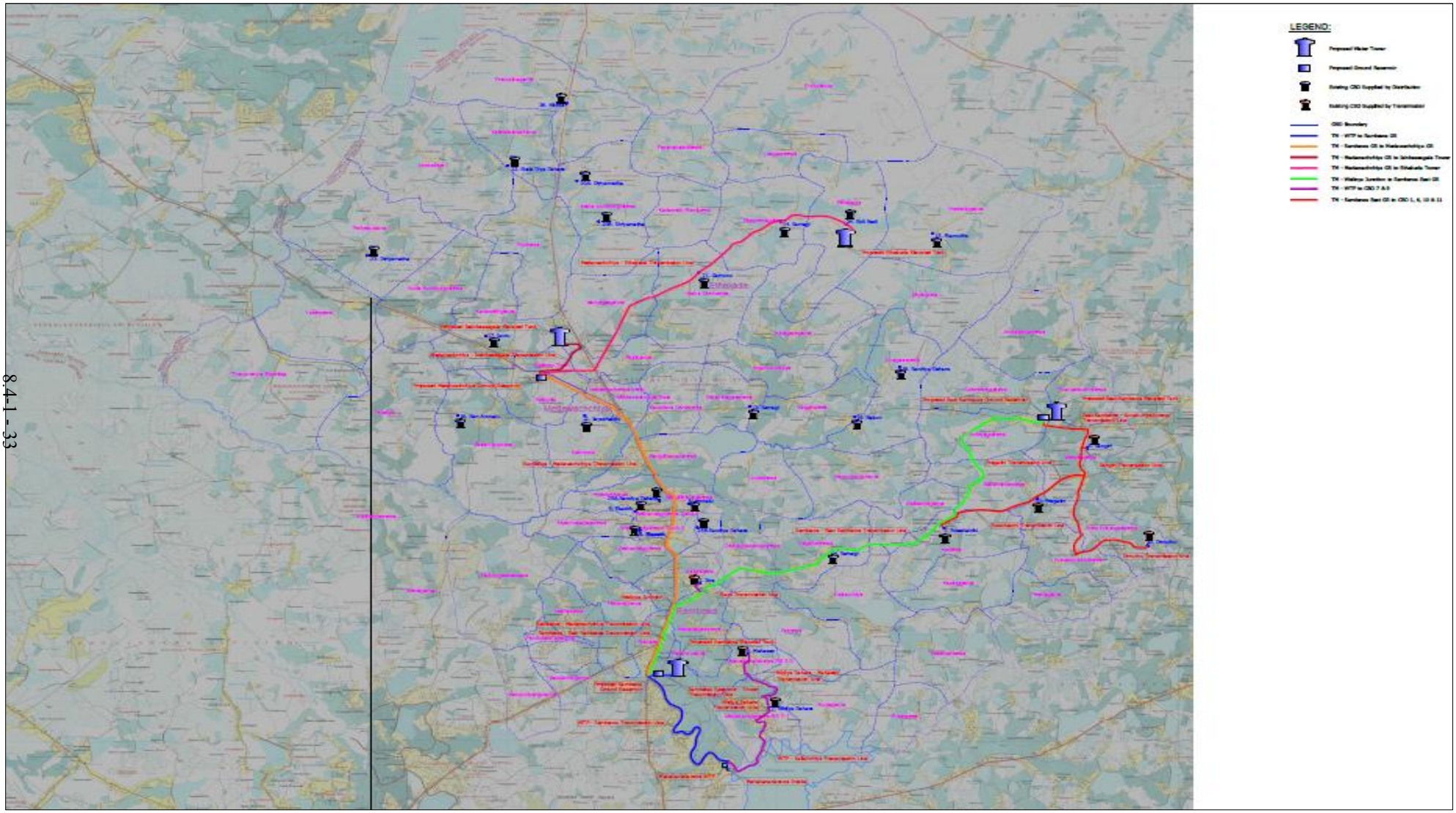
Following items are to be established in the site locations according to the "Lot A" contract package.

Table Definitions of "Lot B" and "Lot C" contract packages

Contract Package	Location	Items
"Lot A" Contract Package	Mahakanadarawa LB Canal	19,800 m^3/day Intake Structure including Low Lift Pump House
		Raw Water Pumps for Stage 1 capacity (9,900 m^3/day)
	Raw Water Transmission System	Supply and Laying of 300 m length of 450 mm dia. DI pipes
	Mahakanadarawa WTP	9,400 m^3/day production capacity WTP and all incorporated facilities
		Construction of 1,000 m^3 Clear Water Reservoir
		High Lift Pump House and treated water transmission pumps
	Rambewa	Construction of 1,500 m^3 ground reservoir
		Construction of 1,000 m^3 elevated water tank
		Construction of building facilities including pump house
		Supply and installation of transmission pumps
		Supply and installation of Chlorination facilities
	Medawachchiya	Construction of 1,000 m^3 ground reservoir
		Construction of building facilities including pump house
		Supply and installation of transmission pumps
		Supply and installation of Chlorination facilities
	Rambewa East	Construction of 500 m^3 ground reservoir
		Construction of 250 m^3 elevated water tank
		Construction of building facilities including pump house
		Supply and installation of transmission pumps
		Supply and installation of Chlorination facilities
	Issinbassagala	Construction of 2,000 m^3 elevated water tank
	Ethakada	Construction of 750 m^3 elevated water tank

Contract Package	Pipe Category / Sub Contract Package	Proposed Pipe Material	Pipe Nominal Diameter (mm)	Pipe Length (m)
"Lot B" Contract Package (Supply and Lay)	Transmission System	HDPE	110	7,780
			160	11,830
			225	2,710
			280	27,370
			315	14,800
			400	2,165
			500	23,310
		Sub-Total		**89,965**
	Distribution Sub Mains	HDPE	110	68,730
			160	28,055
			180	11,575
			225	30,605
			250	10,695
			315	9,925
			355	2,830
			400	395
		Sub-Total		**162,810**
	Total of "Lot B" Contract Package			**252,775**
"Lot C" Contract Package	"Lot C1" Contract Package (Supply and Lay)	PVC	110	25,890
			160	5,065
		Total		**30,955**
	"Lot C2 " Contract Package (Supply Only)	PVC	63	234,920
			90	109,895
		Total		**344,815**
	"Lot C3" Contract Package (Laying Only)	PVC	90	109,895
		Total		**109,895**
	Total of "Lot C" Contract Package (supply)			**375,770**

ANNEX 2 TRANSMISSION KEY MAP



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ANNEX 3 IMPORTANT ENVIRONMENTAL LEGISLATIVE INSTRUMENTS

National Environment Policy – 2003

The policy aims to promote the sound management of Sri Lanka's environment balancing the needs for social and economic development and environment integrity. It also aims to manage the environment by linking together the activities, interests and perspectives of stakeholders and to assure environmental accountability.

National Forestry Policy – 1995

The policy was drawn up to provide clear directions for safeguarding the remaining natural forests of the country in order to conserve biodiversity, soil and water resources.

The National Policy on Wildlife Conservation – 2000

The policy renews the commitment of the government to conserve wildlife resources through promoting conservation, maintaining ecological processes and life sustaining systems, managing genetic diversity and ensuring sustainable utilization and sharing of equitable benefits arising from biodiversity. It emphasizes the need for effective protected area management with the participation of local communities.

National Air Quality Management Policy – 2000

The policy aims to maintain good air quality to reduce morbidity due to air pollution and in turn reduce national health expenditures.

National Watershed Management Policy – 2004

The policy aims to conserve, protect, rehabilitate, sustainably use and manage the watersheds while managing their environment characteristics with the involvement of people.

Cleaner Production Policy – 2004

The objective of this policy is to incorporate the cleaner production concept and practices into all development sectors of the country.

National Biosafety Policy – 2005

The policy on biosafety set the overall framework in which adequate safety measures will be developed and put into force to minimize possible risks to human health and the environment while extracting maximum benefits from any potential that modern bio technology may offer.

National Air Quality Management Policy – 2000

The purpose of this policy is to maintain good air quality to reduce morbidity due to air pollution and in turn reduce national health expenditures.

National Policy on Wetlands – 2005

The policy seeks to give effect to National Environment Policy and other relevant national policies, while respecting national commitments towards relevant international conventions, protocols, treaties and agreements to which Sri Lanka is a party.

National Policy on Sand as a Resource for the Construction Industry – 2006

The policy statement reflects Sri Lanka's constitutional, international and national obligations, including the Mines and Minerals Act No. 33 of 1992, the National Environmental Act of 1980, the Coast Conservation Act of 1981 and other relevant legislation, regulations and policy statements. It defines the commitment of Government, in partnership with the people, to effectively manage the construction-sand resource for the benefit of present and future generations.

National Policy on Elephant Conservation – 2006

The policy was developed to ensure the long-term survival of the elephant in the wild in Sri Lanka through the mitigation of the human-elephant confect.

National Policy on Solid Waste Management – 2007

The policy has been prepared to ensure integrated, economically feasible and environmentally sound solid waste management practices for the country at national, provincial and Local Authority level. The main objectives of the policy are (a) to ensure environmental accountability and social responsibility of all waste generators, waste managers and service providers (b) to actively involve individuals and all institutions in integrated and environmentally sound solid waste management practices (c) to maximize resource recovery with a view to minimize the amount of waste for disposal and (d) to minimize adverse environmental impacts due to waste disposal to ensure health and well being of the people and on ecosystems.

ANNEX 4 NATIONAL ENVIRONMENTAL ACT (NEA)

The NEA was established as No.47 of 1980 and it was amended (Act No. 56 of 1988) to include a provision relating to EIA Regulations contained in Part IV C of the statute entitled "Approval of Projects". This section was further amended by Act No. 53 of 2000.

Prescribed project and EIA/IEE procedure

The prescribed projects which are requested to implement EIA/IEE are defined and listed in the Gazette no 772/22 of 24th June, 1993 and 859/14 of 23rd February 1995. Only large-scale development projects that are likely to have significant impacts on the environment are listed as prescribed projects. There are two categories.

1. By type and the magnitude

   In case of Water Supply Project, the conditions are;

   - All ground water extraction projects of capacity exceeding 1/2 million cubic meters per day.
   - Construction of water treatment plans of capacity exceeding 1/2 million cubic meters

2. By location (e.g. if projects are located wholly of partially within environmentally sensitive areas such as forest and wildlife reserves, stream or lake reservation, archaeological reserve, declared erodible areas etc.

Environmental recommendation

The any projects to establish industrial activities, which are not subject to EIA are advised to obtain environmental recommendation from the CEA for the proposed sites. The purpose of environmental recommendation is to minimize the environmental impact. The potential of the environmental impact of a proposed project is evaluated with respect to the zoning plans of relevant local Authorities surrounding land use, land availability for buffer zones, and the capacity of the area to receive additional pollution load and waste disposal requirements. The document contains the conditions, and the project should take mitigation measures to satisfy the conditions.

EPL

The potential polluting activities are requested to obtain Environmental Protection License (EPL) under the section 23.A of NEA. The prescribed activities for which a license is required are listed in the Gazette Notification No 1533/16 dated 25.01.2008. Water treatment plants having a treatment capacity of 10,000 or more cubic meters per day is stated as the prescribed activity in part A. The license for a project is issued by Provincial Offices or District Offices of the CEA, and it has maximum one year validity. The project proponent has to renew the license.

ANNEX 5 BASIS OF REGULATIONS AND STANDARDS AND A SUMMARY OF ENVIRONMENTAL COMPLIANCE REQUIREMENTS FOR THE PROJECT ACTIVITIES

Table Summary of basis of regulations and the standards

Air Quality (discharge and ambient)	Discharge: No standard Ambient: The National Environmental (Ambient Air Quality) Regulations, 1994, published in Gazette Extraordinary, No. 850/4 of December, 1994 amended No. 1562/22 - Friday, August 15, 2008
Water Quality (discharge and ambient)	Discharge: National Environmental (Protection and Quality) Regulations, No. 1 of 2008 - Schedule I Ambient: Proposed standard
Drinking Water Quality	Sri Lanka Standards for potable water – SLS 614: 1983
Wastes (domestic and water treatment operation)	As specified in Environmental Protection License
Noise and Vibration	Noise: National Environnemental (Noise Control) Régulations No.1 1996 Vibration: Proposed standards
Forest	Forest Ordinance No. 16 of 1907 (as amended) and the Rules and Regulations under the Ordinance
Wildlife	Fauna and Flora Protection Ordinance No. 2 of 1937 (as amended by Act Nos. 49 of 1993, 12 of 2005) and the Regulations under the Ordinance
Landscape	UDA Act No. 41 1978 and No. 4 of 1982
Heritage (Archeology)	Antiquities Ordinance No. 9 of 1940 as amended
Involuntary Resettlement	National Involuntary Resettlement Action Plan; Land Acquisition Act No.09 of 1950 (As Amended)
Protection of minority	The Constitution of Sri Lanka, 1978 as amended
Land expropriation and compensation	National Involuntary Resettlement Action Plan; Land Acquisition Act No.09 of 1950 (As Amended)
Safety of Labor	Factories Ordinance

Table Summary of Environmental Compliance Requirements for the Project Activities

	Project activity	Applicable Legislation	Statutory Requirement	Authorizing Body
1	Groundwater extraction projects of capacity exceeding 500,000 cubic meters per day	National Environment Act (NEA)	Environmental Clearance (EC)	Central Environment Authority (CEA)
2	Water treatment plant	NEA	EC	CEA

	exceeding 500,000 cubic meters per day			
3	All activities in sensitive areas	NEA	EC	CEA
4	All activities that require site clearance	Municipal Councils Ordinance No. 29 of 1947, the Urban Councils Ordinance No. 61 of 1939 and the Pradeshiya Sabha Act No. 15 of 1987 as amended	Clearance	Municipal Councils, Urban Councils and Pradeshiya Sabhas
5	All activities that require cutting of trees	Felling of Trees (Control) Act No 9 of 1951	Tree-cutting Permit	Forest Department
6	All s activities within a 1 mile (1.6 km) radius of a national reserve	Section 14 of Fauna and Flora Protection (Amendment) Act, No. 22 of 2009	Clearance	Department of Wildlife Conservation
7	All activities in close proximity of a reserve forest	Forests Ordinance No. 16 of 1907 as amended	Clearance	Forest Department
8	All s activities in and around fishery reserves	Fisheries and Aquatic Resources Act No. 2 of 1996	Clearance	Director of Fisheries and Aquatic Resources
9	All activities in proximity of archaeological reserves	Antiquities Ordinance No. 9 of 1940 as amended	Clearance	Department of Archaeology
10	All activities in and around irrigation development	Irrigation Development Act	Clearance	Director, Irrigation Department
11	All activities in and around declared urban development areas	Urban Development Authority Act No. 41 1978 and No. 4 of 1982	Clearance	Regional Director UDA
12	Water treatment plants having a treatment capacity of 10,000 or more cubic meters per day.	Gazette Notification No 1533/16 dated 25.01.2008	Environmental Protection License	CEA

ANNEX 6 ENVIRONMENTAL STANDARDS APPLICABLE TO THE PROJECT

Air quality standards

Table Discharge Standards for Petrol Vehicles

Type of Vehicle	Pollution Standard		Remarks
	Carbon Monoxide(CO (%vol)	Hydrocarbon HC (ppm v/v)	
Petrol wo/cc	a. > 5 years 3.0 < 5 years	1200	Low idling
Petrol w/cc	2	400	Low idling

wo/cc - Without catalytic converter

w/cc - with catalytic converter

>5 years - vehicles more that 5 years old from the year of manufacture (used / unused)

< 5 years - vehicles less than 5 years old from the year of manufacture

Table Discharge Standards for Diesel Vehicles

Type of Vehicle	Smoke Capacity% (k factor m-1)	
	Idle	Load
Diesel – Tare less than 1728 Kg Including three wheelers	65 (2.44)	75 (3.22)
Diesel – Tare more than 1728 kg	65 (2.44)	75 (3.22)

Table Ambient Air Quality Standards

	Pollutant	Averaging Time*	Maximum Permissible Level		
			μgm^{-3}	ppm	
1	Particulate Matter - Aerodynamic diameter is less than 10 µm in size (PM_{10})	Annual	50	—	Hi-volume sampling and Gravimetric or Beta Attenuation Hi-volume sampling and Gravimetric or Beta Attenuation
		24 hrs.	100	—	
2	Particulate Matter - Aerodynamic diameter is less than 2.5 µm in size ($PM_{2.5}$)	Annual	25	—	
		24 hrs.	50	—	
3	Nitrogen Dioxide (NO_2)	24 hrs.	100	0.05	Colorimetric using Saltzman Method or equivalent Gas phase chemiluminescence
		8 hrs.	150	0.08	
		1hr.	250	0.13	
4	Sulphur Dixoxide (SO_2)	24 hrs.	80	0.03	Pararosaniliene Method or equivalent Pulse Flourescent
		8 hrs.	120	0.05	

	Pollutant	Averaging Time*	Maximum Permissible Level		
			μgm^{-3}	ppm	
		1hrs.	200	0.08	
5	Ozone (O_3)	1 hr.	200	0.1	Chemiluminescence Method or equivalent Ultraviolet photometric
6	Carbon Monoxide (CO)	8 hrs.	10,000	9	Non-Dispersive Infrared
		1 hr	30,000	26	Spectroscopy"
		Anytime	58,000	50	

Table Occupational Safety and Health Guideline for Chlorine

	ppm	mg/m3	Source
Permissible exposure limit	1	3	United States Department of Labor
Advisable limit	0.5	1.5	National Institute of Occupational Safety & Health
Evaluation standard	0.5	1.5	Notification No. 53 Department of Labor（Japan）

Water quality standards

Table Tolerable Limit of Discharge to Inland Surface Water

No.	Parameter	Unit type of limit	Tolerance Limit values
1	Total suspended solids	mg/1, max.	50
2	Particle size of the total suspended solids	µm, less than	50
3	pH at ambient temperature	-	6.0 - 8.5
4	Biochemical oxygen demand (BOD_5 5 days at 20℃ or BOD_3 3 days at 27℃)	mg/1, max.	30
5	Temperature of discharge	℃, max.	Shall no exceed 400℃ in any section of the stream within 15 m down stream from the effluent outlet.
6	Oils and greases	mg/1, max.	10
7	Phenolic compounds (as C_6H_5OH)	mg/2, max.	1
8	Chemical oxygen demand (COD)	mg/3, max.	250
9	Colour	Wavelength Range 436 nm (Yellow range) 525nm (Red range) 620nm (Blue range)	Maximum spectral absorption coefficient $7m^{-1}$ $5m^{-1}$

No.	Parameter	Unit type of limit	Tolerance Limit values
			$3m^{-1}$
10	Dissolved phosphates (as P)	mg/1, max.	5
11	Total Kjeldahl nitrogen (as N)	mg/1, max.	150
12	Ammoniacal nitrogen (as N)	mg/1, max.	50
13	Cyanide (as CN)	mg/1, max.	0.2
14	Total residual chlorine	mg/1, max.	1
15	Flourides (as F)	mg/1, max.	2
16	Sulphide (as S)	mg/1, max.	2
17	Arsenic (as As)	mg/1, max.	0.2
18	Cadmium (as Cd)	mg/1, max.	0.1
19	Chromium, total (as Cr)	mg/1, max.	0.5
20	Chromium, Hexavalent (as Cr6+)	mg/1, max.	0.1
21	Copper (as Cu)	mg/1, max.	3
22	Iron (as Fe)	mg/1, max.	3
23	Lead (as Pb)	mg/1, max.	0.1
24	Mercury (as Hg)	mg/1, max.	0.0005
25	Nickel (as Ni)	mg/1, max.	3
26	Selenium (as Se)	mg/1, max.	0.05
27	Zinc (as Zn)	mg/1, max.	2
28	Pesticides	mg/1, max.	0.005
29	Detergents/surfactants	mg/1, max.	5
30	Faecal Coliform	MPN/100 ml, max	40
31	Radio Active Material : (a) Alpha emitters (b) beta emitters	 micro curie/ml, max micro curie/ml, max	 10^{-8} 10^{-7}

Noise and vibration

Table Maximum permissible noise levels

	Duration	Laeq', T
Day time	6:00 ~ 18:00	75
Night time	18:00 ~ 6:00	50

Table Maximum Permissible Noise Levels at Boundaries in LAeq, T, for Industrial Activities

Area	Day time	Night time
Rural Residential Area	55	45
Urban Residential Area	60	50
Noise Sensitive Area	50	45
Mixed Residential	63	55
Commercial Areas	65	55
Industrial Area	70	60
Japanese Environmental Standard		
A (residential area)	55	45

Appendix 8.4-2 Environmental Management Plan for Phase 2

Pre construction and Land Clearance Stage

Impact	Object	Mitigation measures	Impact	In charge or implemented by	Supervising
Noise and vibration	Provision of procurement of pump, generator and other noise generation facility	● Low noise/vibration pump and generator are specified in tender document. ● Building is designed with the consideration to decrease noise and vibration to meet the requirement. ● Location of these facilities is examined.	Minor	NWSDB HO	PMU (CEA)
Waste	Provision of treatment method of construction waste and Domestic waste	● Waste management plan is prepared under discussion with CEA and DS. The dumping site should not disturb wildlife. ● Temporally dumping area is secured.	Minor	NWSDB RSC	PMU DS CEA
Ecological impact	Clearing land	● Clearing land and cutting tree are planned under the discussion with Forest Dept and/or CEA to avoid destruction of habitat. ● These activities will be monitored and inspected. ● The contractor shall submit report with photos.	Minor	ESO/ Contractor	NWSDB RSC
	Rare species	● The contractor prepares code of conduct if workers encounter the rare species, and provides appropriate training to workers. ● Making a plan of transplant and recovery of habitat in case.	Minor	ESO/ Contractor	NWSDB RSC
Archaeological impact	Excavating antiquity	● The contractor prepares code of conduct if workers excavate antiquity, and provides appropriate training.	Minor	ESO/ Contractor	NWSDB RSC Archaeological dept.
Social impact	Stakeholder meeting	● Discussion and making agreement about construction schedule, procedure, and impact	Minor	NWSDB RSC	PMU DS
	Public relation activities for local residents	● Explanation for local residents and to develop understanding about construction work schedule, expected impacts, mitigation measures etc.	Minor	NWSDB RSC	PMU DS

Construction Stage

Impact		Mitigation measures	Impact	In charge or implemented by	Supervising
Air pollution	Exhaust gas	● To ensure the use of vehicles and machineries officially registered, and properly maintained.	Minor	ESO/ Contractor	PMU
	Dust	● To cover the earth or dusty materials and store properly. ● To sprinkle water to prevent the dust raising if necessary.	Minor	ESO/ Contractor	PMU
	Leakage of chlorine gas	● Guidance of proper installation ● Safety training to laborer	Minor	ESO/ Contractor	PMU
Noise	Vehicles and machinery	● To ensure the use of vehicles and machineries officially registered, and properly maintained. ● Unnecessary idling is not allowed. ● Route of transportation is examined to prevent noise or other effect on vicinity.	Minor	ESO/ Contractor	PMU
	Construction work	● To avoid doing the work generating noise and vibration at nighttime. ● Sound insulation wall will be used if necessary.	Minor	ESO/ Contractor	PMU
Water quality	Water source	● Making water resource protection plan with the commitment of relevant authority	Minor	PMU	PD
	Discharge water	● Clean water such as rain water is separately collected to prevent from mixing with muddy materials ● Turbid water generated by earthwork is introduced to the sedimentation basin and turbid material will be settled. ● If necessary further treatment (use of coagulant) is done.	Minor	ESO/ Contractor	PMU
	Domestic effluent	● Effluent is treated by the soak pit.	Minor	ESO/ Contractor	PMU
	Oil and grease	● Oil and grease are kept separately in the container. ● Oil absorbent is prepared. ● All vehicles are serviced at proper station.	Minor	ESO/ Contractor	PMU
Waste	Construction waste	● The waste reduction plan and dumping procedure will be proposed at the tender document and implemented. ● The temporally dumping yard for construction waste is secured. ● Waste is segregated in order to recycling purpose. ● Recyclable material is transferred	Minor	ESO/ Contractor	PMU

Impact		Mitigation measures	Impact	In charge or implemented by	Supervising
		to the recycling manufacturer. ● Waste which is not recyclable is disposed to follow the fixed rule of relevant DS.			
	Domestic waste generated by laborer	● Domestic waste is placed at the temporally damping yard, and transferred to the officially operated disposal field.	Minor	ESO/ Contractor	PMU
Ecological environment	Violation to ecosystem	● Training and awareness program for laborer must be planned and conducted. ● Code of conduct to prevent the violation to ecosystem is prepared. ● The all construction activities should follow the approved procedure. ● Scheduled patrol and inspection will must be conducted. ● Special measures to prevent traffic accidents will be taken.	Minor	ESO/ Contractor	PMU
	Trees and plant	● Clearing land is minimized and the large tree is remained as far as possible, or transplanted.	Minor	ESO/ Contractor	PMU
	Rare species	● If the special species will be found out at the site, the contractor has to report immediately to NWSDB and receive the guidance of CEA or wildlife dept. before taking any actions. ● The training for protection of rare species is conducted.	Minor	ESO/ Contractor	PMU CEA Wildlife dept
Archaeological impact	Excavating antiquity	● If the antiquity will be excavated at the site, report to NWSDB and receive the guidance of Archaeological dept.	Minor	ESO/ Contractor	PMU Archaeological dept.
Social impact	Social conflict caused by laborer	● Training and awareness program for laborer are planned and done. ● Security guard is appointed.	Minor	ESO/ Contractor	PMU
	Inconvenience of livelihood	● Pipe laying work on the road is planned carefully to prevent inconvenience as much as possible. ● Refraining from working during peak hours to prevent road traffic blocks ● Public notice prior to construction	Minor	ESO/ Contractor	PMU
Working condition	Occupational safety	● Training and awareness program for laborer is planned and done. ● Safety tools are provided to laborer by Contractor.	Minor	ESO/ Contractor	PMU

Operation Stage

Impact		Mitigation measures	Impact	In charge or implemented by	Supervising
Air pollution	Leakage of chlorine gas	● Chlorine gas concentration is monitored by appropriate device. ● Safety training to laborer	Minor	NWSDB RSC	NWSDB HO
Noise	Noise generation facility (pump etc)	● To ensure the proper operation and maintenance ● To control the noise and vibration to meet the CEA recommendation.	Minor	NWSDB RSC	NWSDB HO
Water quality	Discharge water	● Under drain water from sludge drying bed should be managed to satisfy the request of Irrigation dept.	Minor	NWSDB RSC	NWSDB HO
	Domestic effluent	● Effluent is treated by the soak pit.	Minor	NWSDB RSC	NWSDB HO
	Oil and grease	● Oil and grease are kept separately in the container and discarded in proper way.	Minor	NWSDB RSC	NWSDB HO
Waste	Domestic waste	● Domestic waste is placed at the temporally collection place, and transferred to the officially operated disposal field	Minor	NWSDB RSC	NWSDB HO
	Sludge	● Sludge is dried up at the drying bed to reduce its quantity ● Dried sludge is dumped by the contract with the approval of land owner.	Minor	NWSDB RSC	NWSDB HO
Working condition	Safety and health	● Safety and emergency tool is always ready. ● Safety training is provided on schedule. ● Newly hired employee shall have safety training.	Minor	NWSDB RSC	NWSDB HO

NWSDB RSC : National Water Supply and Drainage Board Reginal Support Center
NWSDB HO : National Water Supply and Drainage Board Head Office
PMU: Project Management Unit
PCC: Project Coordination Committee
DS: Divisional Secretariat
ESO: Environment and safety officer

Appendix 8.5-1 Monitoring Plan for Phase 2

Items	Monitoring parameters	Procedure	Frequency	Implemented and reported by	Report to
Designing stage					
Procurement	Suitability of specification	Checking the specification to meet the proposed mitigation measures	1 time	NWSDB	PMU
Waste	Waste management procedure	Checking dumping plan and obtaining agreement with local authority	1 time	NWSDB	PMU
Ecological environment	Clearing land procedure	Checking the plan of clearing and obtaining permission	1 time	NWSDB	PMU
	Rare species	Checking the plan of transplant and recovery of habitat	1 time	NWSDB	PMU
Social impact caused by laborer of construction	Awareness raising program	Checking the training plan of laborer	1 time	NWSDB	PMU
Construction stage					
Air quality	Vehicle registration	To register all vehicles for the project activities and inspect its certification	New vehicle is enlisted	Contractor	PMU
	Vehicle maintenance condition	Checking the registered vehicles and its maintenance record	Once a month	Contractor	PMU
	Dust	Visual observation at the site	Once a week	Contractor	PMU
	Chlorine gas emission	To check and calibrate the gas leak detector	Once a month	Contractor	PMU
Water quality	Discharge water quality	Measurement of turbidity	Every day during soil work	Contractor	PMU
		Monitoring discharge water quality (Minimum items are pH, TSS, Oil and grease, COD, Iron, Faecal Coliform)	Once a month	Contractor	PMU

Items	Monitoring parameters	Procedure	Frequency	Implemented and reported by	Report to
Noise	Working time of construction	Checking working record	Once a week	Contractor	PMU
	Noise at boundary	Measurement of noise at the boundary of the site	Once a month both in daytime and night time	Contractor	PMU
Ecological environment	Violation to ecosystem, such as cutting tree, hunting, killing taking plants and animals, disturbing habitat etc.	To examine code of conduct for prevention measures	Before starting construction	NWSDB	PMU
		Patrol of construction site and submission of the record	Once a week	Contractor	PMU
		Checking training record of awareness raising	Two times a year	Contractor	PMU
		To check the monthly report whether there is any violation to code of conduct.	Once a month	Contractor	PMU
	Trees and Plant	To check the extent of clearing land whether it is same as planned.	Stage of clearing land	Contractor	PMU
		Observation of the planting condition of the project site	End of construction work at each site	Contractor	PMU
	Rare species	To check the description about environmental protection activities at the monthly report.	Once a month	Contractor	PMU
Waste	Construction waste	To check condition of segregation at the dumping site. To check past record of recycling .	Every 3 months	Contractor	PMU
	Domestic waste	Observation of temporally dumping yard.	Every 3 months	Contractor	PMU

Items	Monitoring parameters	Procedure	Frequency	Implemented and reported by	Report to
Operation stage					
Air quality	Chlorine gas leakage	Measurement of gas concentration and check and calibration of gas leak detector	Once a week	NWSDB RSC	NWSDB
Raw water quality	Parameters listed in drinking water quality	Chemical analysis by laboratory	Once a month	NWSDB RSC	NWSDB
Distributing water quality	Parameters listed in drinking water quality	Chemical analysis by laboratory	Once a month	NWSDB RSC	NWSDB
Discharge water quality	Parameters listed in discharge water quality	Chemical analysis by laboratory	Every 3 months	NWSDB RSC	NWSDB
Occupational safety	Chlorine gas leakage	Measurement of gas concentration	Checking the daily record	NWSDB RSC	NWSDB
Noise	Noise at the boundary	Measurement of noise	Every 3 months	NWSDB RSC	NWSDB
Waste	Sludge	Observation of the drying bed Checking the record of sludge disposal	Every 4 months	NWSDB RSC	NWSDB

NWSDB : National Water Supply and Drainage Board
NWSDB RSC : National Water Supply and Drainage Board Reginal Support Center
PMU: Project Management Unit
ESO: Environment and safety officer

Appendix 8.5-2 MONITORING FORM

1. Responses/Actions to Comments and Guidance from Government Authorities and the Public

Monitoring Item	Monitoring Results during Report Period
Obtaining Environmental Protection License	
Stakeholder meeting	

2. Mitigation Measures

- Air Pollution

Monitoring Item	Monitoring Results during Report Period
Inventory of registered vehicle and maintenance record	

- Water Quality (Discharge Water Quality)

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred International Standards (Japanese standard)	Remarks (Measurement Point, Frequency, Method, etc.)
Turbidity	NTU			5 NTU Proposed Ambient Water Quality Standards for Inland Waters Sri Lanka	200mg/L as Total Suspended Solid	Measurement at discharge point by turbidity meter, daily during earth work Management value is to be 50 NTU (10 times as much as ambient standard)
pH				6.0 ～ 8.5	5.8 ～ 8.6	Measurement at discharge point by laboratory test, Monthly in construction stage, every three months in operation stage. In case of abnormal result, the full examination of discharge water standard items should be done.
Total Suspended Solid (TSS)	mg/l			50	200	
Oil and grease	mg/l			10	5 (as mineral oil) 30 (as oil extracted from animals and plants)	
COD	mg/l			250	160	
Iron	mg/l			3	10	
Faecal Coliform	MPN/ 100m1, max.			40	3,000/ml as Total Coliform	

- Waste

Monitoring Item	Monitoring Results during Report Period
Operation of temporal dumping area	

- Noise / Vibration

Item	Unit	Measured Value (Mean)	Measured Value (Max.)	Country's Standards	Referred Inter-national Standard	Remarks (Measurement Point, Frequency, Method,
Noise level	dB (A)			75dB (A) from 6:00 to 18:00 50dB(A) from 18:00 to 6:00 (Environmental Recommendation for construction stage)	85dB for construction machinery (Japan)	Measured at boundary by noise meter, monthly at day and night in construction stage, every three months in operation stage

3. Natural Environment

- Ecosystem

Monitoring Item	Monitoring Results during Report Period
Code of conduct for preventing violation to ecosystem	
Record of patrol	
Site inspection	

4. Social Environment

- Living / Livelihood

Monitoring Item	Monitoring Results during Report Period
Implementation of awareness training for laborer	

Appendix 8.6-1 Environmental Checklist for Phase 2

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N/A (b) N/A (c) N/A (d) Y	(a) (b) (c)Under currently proposed project condition, EIA is not required. On the other hand, IEE level research is ongoing by the project. (d) All clearances are obtained
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) Water Board held explanation meetings several times to the stakeholders. (b) Water Board has continued discussion with the Irrigation Department about water sharing.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Water intake procedure, location of facilities, course of pipe laying, treatment procedure are examined.

<table>
<tr>
<td>2 Pollution Control</td>
<td>(1) Air Quality</td>
<td>(a) Is there a possibility that chlorine from chlorine storage facilities and chlorine injection facilities will cause air pollution? Are any mitigating measures taken?
(b) Do chlorine concentrations within the working environments comply with the country’s occupational health and safety standards?</td>
<td>(a) N
(b) N</td>
<td>(a) Neutralization facility for spill protection is established. The gas leak detectors are placed and the it can automatically run the neutralization instrument with the detection.
(b) Sri Lankan Occupational Health Standards for chlorine is not existing. The facility will be designed to satisfy the American Operation of exhaust fan achieves the standard requirement.

Occupational Safety and Health Guideline for Chlorine
<table>
<tr><th></th><th>ppm</th><th>mg/m3</th><th></th></tr>
<tr><td>Permissible exposure limit</td><td>1</td><td>3</td><td>US dept of Labor</td></tr>
<tr><td>Advisable limit</td><td>0.5</td><td>1.5</td><td>NIOSH</td></tr>
<tr><td>Evaluation standard</td><td>0.5</td><td>1.5</td><td>Japan</td></tr>
</table>
Ambient Air Quality
<table>
<tr><th></th><th>Pollutant</th><th>Averaging Time*</th><th>Maximum µgm-3</th><th>Maximum ppm</th><th>Method of measurement</th></tr>
<tr><td>1</td><td>Particulate Matter - Aerodynamic diameter is less than 10 µm in</td><td>Annual</td><td>50</td><td>—</td><td rowspan="2">Hi-volume sampling and Gravimtric or Beta Attenuation</td></tr>
<tr><td></td><td></td><td>24 hrs.</td><td>100</td><td>—</td></tr>
<tr><td>2</td><td>Particulate Matter - Aerodynamic diameter is less than 2.5 µm in</td><td>Annual</td><td>25</td><td>—</td><td rowspan="2">Hi-volume sampling and Gravimtric or Beta Attenuation</td></tr>
<tr><td></td><td></td><td>24 hrs.</td><td>50</td><td>—</td></tr>
<tr><td>3</td><td>Nitrogen Dioxide (NO_2)</td><td>24 hrs.</td><td>100</td><td>0.05</td><td rowspan="3">Colorimetric using saltzman Method or equivalent Gas phase</td></tr>
<tr><td></td><td></td><td>8 hrs.</td><td>150</td><td>0.08</td></tr>
<tr><td></td><td></td><td>1hr.</td><td>250</td><td>0.13</td></tr>
<tr><td>4</td><td>Sulphur Dixoxide (SO_2)</td><td>24 hrs.</td><td>80</td><td>0.03</td><td rowspan="3">Pararosaniliene Method or equivalent Pulse Flourescent</td></tr>
<tr><td></td><td></td><td>8 hrs.</td><td>120</td><td>0.05</td></tr>
<tr><td></td><td></td><td>1hrs.</td><td>200</td><td>0.08</td></tr>
<tr><td>5</td><td>Ozone (O_3)</td><td>1 hr.</td><td>200</td><td>0.1</td><td>Chemiluminescence Method or equivalent Ultraviolet</td></tr>
<tr><td>6</td><td>Carbon Monoxide (CO)</td><td>8 hrs.</td><td>10,000</td><td>9</td><td rowspan="3">Non-Dispersive Infrared Spectroscopy”</td></tr>
<tr><td></td><td></td><td>1 hr.</td><td>30,000</td><td>26</td></tr>
<tr><td></td><td></td><td>Any time</td><td>58,000</td><td>50</td></tr>
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<td>(2) Water Quality</td>
<td>(a) Do pollutants, such as SS, BOD, COD contained in effluents discharged by the facility operations comply with the country’s effluent standards?</td>
<td>(a) Y</td>
<td>(a) Turbid water generated by construction work is introduced to the sedimentation pond and settled down. Domestic wastewater of usual operation is treated by soak pit and infiltrate to the ground. The expected discharge by the usual plant operation is seeping water from sludge mainly. It will be introduced into the lagoon. And final will satisfy the Sri Lankan standards. Irrigation Department might request to meet the drinking water standards. The use of drainage will be required.
Tolerable limit of discharge to inland surface water
<table>
<tr><th>No</th><th>Parameter</th><th>Unit type of limit</th><th>Tolerance Limit values</th></tr>
<tr><td>1</td><td>Total suspended solids</td><td>mg/1, max.</td><td>50</td></tr>
<tr><td>2</td><td>Particle size of the total suspended solids</td><td>µm, less than</td><td>50</td></tr>
<tr><td>3</td><td>pH at ambient temperature</td><td>-</td><td>6.0 - 8.5</td></tr>
<tr><td>4</td><td>Biochemical oxygen demand (BOD_5 5 days at 20℃ or BOD3 $_3$ days at 27℃)</td><td>mg/1, max.</td><td>30</td></tr>
<tr><td>5</td><td>Temperature of discharge</td><td>℃, max.</td><td>Shall no exceed 400℃ in any section of the stream within 15 m down stream from the effluent outlet.</td></tr>
<tr><td>6</td><td>Oils and greases</td><td>mg/1, max.</td><td>10</td></tr>
<tr><td>7</td><td>Phenolic compounds (as C_6H_5OH)</td><td>mg/2, max.</td><td>1</td></tr>
<tr><td>8</td><td>Chemical oxygen demand (COD)</td><td>mg/3, max.</td><td>250</td></tr>
<tr><td>9</td><td>Colour</td><td>Wavelength Range
436 nm (Yellow range)
525nm (Red range)
620nm (Blue range)</td><td>Maximum spectral absorption coefficient
$7m^{-1}$
$5m^{-1}$
$3m^{-1}$</td></tr>
<tr><td>10</td><td>Dissolved phosphates (as P)</td><td>mg/1, max.</td><td>5</td></tr>
<tr><td>11</td><td>Total Kjeldahl nitrogen (as N)</td><td>mg/1, max.</td><td>150</td></tr>
<tr><td>12</td><td>Ammoniacal nitrogen (as N)</td><td>mg/1, max.</td><td>50</td></tr>
<tr><td>13</td><td>Cyanide (as CN)</td><td>mg/1, max.</td><td>0.2</td></tr>
<tr><td>14</td><td>Total residual chlorine</td><td>mg/1, max.</td><td>1</td></tr>
<tr><td>15</td><td>Flourides (as F)</td><td>mg/1, max.</td><td>2</td></tr>
<tr><td>16</td><td>Sulphide (as S)</td><td>mg/1, max.</td><td>2</td></tr>
<tr><td>17</td><td>Arsenic (as As)</td><td>mg/1, max.</td><td>0.2</td></tr>
<tr><td>18</td><td>Cadmium (as Cd)</td><td>mg/1, max.</td><td>0.1</td></tr>
<tr><td>19</td><td>Chromium, total (as Cr)</td><td>mg/1, max.</td><td>0.5</td></tr>
<tr><td>20</td><td>Chromium, Hexavalent (as Cr6+)</td><td>mg/1, max.</td><td>0.1</td></tr>
<tr><td>21</td><td>Copper (as Cu)</td><td>mg/1, max.</td><td>3</td></tr>
<tr><td>22</td><td>Iron (as Fe)</td><td>mg/1, max.</td><td>3</td></tr>
<tr><td>23</td><td>Lead (as Pb)</td><td>mg/1, max.</td><td>0.1</td></tr>
<tr><td>24</td><td>Mercury (as Hg)</td><td>mg/1, max.</td><td>0.0005</td></tr>
<tr><td>25</td><td>Nickel (as Ni)</td><td>mg/1, max.</td><td>3</td></tr>
<tr><td>26</td><td>Selenium (as Se)</td><td>mg/1, max.</td><td>0.05</td></tr>
<tr><td>27</td><td>Zinc (as Zn)</td><td>mg/1, max.</td><td>2</td></tr>
<tr><td>28</td><td>Pesticides</td><td>mg/1, max.</td><td>0.005</td></tr>
<tr><td>29</td><td>Detergents/surfactants</td><td>mg/1, max.</td><td>5</td></tr>
<tr><td>30</td><td>Faecal Coliform</td><td>MPN/100 ml, max</td><td>40</td></tr>
<tr><td>31</td><td>Radio Active Material :
(a) Alpha emitters
(b) beta emitters</td><td>
micro curie/ml, max
micro curie/ml, max</td><td>
10^{-8}
10^{-7}</td></tr>
</table>
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<tr>
<td></td>
<td>(3) Wastes</td>
<td>(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed in accordance with the country’s regulations?</td>
<td>(a) Studying</td>
<td>(a) The sludge treatment system is designed.</td>
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<td>(4) Noise and Vibration</td>
<td>(a) Do noise and vibrations generated from the facilities, such as pumping stations comply with the country’s standards?</td>
<td>(a) Y</td>
<td>(a) The main noise and vibration generating machineries are generator and pump. The low-noise type and low- vibration type machinery is selected for reduction of noise and vibration. The other measures are also taken for reduction of noise level, accordingly, the noise level satisfy the Sri Lankan standards. The standards to be followed is shown below.
Maximum permissible Noise Levels at Boundaries of the land in which the source of noise is located in Laeq’ ,T,
<table>
<tr><th></th><th>Laeq’, T</th></tr>
<tr><td>Day time</td><td>75</td></tr>
<tr><td>Night time</td><td>50</td></tr>
</table>
Maximum permissible Noise Levels at Boundaries in LAeq, T, for industrial activities
<table>
<tr><th>Area</th><th>Daytime</th><th>Night time</th></tr>
<tr><td>Rural Residential Area</td><td>50</td><td>45</td></tr>
<tr><td>Urban Residential Area</td><td>60</td><td>50</td></tr>
<tr><td>Noise Sensitive Area</td><td>50</td><td>45</td></tr>
<tr><td>Mixed Residential</td><td>63</td><td>55</td></tr>
<tr><td>Commercial Areas</td><td>65</td><td>55</td></tr>
<tr><td>Industrial Area</td><td>70</td><td>60</td></tr>
<tr><td colspan="3">Japanese Environmental Standard</td></tr>
<tr><td>A (residential area)</td><td>55</td><td>45</td></tr>
</table>
</td>
</tr>
</table>

	(5) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N	(a) The project does not extract groundwater.
3 Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The project area is located outside of protected area. However, the environmental impact should be minimized.
3 Natural Environment	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site or discharge area encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (d) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) N (d) N	(a) Some part of project area is located in the forest but it is not special forest. (b) There are no endangered species. (c) The significant ecological impact is not expected. (d) The project takes water from irrigation canal so the adverse effect to the aquatic environment is limited. Furthermore, the purpose of the use of the project, the water will let flow on a steady basis. it will improve the environment.
	(3) Hydrology	(a) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect surface water and groundwater flows?	(a) N	(a) Currently, the water is used only the purpose of irrigation. The project will share a part of current water use, so the effect is negligible.
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) N (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A	(a) One household was the only identified in the Phase 1 project site, and resettlement was done properly. There is no any resettlement in Phase 2 site. (b), (c), (d), (e), (f), (g), (h), (i), (j) There is no object person.

4 Social Environment	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary? (b) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect the existing water uses and water area uses?	(a)N (b) N	(a) The other irrigation project (Yan Oya Reservoir Project) is ongoing and the water scarcity will be mitigated..(b) The villagers living the surrounding of the tank use tank water for domestic use. But same reason described above can solve the potential problem.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archaeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) The project area is not located in archaeological reserves. However, the project will take care and make an action plan in the case of excavating antiquities.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) The size of all facilities are small and the effect on the landscape is ignorable.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N/A (b) N/A	There is no indigenous group. The minority will be taken care of.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) N (b) Y (c) Y (d) Y	(a) NWSDB follows the Labor law, Factories Ordinance. (b) The contract condition is made under the 'Standard Bidding Document Procurement of Works' or 'Conditions of Contract'. And the Occupational safety and hazardous management will be secured. (c) It will be included in a contract document. (d) It will be included in a contract document.
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts? (d) If the construction activities might cause traffic congestion, are adequate measures considered to reduce such impacts?	(a) Y (b) Y (c) Y (d) Y	(a) Reduction and mitigation measures are taken. (b) The protection and mitigation measures are taken. (c) The people living in the project area will be taken care under the RAP. (d) It is solved by the adjustment of construction plan.

5 Others	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) ongoing (b) ongoing (c) ongoing (d) Y	(a)(b)(c)The project is preparing the monitoring plan (d) The project is requested to obtain the EPL (Environmental Protection License). The reporting format is included. The license is fixed-term and reporting is requested.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Dam and River Projects checklist should also be checked.	(a) N/A	(a) The project does not develop the dam and canal. The project only use the existing facilities for irrigation. There is no item to conflict with the Dam and River Projects checklist.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N/A	(a) There is no negative impact to transboundary or global issues because the project is small scale water supply scheme targeting the improvement of living standards.