

**NATIONAL WATER SUPPLY AND DRAINAGE BOARD (NWSDB)
MINISTRY OF CITY PLANNING AND WATER SUPPLY
THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA**

**SUPPLEMENTAL STUDY
ON
ANURADHAPURA NORTH WATER
SUPPLY PROJECT (PHASE 2)
IN
THE DEMOCRATIC SOCIALIST
REPUBLIC OF SRI LANKA**

FINAL REPORT

FEBRUARY 2016

JAPAN INTERNATIONAL COOPERATION AGENCY

NJS CONSULTANTS CO., LTD.

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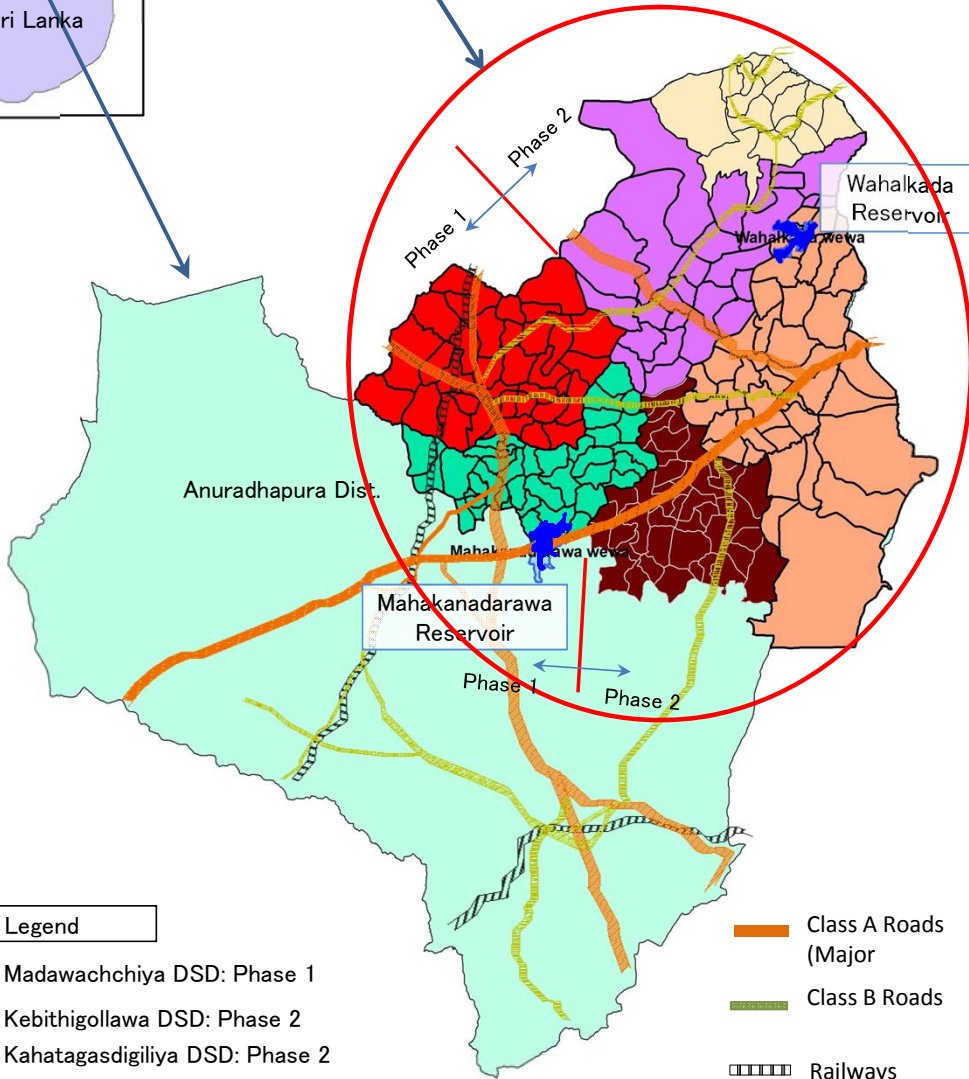
JAPAN INTERNATIONAL COOPERATION AGENCY

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Anuradhapura North Water Supply Project



Project Area



Legend

- Madawachchiya DSD: Phase 1
- Kebithigollawa DSD: Phase 2
- Kahatagasdigiliya DSD: Phase 2
- Horowpothana DSD: Phase 2
- Rambewa DSD: Phase 1
- Padaviya DSD: Phase 2

Location Map

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
ANWSP	Anuradhapura North Water Supply Project
CBO	Community-Based Organization
CEA	Central Environmental Authority, the Ministry of Environment and Natural Resources (ME&NR)
CEB	Ceylon Electric Board
CFI	Community Fluorosis Index
CKD	Chronic Kidney Diseases
CRM	Certified Reference Material
CWSSP	Community Water Supply and Sanitation Program
DAF	Dissolved Air Flootation
DI pipe	Ductile Iron Pipe
DSD	Divisional Secretary Division
EA	Engineering Assistant
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EOI	Expression of Interest
ET	Elevated Tank
FB	Freeboard
FC	Foreign Currency
FIRR	Financial Internal Rate of Return
FR	Forest Reserve
FSD	Full Supply Depth
FSL	Full Storage Level
GAC	Granular Activated Carbon
GND	Grama Niladhari Division
GOJ	Government of Japan
GOSL	Government of Sri Lanka
GPRS	General Packed Radio Service
HDPE	High Density Polyethylene
HH	Household
HWL	High Water Level
ID	Irrigation Department
IDP	Internally Displaced Persons
IEE	Initial Environmental Examination
IFRC	International Federation of Red Cross and Red Crescent Societies
JICA	Japan International Cooperation Agency
KfW	German Government-owned Development Bank, (Kreditanstalt für Wiederaufbau)
NC	North Central
LA	Local Authority

LAA	Land Acquisition Act
LB	Left Bank
LC	Local Currency
LCD	Liquid Crystal Display
Lpcd	Litre per capita per day
LWL	Low Water Level
MCB	Miniature Circuit Breaker
MCC	Motor Control Centre
MCCB	Molded Case Circuit Breaker
MCGs	Mahinda Chintana Goals
MCM	Million Cubic Meter (1,000,000 m ³)
MDGs	Millennium Development Goals
MWSD	Ministry of Water Supply and Drainage
NABL	National Accreditation Board for Testing and Calibration Laboratories
N/C	North Central
NCP	North Central Province
ND	Nominal Diameter
NEA	National Environmental Act
NEP	National Environmental Policy
NHWA	National Heritage Wilderness Area
NIRP	National Involuntary Resettlement Policy
NRW	Non Revenue Water
NWSDB	National Water Supply and Drainage Board
OD	Outer Diameter
OIC	Officer-in-Charge
PAA	Project Approving Agency
PCC	Project Coordination Committee
PCV pipe	Un-plasticized Polyvinyl Chloride Pipe
PD	Project Director
PEA	Project Executing Agency
PE pipe	Polyethylene Pipe
PLC	Programmable Logic Controller
PMU	Project Management Unit
PS	Pump Station
RAP	Resettlement Action Plan
RSC (N/C)	Regional Support Centre (North Central)
RSF	Rapid Sand Filter
RWS	Rural Water Supply
SCADA	Supervisory Control and Data Acquisition
SLAB	Sri Lanka Accreditation Board
SP	Steel Pipe
SSF	Slow Sand Filter

TEC	Technical Evaluation Committee
UPS	Uninterruptible Power Systems
uPVC	Un Plasticized Poly-Vinyl Chloride
VSD	Variable Speed Driver
WB	World Bank
WFP	Work and Financial Plan
WHO	World Health Organization
WLPSA	Wildlife Protected Area
WSP	Water Supply Project
WSS	Water Supply Scheme
WTP	Water Treatment Plant
Ac	= 4,047 m ²
Acft	= 1,234 m ³

SUMMARY

CHAPTER 1 BACKGROUND OF SUPPLEMENTAL STUDY

1.1 Background of the Study

The Anuradhapura North Water Supply Project (hereinafter referred to as “Project”) aims to develop the water supply system in the Project area which can supply stable and safe water, and consequently to prevent health damage of the residents.

Regarding this Project, National Water Supply and Drainage Board (hereinafter referred to as “NWSDB”), the executing agency, considered that the Project would be financed by Japanese official development assistance loan (hereinafter referred to as “ODA loan”) based on the results of the Preparatory Survey conducted by JICA in 2013 (hereinafter referred to as “F/S”). The Phase 1 of the Project (hereinafter referred to as “Phase 1”) has been conducted under the ODA loan SL-P110, and a part of the scope of the Phase 1 was changed during its detailed design stage (hereinafter referred to as “D/D”), i.e. water supply method (from bowser supply to piped water supply in isolated areas) and water treatment process (from coagulation sedimentation method to dissolved air floatation method (DAF), and early introduction of Granular Activated Carbon (GAC) filtration which was planned to be introduced in future in the F/S). Further, the engineer’s estimates for Phase 1 was extremely increased through D/D from the one estimated in the F/S. Because of the increase of the cost estimates for Phase 1, it was expected with high possibility that the cost for the work of Anuradhapura North Water Supply Project (Phase 2)” (hereinafter referred to as “Phase 2”) will also be increased largely. Consequently, it was determined that collection of additional information, and review of cost estimates are necessary for the Phase 2 project which was requested by NWSDB in 2015 to be financed by the ODA loan, and then, this Supplemental Study (hereinafter referred to as “S/S”) was conducted.

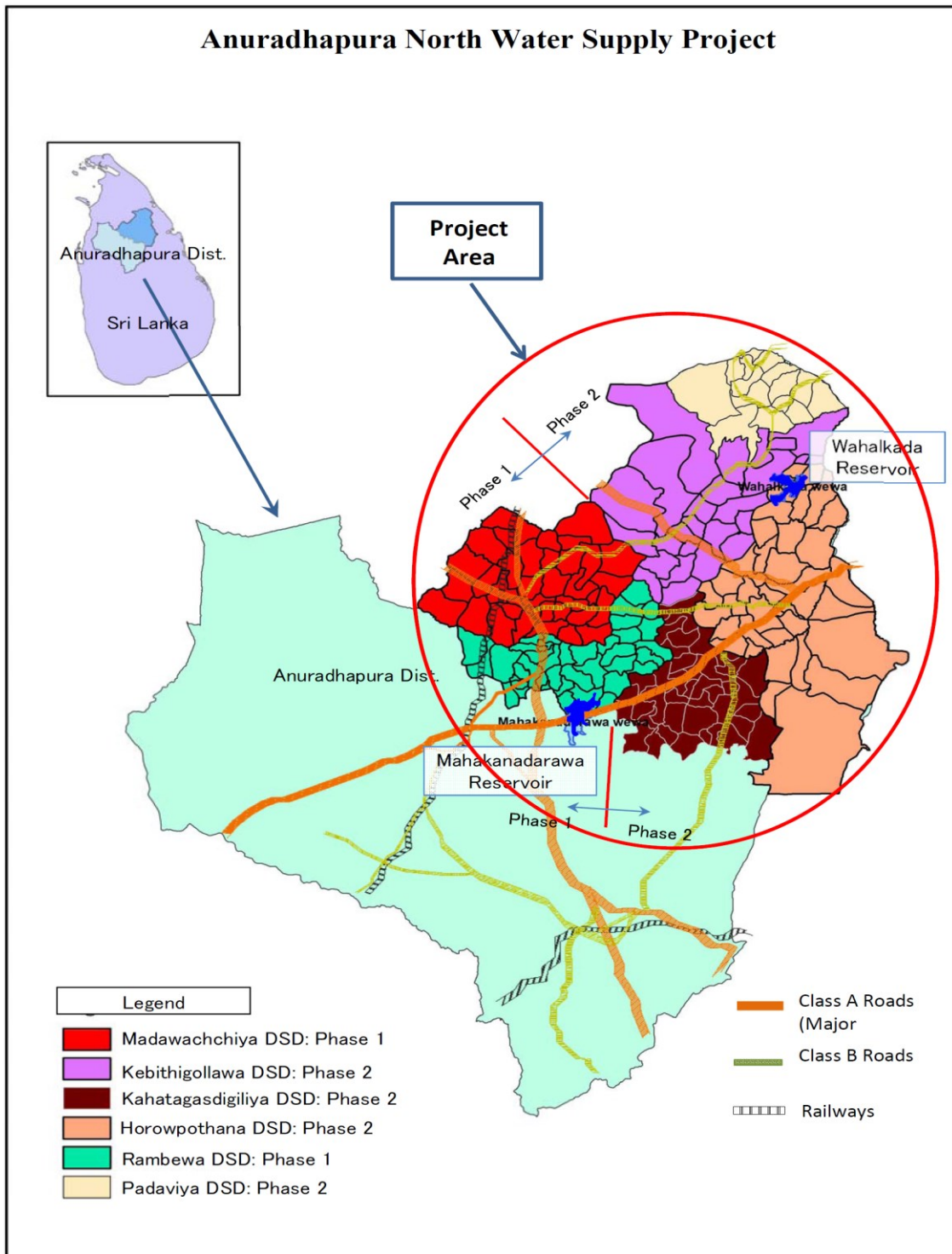
1.2 Objective of the S/S

Objective of the S/S is to conduct collection of supplemental information, to analyze the collected information, and to provide recommendation based on them, then consequently, to examine appropriateness of the Project for Japanese ODA loan.

CHAPTER 2 WATER DEMAND PROJECTION

2.1 Service Area

- Phase-1 Area (Mahakanadarawa System) : Medawachchiya, Rambewa, a part of 2 GNDs of Mihinthale
- Phase-2 Area (Wahalkada System) : Kebithigollewa, Horowpothana, Kahatagasdigiliya, Padaviya



Source: F/S Final Report

Figure 2.1-1 Project Area and DSDs

2.2 Design Criteria and Result of Water Demand Projection

2.2.1 Mahakanadarawa System

Table 2.2-1 Summary of Design Criteria for Mahakanadarawa System

Items	Unit	Calculation	S/S		F/S	
			2024	2034	2024	2034
Served Population	pop	a	46,110	65,686	70,097	111,900
Per Capita Water Consumption	LPCD	b	86	91	86/10	91/10
Non-Domestic Water Demands	%	c	30		35	
Allowance for Unplanned Water Demands	%	d	1.5		-	-
Non-Revenue Water (in total water demand)	%	e	13.8	20.0	20	
Design Daily Average Water Demand (Dave)	m ³ /day	$f = a \times b \times \frac{(1+c)}{x(1+d) / (1-e)}$	10,002	17,252	7,154	14,414
Design Load Factor to Dmax	%	g	110		120	
Design Daily Maximum Water Demand (Dmax)	m ³ /day	$h = f \times g$	11,003	18,977	8,585	17,297
Required WTP Production Capacity (Output)	m ³ /day	i	11,003	18,977	8,585	17,297
Proposed WTP Production Capacity (Output)	m³/day	j	11,200	18,800	8,950	17,900
Water Loss at Water Treatment Plant	%	k	5		5	
Required Raw Water Demand	m ³ /day	$l = i / (1-k)$	11,582	19,976	9,014*	18,162*
Required Raw Water Intake	m ³ /day	m	11,582	19,976	9,014	18,162
Proposed Capacity of Intake Facility	m³/day	n	11,800	19,800	9,400	18,800
Design Peak Factor	%	o	160		200	
Design Hourly Maximum Water Supply (Hmax)	m ³ /day	$p = h \times o$	17,605	30,363	17,170	34,594

*: Required Raw Water Demand in F/S = Required WTP Production x 1.05

9,014 = 8,585 x 1.05; 18,162 = 17,297 x 1.05

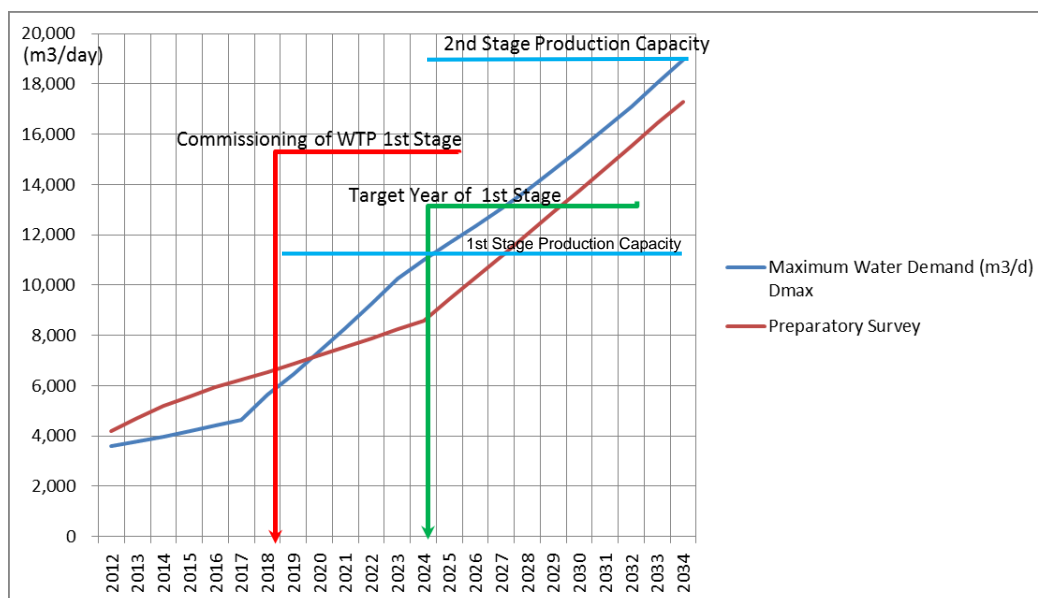


Figure 2.2-1 Demand and Supply of Mahakanadarawa System

2.2.2 Wahalkada System

Table 2.2-2 Design Criteria for Wahalkada System

Items	Unit	calculation	S/S		F/S	
			2024	2034	2024	2034
Served Population	pop	a	106,121	168,776	100,393	161,468
Per Capita Water Consumption	LPCD	b	86	91	86/10	91/10
Non-Domestic Water Demands	%	c	30		35	
Allowance for Unexpected Water Demands	%	d	1.5		-	-
Non-Revenue Water (in total water demand)	%	e	12.9	20.0	20	
Design Daily Average Water Demand (Dave)	m ³ /day	$f = a \times b \times \frac{(1+c)}{x(1+d) / (1-e)}$	13,819	25,334	11,098	22,932
Design Load Factor to Dmax	%	g	110		120	
Design Daily Maximum Water Demand (Dmax)	m ³ /day	$h = f \times g$	15,201	27,867	13,318	26,870
Required WTP Production Capacity (Output)	m ³ /day	i	15,201	27,867	13,318	26,870
Proposed WTP Production Capacity (Output)	m³/day	j	15,000	27,400	13,700	27,400
Water Loss at Water Treatment Plant	%	k	5		5	
Required Raw Water Demand	m ³ /day	$l = i / (1-k)$	16,001	29,334	13,983*	28,214*
Required Raw Water Intake	m ³ /day	m	16,001	29,334	13,983*	28,214*
Proposed Capacity of Intake Facility	m³/day	n	16,000	28,800	14,400	28,800
Design Peak Factor	%	o	160		200	
Design Hourly Maximum Water Supply (Hmax)	m ³ /day	$p = h \times o$	24,321	44,587	26,635	53,740

*: Required Raw Water Demand in F/S = Required WTP Production x 1.05

13,983 = 13,318 x 1.05; 28,214 = 26,870 x 1.05

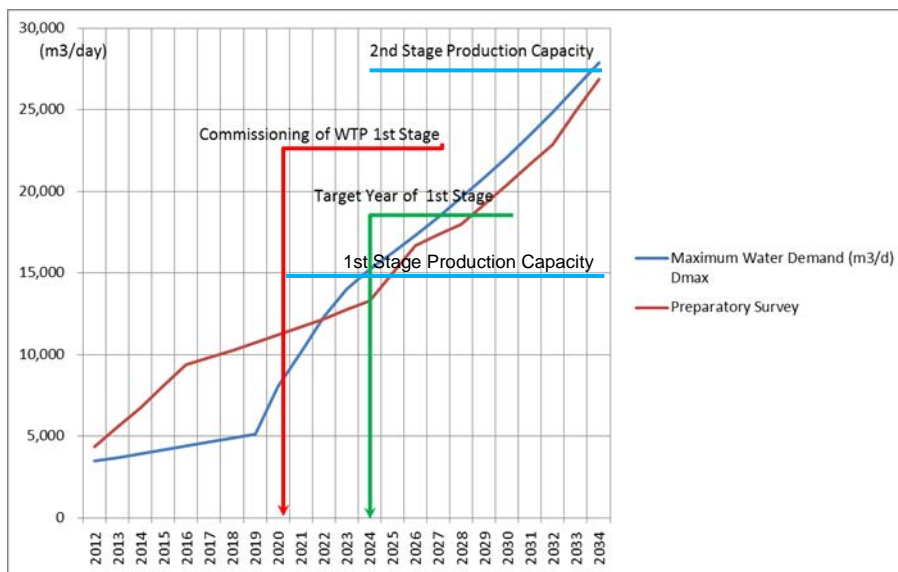


Figure 2.2-2 Demand and Supply of Wahalkada System

CHAPTER 3 REVIEW OF PHASE 1 PROJECT

Non-disclosure Information

CHAPTER 4 REVIEW OF PHASE 2 PROJECT

Non-disclosure Information

CHAPTER 5 IMPLEMENTATION PLAN

Non-disclosure Information

CHAPTER 6 FINANCIAL AND ECONOMIC CONSIDERATIONS

Non-disclosure Information

CHAPTER 7 OPERATION AND EFFECT INDICATORS

The operation and effect indicators presented in the F/S includes those which are considered to be relatively hard to follow up, and several indicators have vague expressions with indistinct definition such like population who has access to safe drinking water in the project. Considering above problems, application of revised indicators are recommended for simplification of indicators as shown in **Table 7.1-1**.

Table 7.1-1 Performance and Operation Indicators

Indicator	(2012)	Present (2015)	Target (2020)
Mahakanadarawa System			
Served Population	27,818	31,896	53,531
Water Supply Coverage (w/ Surface Water) (%)	0	0	56
Fluoride in drinking water (mg/L)	1.9 ³ (Jayashakthi CBO)	-	<1.0
Rate of Facility Utilization ² (%)	-	-	60
Wahalkada System			
	(2012)	Present (2015)	Target (2022)
Served Population			
Water Supply Coverage (w/ Surface Water) (%)	26,589	31,182	88,148
Fluoride in drinking water (mg/L)	0	0	63
Rate of Facility Utilization ² (%)	1.9 ³ (Senath CBO)	-	<1.0

Note:

1: During the F/S, Census Population was not available. Figures in this table are based on the population in 2012 Census.

2: Mahakanadarawa; 6,652/11,200, Wahalkada; 11,193/15,000

3: The Figure of 1.9 mg/L is detected from existing CBO water supply systems in the project area as the analysed maximum value obtained in the Preparatory Survey. This figure exceeded the drinking water quality standard of Sri Lanka 2013 (<1.0 mg/L) (refer to **Appendix 7.2-1**, and **Appendix 7.2-2**).

Chapter 8 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

8.1 Review of the Government Policies and Regulations

There has not been any major change of policies and laws after F/S, but a couple of standard sets have been revised, i.e., drinking water standard and discharge standards for Petrol Vehicles.

8.1.1 Specification for Potable Water (SLS 614)

The old version of standards had two kinds of criteria for some parameters as 'Highest desirable level' and 'Maximum permissible level'. But new version of the standards only has one criteria for each parameter. Other notable differences are the change of criteria concentration for some parameters, such as fluoride (1.5 mg/l to 1.0 mg/l), arsenic (0.05 mg/l to 0.01 mg/l), and addition of some parameters like nickel, total dissolved solid etc.

NWSDB continues the monthly monitoring of water quality at Wahalkada tank. The parameters which exceeded the standard value are colour, turbidity, iron and bacteriological parameters are able to be removed by the usual water treatment procedure. Toxic substances are not measured by usual NWSDB monitoring. The F/S team measured toxic substances from December 2011 to June 2012, and all reported results satisfied the requirements of the updated standards.

8.1.2 Air Emission, Fuel and Vehicle Importation Standards

The Air Emission standards was established in 2003 and amended in 2008. It was again amended in 2014. The type of vehicle is changed and criteria value of emission gas is revised.

8.2 Approval

This project is not requested EIA and IEE. The any projects to establish industrial activities, which are not subject to EIA are advised to obtain Environmental Recommendation from the Central Environmental Authority (hereinafter referred to as “CEA”) for the proposed sites. Environmental Recommendation for the Phase 2 project was issued by the CEA NCR (North Central Region) office on 23rd September 2015. NWSDB should obtain Environmental Protection License (EPL) 3 months before starting operation.

8.3 Current status of the Land Acquisition for the Phase 2

NWSDB has started the land acquisition procedure for the Phase 2 project. **Table 8.3-9** shows current status of proposed sites of Phase 2. The ownership transfer of sites is proceeding smoothly. Currently, there is no possibility of resettlement and NWSDB will pay the effort to avoid relocation of resident in future. But if needs arise, NWSDB will follow the JICA guidelines of resettlement.

Table 8.3-1 Current Status of Land Acquisition (as of 3rd November 2015)

No	Name of Site	Major Facilities*	Area (m ²)	Current Owner	Present Status of Land Clearance
1	Kahatagasdigiliya	WR, WT, PH, CH, GR, OF, SQ,	7,000m ²	NWSDB	ok
2	Hamillewa	WT, CH, SQ	4,000m ²	Government	Approval letter to be received from Divisional Secretary (DS).
3	Rathmalgahawewa	WT, CH, SQ	2,000 m ²	Government	Land commission's Approval to be received for prepares a survey plan.
4	Horowpothana	WR, WT, PH, GR, CH, OF, WS, SQx2	8,000 m ²	NWSDB	ok
5	West Horowpothana	WT, CH, SQ	4,000 m ²	FOREST Dept.	Approval granted by the Forest Conservator. Position to be transferred. Constructions can be commenced under the supervision of Divisional Forest Officer (DFO).
6	North Horowpothana	WT, CH, SQ	2,000 m ²	FOREST Dept.	Approval granted by the Forest Conservator. Position to be transferred. Constructions can be commenced under the supervision of DFO.
7	Weerasole	WR, PH, GR, CH, SQ	4,000 m ²	FOREST Dept.	Approval granted by the Forest Conservator. Position to be

					transferred. Constructions can be commenced under the supervision of DFO.
8	Kebithigollewa	WR, WT, PH, GR, WS, CH, SQx2, OF	9,000 m ²	NWSDB	ok
9	KAH-KEB	WT, CH, SQ	2,000 m ²	Government	Local authority approval to be received.
10	Kahatagollewa – 1	WT, CH	2,000 m ²	Government	Local authority approval was received.
11	Kahatagollewa – 2	WR, PH, GR, SQ,	4,000 m ²	Government	Local authority approval was received.
12	Bogahawewa	WT, OF, CH, SQx2	4,000 m ²	Government	Lease application and relevant documents to be forwarded to Land Commissioner (LC) through the Provincial Land Commissioner (PLC) by DS.
13	Wahalkada - 1	Water Treatment Plant, WT	40,000 m ²	FOREST Dept.	Approval from the Forest department was received. Annual rental to be paid amount of LKR 160,000.00 to the Forest Department.
14	Wahalkada – 2	Intake and PH	2,000 m ²	FOREST Dept.	Approval granted by the Forest Conservator. Position to be transferred. Constructions can be commenced under the supervision of DFO.
15	Mahakanadarawa System service area	Water Tower (750m ³)	Approx.. 4,000 m ²	Not yet identified	Sites are not yet identified. They shall be identified during Phase 2 D/D stage. It will be selected in a property of Forest department or local government property for obtaining clearance smoothly.
16	Mahakanadarawa System service area	Water Tower (250m ³)	Approx.. 2,000 m ²	Not yet identified	Same to above.
17-19	Wahalkada System service area	Water Tower (250m ³) x 3	Approx.. 2,000 m ² each	Not yet identified	Same to above.

*: Abbreviations

WR; Ground Reservoir, WT; Water Tower (Elevated Tank), PH; Pump House, CH; Chlorination House, GR; Generator Room, OF; Office, SQ; Staff Quarters,

Source: NWSDB- RSC-NC

8.4 Lessons learned from Phase 1 Project

8.4.1 Issues of Effluent Management

In the phase 1, the Irrigation Department requested that the discharge water quality has to meet the drinking water quality standards because the residents living alongside the canal usually use the canal water for drinking and cooking purpose. In case of the Wahalkada WTP, NWSDB will be requested to take measures for effluent management. NWSDB can treat effluent in order to satisfy the drinking water quality standard with the additional treatment processes or, discharge water to the drainage canal.

8.4.2 Issues of Water Intake Design

The Irrigation Department requested NWSDB to bear the cost to automate the main gate due to the difficulty of the manual gate operation of the Mahakanadarawa scheme in phase 1. Therefore, similar request might come to Wahalkada. In case of the Wahalkada, there is unlined extent at upper stream of the proposed intake point. It is expected that the Irrigation Department will request NWSDB to campshd the

upper distance of the intake point.

8.4.3 Protest Movement

During the F/S period, there were multiple protest movement for opposition against the sharing water of irrigation to drinking water use at the surroundings of the Wahalkada WTP planned site. However, protest movement quieted down by the effort of NWSDB. On the other hand, the new development plan of irrigation system is ongoing in the vicinity of the Wahalkada. Wahalkada is also covered by the project. Therefore, it is conceivable that possibility of relapse of protest movement became extremely low.

8.4.4 Pipe laying at Road Reservation

The road reservation and building limit are discussed at National Thoroughfares Act. The Act states that the construction work can be conducted within the reservation with the permission of Executive Engineer of the authority. Therefore, the pipelines of the Project can be laid within the road reservation, and land acquisition beside the road is not required.

8.5 Environmental Management

The environment of the project area has not changed significantly for these three years. Therefore, the reported contents of environmental and social consideration in the F/S report are still effective. The environmental management and mitigation measures are part of the report and the concept is succeeded by the Environmental Management Plan (EMP).

Phase 2 project area is located in forest-rich area compared with Phase 1. The main possible adverse effects to be considered at any project for fauna and flora are loss or separation of living place, disturbance of living, and danger of life. Pipe laying construction work could affect negatively to the fauna and flora. In same sense, the negative effect is considerable at the construction mainly. The JICA Study team observed a traffic sign notifying elephant crossing. The most effective preventive action to traffic accident is training and education of site workers and drivers. The awareness raising program is very effective and the EMP put the importance on the educational program. The revised EMP draft is attached as **Appendix 8.5-2**.

8.6 Environmental Monitoring and Implementation Framework

The Contractor is to submit his/her proposal for the Environmental Management Implementation Plan (EMIP) at the beginning of the contract and obtain the Engineer's approval and is to employ a competent Officer (Health & Safety / Accident Prevention) to monitor the EMP requirements. The contractor will submit a monthly environment and safety status report on the basis of EMIP, and is requested to conduct internal auditing in every six months.

The revised Environmental Monitoring Plan and Monitoring Form are attached as **Appendix 8.6-1** and

Appendix 8.6-2, respectively.

8.7 Environmental Check List

Table 8.7-1 describes the necessary considerations with the difference of the project scope between the F/S and the S/S. The revised checklist for Phase 2 is attached as Appendix 8.7-2.

Table 8.7-1 Necessary Considerations with Review of Phase 2

Item		Stage of study		Description	Impact
		F/S	S/S		
Water treatment capacity		13,700m ³ /day	15,000m ³ /day	The increase of capacity and addition of facilities don't need the increase of land always. Phase 1 solves the same issues by the arrangement of facilities. Phase 2 will be able to solve it same way and impact will not be significant.	Same
Treatment procedure		Coagulating sedimentation	Dissolved Air Flootation and Granular Activated Carbon Filtration		
Elevated tanks and reservoirs for isolated area		0	5 (2 in Phase 1) (3 in Phase 2)	The new project land will be acquired. The locations are in remote area and the resettlement is avoidable by selecting unused lands. Impact to the natural environment should be carefully considered.	Increase negative but minor
Length of pipe works	Transmission	117.3 km	126.1 km	Laying pipe at road doesn't require land. The longer construction distance will create the negative impact during construction stage.	Increase negative but minor
	Distribution -sub	633.0 km	720.7 km		
Supply procedure to isolated area		Bowser supply	Piped supply	Users can access water dramatically easier. They are free from inconvenience of water fetching.	Positive impact

8.8 Recommendation

There are some ongoing development projects for irrigation, and the negative feeling of the farmers seems settled down. However, NWSDB has to continue the discussions with stakeholders. Sharing information of the project activities and progress, explanation of positive and negative aspects honestly are important for succeeding the project. The meeting records of these discussions should be kept.

The environmental adverse effect is generally limited in a water supply project. The impact is mainly created at the construction period. Therefore the EMP and the EMIP are important, and the establishment of monitoring body and its active contribution are highly appreciated. The project site is outside of the natural reserves or other protected area, however, the all concerning parties should be aware of protection of environment.

Currently, there are no squatters and illegal cultivation at the planned project sites. Many of sites are covered by the trees and bushes and difficult to start living. However, NWSDB is better to establish a

signboard, fence or some kind of notice at the land to reduce the possibility of the encroachment. The clear statement of the cut-off date is recommended. After cut-off date, the compensation is not required on the basis of the JICA guideline requirement and safe guard policy OP 4.12 of World Bank.

If the additional land is required for the reviewed project activities, the land acquisition will not be problem without the case of protected area and reserved forest. In such case, the prompt decision of the land selection is required.

CHAPTER 1

BACKGROUND OF SUPPLEMENTAL STUDY

CHAPTER 1 BACKGROUND OF SUPPLEMENTAL STUDY

1.1 Background of the Study

In the Democratic Socialist Republic of Sri Lanka (hereinafter referred to as “Sri Lanka”), 85.2%¹ of the population is accessible to safe water² by means of a water supply system, wells and/or rainwater. However, there is no developed water supply system in Anuradhapura District, located in the North Central Province, and the residents in the region only can access to wells as water sources. The water source, groundwater contains high fluoride concentration exceeding the drinking water quality standard of Sri Lanka. It is harmful to the human body, and this has caused problems on their teeth and bones. The highly concentrated fluoride is also said to be a major factor of Chronic Kidney Diseases (hereinafter referred to as “CKD”) which has a high incidence in this area, as well as other health problems. Because of above situation in the area, the changing of water source from groundwater to surface water is an urgent need.

The Anuradhapura North Water Supply Project (hereinafter referred to as “Project”) aims to develop the water supply system in the Project area which can supply stable and safe water, and consequently to prevent health damage of the residents.

Regarding this Project, National Water Supply and Drainage Board (hereinafter referred to as “NWSDB”), the executing agency, considered that the Project would be financed by Japanese official development assistance loan (hereinafter referred to as “ODA loan”) based on the results of the Preparatory Survey conducted by JICA in 2013 (hereinafter referred to as “F/S”). The Phase 1 of the Project (hereinafter referred to as “Phase 1”) has been conducted under the ODA loan SL-P110, and a part of the scope of the Phase 1 was changed during its detailed design stage (hereinafter referred to as “D/D”), i.e. water supply method (from bowser supply to piped water supply in isolated areas) and water treatment process (from coagulation sedimentation method to dissolved air floatation method (DAF), and early introduction of Granular Activated Carbon (GAC) filtration which was planned to be introduced in future in the F/S). Further, the engineer’s estimates for Phase 1 was extremely increased through D/D from the one estimated in the F/S. Because of the increase of the cost estimates for Phase 1, it was expected with high possibility that the cost for the work of Anuradhapura North Water Supply Project (Phase 2)” (hereinafter referred to as “Phase 2”) will also be increased largely. Consequently, it was determined that collection of additional information, and review of cost estimates are necessary for the Phase 2 project which was

¹ NWSDB WEB Site on 14th January 2016: file:///C:/Users/NJS-Temp/Downloads/ASW%20Coverage%20June%202015.pdf
Piped Water Supply: 45.0%, Protected Dug Well: 36.5%, Tube Wells/Hand Pumps: 3.2%, Rain Water Harvesting & others: 0.5%,
No access to Safe Water: 14.8%

² Terminology of “Safe Water” means harmless water to human body. To assure the drinking safety of water, satisfaction of water quality standard is required in principle.

requested by NWSDB in 2015 to be financed by the ODA loan, and then, this Supplemental Study (hereinafter referred to as “S/S”) was conducted.

1.2 Objective of S/S

Objective of the S/S is to conduct collection of supplemental information, to analyze the collected information, and to provide recommendation based on them, then consequently, to examine appropriateness of the Project for Japanese ODA loan.

1.3 Study Team for S/S

The Study Team for the S/S was composed of following persons;

- | | | |
|-----|-------------------------|--|
| (1) | Mr. Takafumi Kiguchi | Team Leader / Water Supply Planning |
| (2) | Mr. Hirofumi Sano | Construction Plan / Cost Estimates 1 |
| (3) | Mr. M. M. P. M. Bandara | Construction Plan / Cost Estimates 2 |
| (4) | Mr. Toru Suetake | Economic and Financial Analysis |
| (5) | Ms. Yasuko Kamegai | Environmental and Social Consideration |

1.4 Schedule of S/S

The S/S was conducted as follows:

- (1) Stage 1 (15 to 18 October 2015): Preparation for Field Work

The Stage 1 was started from 15 October and ended on 18 October 2015 for preparation of field work of the S/S. The Work Plan was established during this period.

- (2) Stage 2 (19 October to 8 November 2015): Field Work

The field work was conducted from 19 October to 8 November 2015. Required data collection and interviews with concerning persons were conducted during this period.

- (3) Stage 3 (9 November to 30 November 2015): Analysis of Collected Data

Data and information collected by the field work were examined and analyzed. Results were compiled in the Draft Final Report (hereinafter referred to as “DFR”).

- (4) Stage 4 (1 December to 10 December 2015): Explanation and Discussion on DFR

Accompanying with the Fact Finding mission of JICA, explanation about DFR and discussion with NWSDB based on the draft papers for the DFR was conducted in order to finalize the DFR.

(5) Stage 5 (11 December 2015 to 3 February 2016)

The Final Report (hereinafter referred to as “FR”), which reflected comments from JICA and NWSDB on the DFR, was prepared and submitted on 3 February 2016.

CHAPTER 2

WATER DEMAND PROJECTION

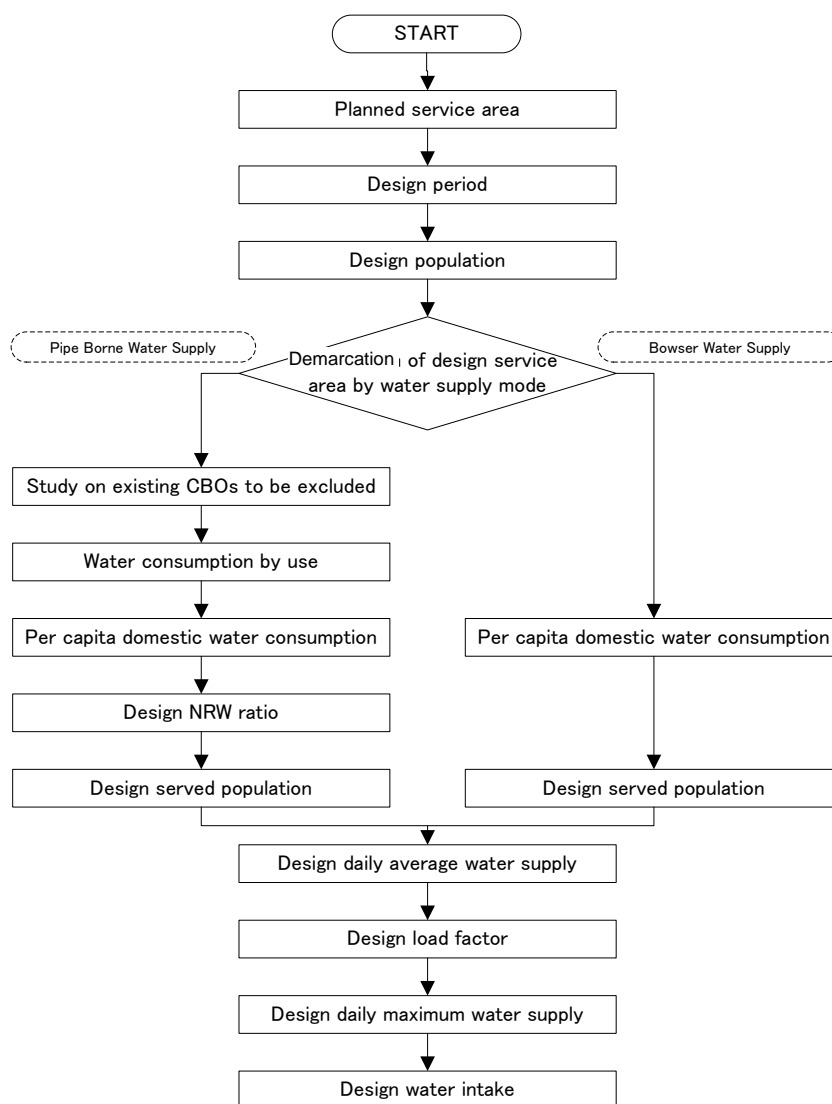
CHAPTER 2 WATER DEMAND PROJECTION

2.1 Water Demand Projection in F/S

In the Preparatory Survey (F/S), the design water flow was estimated as described below. (Tables and figures in Section 2.1 are referred from the F/S report.) :

2.1.1 Flowchart for Estimation

The design water flow was estimated in accordance with the flowchart as shown in **Figure 2.1-1**.



Source: F/S Final report

Figure 2.1-1 Flowchart of Design Water Flow Estimation

2.1.2 Estimation of Design Water Flow

(1) Service Area

The service area covers six DSDs¹, namely, Medawachchiya, Rambewa², Kebithigollewa, Horowpothana, Kahatagasdigiliya, and Padaviya which are located in the north-eastern part of Anuradhapura District. Out of six DSDs stated above, Medawachchiya and Rambewa belong to Phase-1 area of the Project and remaining 4 DSDs belong to Phase 2 (refer to **Figure 2.1-2**).

(2) Target Year

The target year was set in 2034 and an interim target year was also set in 2024 for staged construction.

(3) Projected Population

The projected population is summarized in **Table 2.1-1**.

Table 2.1-1 Population Projection in the Project Area in F/S

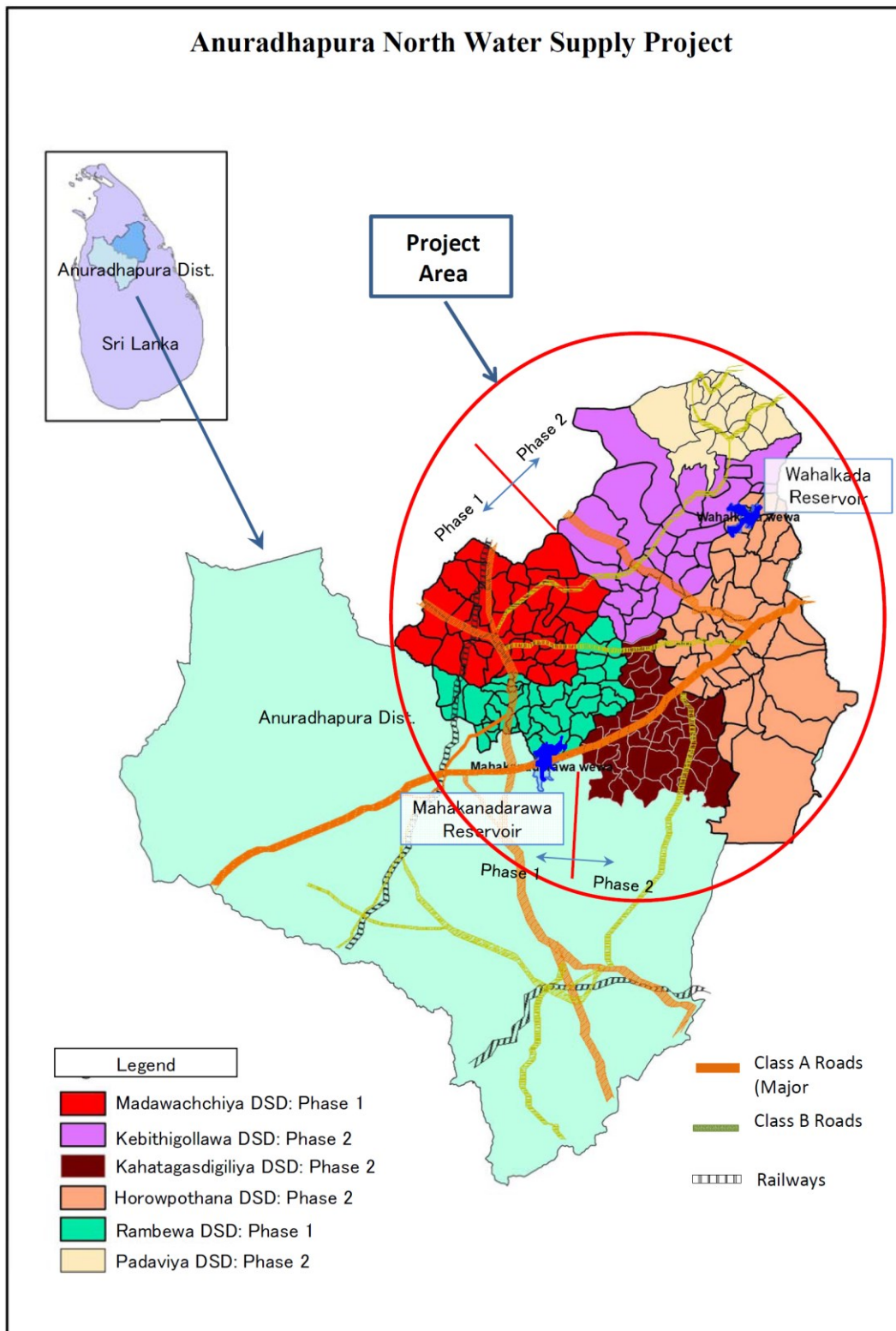
	Census	Estimated Population			Annual Average Growth Rate (%)		
	2001	2012	2024	2034	2012/2001	2024/2012	2034/2012
Padaviya	21,146	24,403	28,583	32,655	1.31	1.33	1.33
Kebithigollewa	19,457	23,007	27,661	32,276	1.54	1.55	1.55
Horoupothana	29,642	34,374	40,462	46,412	1.36	1.37	1.37
Kahatagasdigillia	33,572	39,096	46,234	53,219	1.39	1.41	1.41
Sub-total	103,817	120,880	142,940	164,562	1.39	1.41	1.41
Medawachchiya	40,469	47,533	56,688	65,677	1.47	1.48	1.48
Rambewa	31,604	36,325	42,355	48,207	1.27	1.29	1.29
Sub-total	72,073	83,858	99,043	113,884	1.39	1.40	1.40
Total	175,890	204,738	241,983	278,446	1.39	1.40	1.41

Note: Population in 2012 was estimated because results of 2012 Census was not available at the time of the F/S.

Source: F/S final report

¹ DSD: Divisional Secretary Division. Administrative sub-units in Sri Lanka between District and GND (page2-3)

² Very small part of Mihinhale, i.e. a part of 2 GNDs, was added in Phase-1 D/D because their water supply systems will be connected with the Mahakanadarawa System.



Source: F/S Final Report

Figure 2.1-2 Project Area and DSDs

(4) Served Population

1) Pipe Borne Water Supply

In the GNDs³ with an existing pipe borne water supply system, the coverage ratio was assumed to be growing up from present coverage ratio to 100 % in 2034 lineally, while in those with no pipe borne water supply system, the served population was assumed to be increased in the later years.

2) Bowser Water Supply

Water supply to the isolated areas was planned by using water bowsers and the water reservoirs which were arranged at the locations convenient to the residents. Population coverage was set at 100% constantly.

(5) Per Capita Domestic Water Consumption

The per capita domestic water consumption was set at 80 LPCD⁴ for the year of 2012 with an annual increment of 0.5 LPCD. Accordingly, the per capita domestic water consumption was 86 LPCD in 2024 and 91 LPCD in 2034.

For the isolated areas covered by bowsers, the per capita domestic water consumption is fixed at 10 LPCD with no annual increment.

(6) Non-Domestic Water Demand

Non-domestic water demand such as commercial use was calculated as 35% of domestic water demand in the F/S.

(7) Non-revenue Water (NRW)

In the Project, the water distribution facilities in the existing water supply system will be used for the proposed integrated water supply system as much as possible. However, since water transmission and other distribution pipelines will be newly installed, the present NRW level of 20% in Anuradhapura District is assumed to be maintained in the future. This ratio of 20% is the one to total supply and is equivalent to 25% of revenue water.

(8) Load Factor for Daily Maximum Water Demand

³ GND: Grama Niladhari Division. The smallest administrative unit in Sri Lanka under DSD

⁴ LPCD: Liter Per Capita Per Day

The maximum monthly demand per connection per day in 5 water supply systems in the study area varies from 1.18 to 1.23 times of the average monthly demand, with an average of 1.21. Then, load factor for the maximum daily demand was set at 1.20 of the average daily demand

(9) Summary of Design Criteria

The design criteria are summarized in **Table 2.1-2**. Annual Change in Served population, Average Daily Demand and Maximum Daily Demand Water Supply are shown in **Table 2.1-3** for the Mahakanadarawa System and in **Table 2.1-4** for the Wahalkada System, respectively. Planned water production capacity is set so as to have 5% allowance to maximum daily demand taking into account of the miscellaneous use of water in the water treatment plant.

Table 2.1-2 Summary of Design Criteria in F/S

Design Water Demand		Application to Facility Design	Unit	Mahakanadarawa System			Wahalkada System		
				Pipe Borne Water Supply	Bowser Water Supply	Total	Pipe Borne Water Supply	Bowser Water Supply	Total
Design Served Population				92,597	19,303	111,900	144,745	16,723	161,468
Per Capita Domestic Water Consumption	= $80+0.5 \times (2034-2012)=91$		(LPCD)	91	10		91	10	
Premium for Non-domestic Water (35%)	=1.35			1.35	1		1.35	1	
NRW Ratio (20%)	= $100/(100-20)=1.25$			1.25	1		1.25	1	
Design Daily Average Water Supply (Dave)			(m ³ /day)	14,219	193	14,412	22,227	167	22,394
Design Load Factor to Dmax	=1.2								
Design Daily Maximum Water Supply (Dmax)	=Dave x 1.20	-Transmission Facility	(m ³ /day)			17,294			26,873
Design Peak factor	=1.20								
Design Hourly Maximum Water Supply (Hmax)	=Dmax x 2.0	-Distribution Facility	(m ³ /day)			34,588			53,746
Design Water Intake	=Dmax x 1.05	-Intake Pump Station -Raw water -Conveyance Facility -WTP (input)	(m ³ /day)		say Margin	18,245 18,200 600		say Margin	28,217 28,200 600
Water Right			(m ³ /day)			18,800			28,800

Source: F/S Final Report

Table 2.1-3 Annual Change in Design Daily Average and Maximum Water Supply in F/S (Mahakanadarawa System)

Mahakanadarawa System (Excl. Independent CBO)													
		2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032	2034
Total Population	Total Pop.	83,858	86,208	88,626	91,120	93,684	96,321	99,043	101,838	104,719	107,686	110,736	113,884
46 - Maha Kumbukgollewa	Population	1,430	1,473	1,518	1,564	1,611	1,660	1,710	1,761	1,815	1,870	1,926	1,984
	Served Population	286	589	789	860	886	996	1,026	1,233	1,361	1,496	1,733	1,984
	Water Demand	39	81	109	120	126	143	149	181	202	225	263	305
Target Population	Population	82,428	84,735	87,108	89,556	92,073	94,661	97,333	100,077	102,904	105,816	108,810	111,900
for Pipe Borne WS	Pipe Borne WSS	62,778	64,665	66,608	68,613	70,680	72,808	75,010	82,347	84,796	87,319	89,915	92,597
	(Existing)	46,591	48,010	49,473	50,982	52,541	54,141	55,802	57,512	59,277	61,098	62,974	64,912
	(New)	16,187	16,655	17,135	17,631	18,139	18,667	19,208	24,835	25,519	26,221	26,941	27,685
for Non Pipe Borne WS	Non Pipe Borne WSS	19,650	20,070	20,500	20,943	21,393	21,853	22,323	17,730	18,108	18,497	18,895	19,303
Coverage (%)	Coverage (Total)	31.4	59.4	63.0	65.2	67.5	69.7	72.0	74.8	82.1	88.4	94.7	100.0
for Pipe Borne WS	Coverage (Pipe WS)	41.2	46.8	51.6	54.6	57.7	60.7	63.7	69.4	78.2	85.9	93.6	100.0
	(Existing)	56.0	60.0	64.0	68.0	72.0	76.0	80.0	84.0	88.0	92.0	96.0	100.0
	(New)	0.0	10.0	17.0	17.0	17.0	17.0	17.0	40.0	60.0	75.0	90.0	100.0
for Non Pipe Borne WS	Non Pipe Borne WSS	100	100	100	100	100	100	100	100	100	100	100	100
Served Population	Served Population	25,892	50,347	54,890	58,431	62,142	66,025	70,097	74,846	84,458	93,515	103,019	111,900
for Pipe Borne WS	Pipe Borne WSS	25,892	30,277	34,390	37,488	40,749	44,172	47,774	57,116	66,350	75,018	84,124	92,597
	(Existing)	25,892	28,611	31,476	34,491	37,665	40,998	44,509	48,196	52,073	56,144	60,419	64,912
	(New)	-	1,666	2,914	2,997	3,084	3,174	3,265	8,920	14,277	18,874	23,705	27,685
for Non Pipe Borne WS	Non Pipe Borne WSS	-	20,070	20,500	20,943	21,393	21,853	22,323	17,730	18,108	18,497	18,895	19,303
Water Demand (Dave: m3/day)	Dave	3,495	4,341	4,961	5,456	5,994	6,557	7,154	8,562	10,029	11,448	12,963	14,414
Pipe Borne WS	Pipe Borne WSS	3,495	4,141	4,756	5,247	5,779	6,337	6,982	8,384	9,847	11,263	12,774	14,221
	(Existing)	3,495	3,913	4,354	4,828	5,341	5,882	6,459	7,075	7,728	8,429	9,175	9,970
	(New)	-	228	402	419	438	455	523	1,309	2,119	2,834	3,599	4,251
Non Pipe Borne WS	Non Pipe Borne WSS	-	200	205	209	215	220	172	178	182	185	189	193
Water Demand for Transmission	Dmax (Dave x 1.20)	4,194	5,209	5,953	6,547	7,193	7,868	8,585	10,274	12,035	13,738	15,556	17,297
Water Demand for Treatment	Dmax x1.05	4,400	5,500	6,300	6,900	7,600	8,300	9,000	10,800	12,600	14,400	16,300	18,200

Source: Preparatory Survey Report, JICA

Table 2.1-4 Annual Change in Design Daily Average and Maximum Water Supply in F/S (Wahalkada System)

Wahalkada System (Excl. Independent CBOs)		2012	2014	2016	2018	2020	2022	2024	2026	2028	2030	2032	2034
Total Population	Total Pop.	120,880	124,293	127,794	131,417	135,150	138,985	142,940	147,008	151,200	155,525	159,978	164,562
32 - Kurulugama		1,354	1,379	1,403	1,429	1,455	1,481	1,508	1,535	1,563	1,591	1,620	1,649
119 - Ihala Angunachchiya		1,041	1,073	1,105	1,139	1,173	1,208	1,245	1,283	1,321	1,361	1,402	1,445
Sub-Total		2,395	2,452	2,508	2,568	2,628	2,689	2,753	2,818	2,884	2,952	3,022	3,094
Served Population													
32 - Kurulugama		271	552	730	786	800	889	905	1,075	1,172	1,273	1,458	1,649
119 - Ihala Angunachchiya		208	429	575	626	645	725	747	898	991	1,089	1,262	1,445
Sub-Total		479	981	1,305	1,412	1,445	1,614	1,652	1,973	2,163	2,362	2,720	3,094
Water Demand													
32 - Kurulugama		37	75	101	110	113	128	131	158	174	191	221	253
119 - Ihala Angunachchiya		28	59	80	88	91	104	108	132	147	164	192	222
Sub-Total		65	134	181	198	204	232	239	290	321	355	413	475
Target Population	Population	118,485	121,841	125,286	128,849	132,522	136,296	140,187	144,190	148,316	152,573	156,956	161,468
for Pipe Borne WS	Pipe Borne WSS	95,911	98,775	101,715	104,766	107,907	111,145	114,485	128,836	132,633	136,549	140,587	144,745
	(Existing)	49,985	51,530	53,117	37,488	40,749	44,172	60,026	67,997	70,064	72,193	74,394	76,664
	(New)	45,926	47,245	48,598	50,004	51,445	52,929	54,459	60,839	62,569	64,356	66,193	68,081
for Non Pipe Borne WS	Non Pipe Borne WSS	22,574	23,066	23,571	24,083	24,615	25,151	25,702	15,354	15,683	16,024	16,369	16,723
Coverage	Coverage (Total)	22.7	51.2	62.7	64.8	66.9	69.1	71.6	74.2	80.7	87.1	93.6	100.0
for Pipe Borne WS	Coverage (Pipe WS)	28.1	39.9	54.0	56.7	59.4	62.1	65.2	71.2	78.4	85.6	92.8	100.0
	(Existing)	54.0	18.0	62.0	97.0	98.0	99.0	79.0	59.0	80.0	84.0	87.0	91.0
	(New)	0.0	20.0	45.0	46.0	47.0	48.0	50.0	60.0	70.0	80.0	90.0	100.0
for Non Pipe Borne WS	Non Pipe Borne WSS	100	100	100	100	100	100	100	100	100	100	100	100
Served Population		26,925	62,431	78,510	83,471	88,692	94,133	100,393	107,042	119,656	132,911	146,846	161,468
for Pipe Borne WS	Pipe Borne WSS	26,925	39,365	54,939	59,388	64,077	68,982	74,691	91,688	103,973	116,887	130,477	144,745
	(Existing)	26,925	29,916	33,072	36,392	39,895	43,576	47,449	51,521	55,803	60,302	65,033	70,000
	(New)	-	9,449	21,867	22,996	24,182	25,406	27,242	40,167	48,170	56,585	65,444	74,745
for Non Pipe Borne WS	Non Pipe Borne WSS	-	23,066	23,571	24,083	24,615	25,151	25,702	15,354	15,683	16,024	16,369	16,723
Water Demand	Dave	3,636	5,615	7,843	8,556	9,336	10,147	11,098	13,616	15,599	17,719	19,979	22,392
Pipe Borne WS	Pipe Borne WSS	3,636	5,384	7,608	8,315	9,087	9,893	10,841	13,463	15,441	17,556	19,815	22,225
	(Existing)	3,636	4,203	4,577	5,097	5,658	6,248	6,888	7,566	8,286	9,058	9,874	10,748
	(New)	-	2,240	3,031	3,218	3,429	3,645	3,953	5,897	7,155	8,498	9,941	11,477
Non Pipe Borne WS	Non Pipe Borne WSS	-	1,227	235	241	249	254	257	153	158	163	164	167
Water Demand for Transmission	Dmax (Dave x 1.20)	4,363	6,738	9,412	10,267	11,203	12,176	13,318	16,339	18,719	21,263	23,975	26,870
Water Demand for Treatment	Dmax x 1.05	4,600	7,100	9,900	10,800	11,800	12,800	14,000	17,200	19,700	22,300	25,200	28,200

Source: Preparatory Survey Report, JICA

(10) Design Flow of Water Treatment Plants for Stage Construction

Both water treatment plants for the Mahakanadarawa System and the Wahalkada System were planned to be constructed stage by stage.

The planned capacities of Stage 1 (in 2024) and Long-term Plan (in 2034) are as shown in **Table 2.1-5**.

Table 2.1-5 Planned Capacity of Water Treatment Plants in F/S

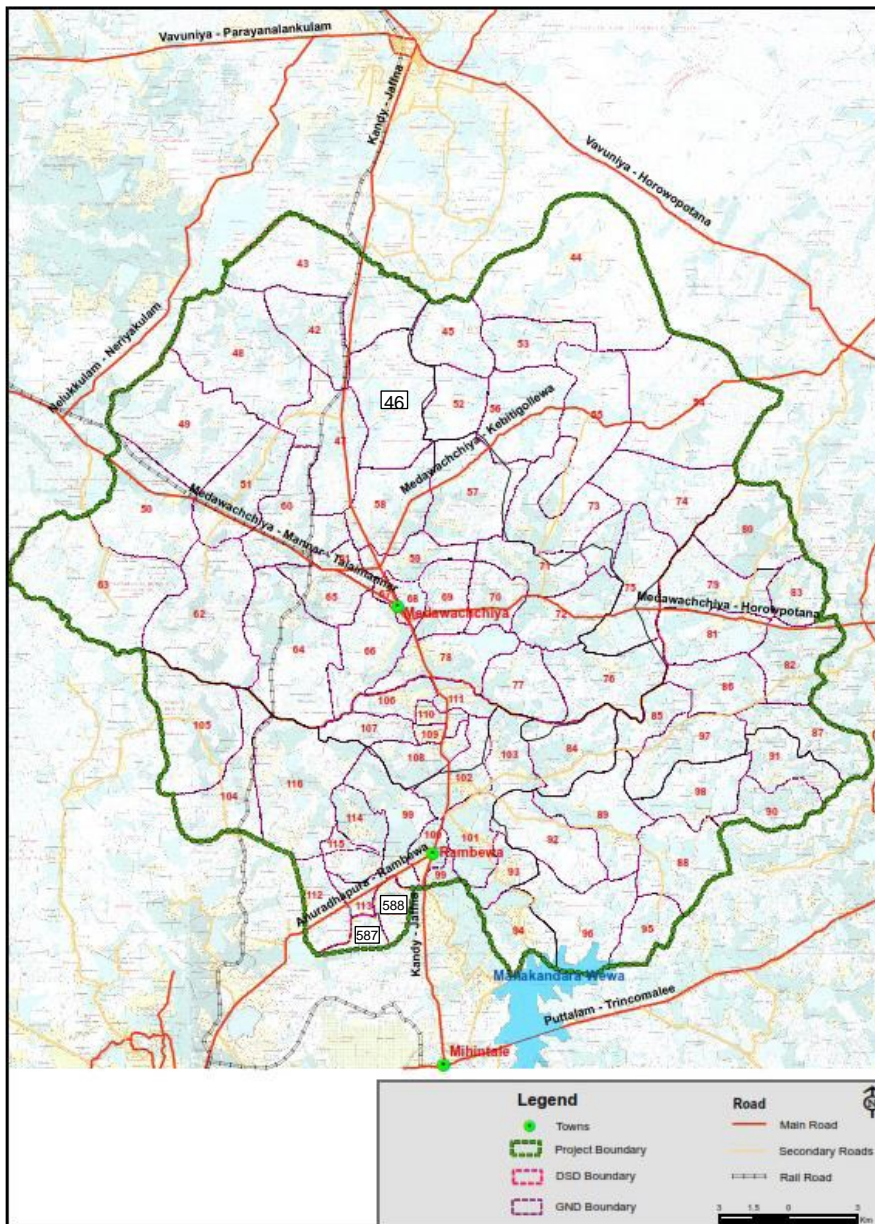
	Stage-1 (2024)	Long-term Plan (2034)
Mahakanadarawa WTP		
Daily Maximum Water Supply (Output)	8,950 m ³ /day	17,900 m ³ /day
Production Capacity* (Input)	9,400 m ³ /day	18,800 m ³ /day
Wahalkada WTP		
Daily Maximum Water Supply (Output)	13,700m ³ /day	27,400 m ³ /day
Production Capacity* (Input)	14,400 m ³ /day	28,800 m ³ /day

*: The terminology “Production Capacity” in this table means required “Input”, namely required volume of raw water intake. Production Capacity for “Output” is the same as Daily Maximum Water Supply.

2.2 Water Demand Projection for Mahakanadarawa System

(1) Service Area

In the D/D stage, GND No.46 - Maha Kumbukgollewa, Medawachchiya DSD, GND No.587 - Doramadala, Mihinthale DSD, and GND No.588 - Ukkulankulama, Mihinthale DSD were added to the service area of the Mahakanadarawa system.



Source: F/S Final Report

Figure 2.2-1 GNDs added in Phase 1 D/D

During the F/S, GND No.46 was not requested for water supply by the Phase 1 project because there is an existing CBO scheme. However, during the Phase-1 D/D, residents in GND No.46 requested NWSDB in writing to include their CBO under the Phase 1 project.

GNDs No.587 and No.588 are in Mihinthale DSD. However, some parts of these GNDs are covered under the existing Rambewa Water Supply System. Since the Rambewa existing pipe network is to be connected to the new pipe network under the scope of Phase 1 project, water of the Mahakanadarawa system will flow to the GNDs No.587 and No.588 automatically. Therefore, these partially covered areas were considered in the demand calculations.

(2) Target Year

In the Phase-1 D/D, the target year was set as 2034 with an interim target year of 2024 for staged construction as same as those in the F/S,

(3) Projected Population

Considering that the results of 2012 Census was not available during the F/S, the population projection was revised in the Phase 1 D/D based on the results of 2012 Census (provisional) as summarized in **Table 2.2-1**. The annual population growth rate at 1.33% was adopted for projection based on the average annual population growth in Anuradhapura District which was derived from data in 2001 Census and 2012 Census (provisional).

Table 2.2-1 Total Population Projection for Mahakanadarawa System

DSD	Area Category	Census	Increase	Projected Total Population				
		2012	Ratio	2019	2020	2024	2030	2034
Rambewa	Existing	14,919	1.33%	16,365	16,582	17,482	18,925	19,952
	New	21,877	1.33%	23,997	24,316	25,636	27,751	29,257
	Total	36,796	1.33%	40,361	40,898	43,118	46,675	49,208
Medawachchiya	Existing	22,032	1.33%	24,167	24,488	25,817	27,947	29,464
	New	24,711	1.33%	27,105	27,466	28,957	31,345	33,047
	Total	46,743	1.33%	51,272	51,954	54,774	59,293	62,511
Mihinthale	Existing	1,298	1.33%	1,424	1,443	1,521	1,646	1,736
	New	-	1.33%	-	-	-	-	-
	Total	1,298	1.33%	1,424	1,443	1,521	1,646	1,736
Total	Existing	38,249	1.33%	41,955	42,513	44,820	48,518	51,151
	New	46,588	1.33%	51,102	51,782	54,592	59,096	62,303
	Total	84,837	1.33%	93,058	94,295	99,413	107,614	113,455

Source: Phase-1 D/D Design report, revised by the JICA Study Team

Note: In Mihinthale DSD, GND No. 587 was counted as its 90% and No. 588 as 50% because of coverage area of the existing system.

Population Projection in S/S

The population growth rate at 1.33% per annum was adopted for projection uniformly. Further, the data used for the project were provisional. Recently, final results of 2012 Census on GND level became available, then, projected total population were revised in the S/S using average annual population increase ratio of each GND in order to reflect characteristic of each GND. GNDs in the project area were categorized into following 4 types considering characteristics of each GND.

- A : GND with main road
- B : Surrounding GND
- C : Isolated GND
- D : Urban Centre

Category of each GND was decided with following method as same as the F/S:

- GNDs at urban centers are categorized in D as shown in Figure 2.2-2.
- GNDs at along the main roads are categorized in A as shown in Figure 2.2-3. Categorized GNDs into D shown in Figure 2.2-2 are not categorized into D

- GNDs next to GNDs in Category A and D are categorized into B.
- Remaining GNDs are categorized into C

Average population increase ratios between 2001 and 2012 by DSD by category were applied for population projection of each GND. Results of revised calculation by DSD is summarized by water supply type as shown in **Table 2.2-2**.

Table 2.2-2 Target Population Projection for Mahakanadarawa System

DSD	Area Category	Census	Projected Target Population				
		2012	2019	2020	2024	2030	2034
Rambewa	Existing	18,438	20,292	20,572	21,730	23,591	24,921
	New	18,344	20,282	20,576	21,792	23,752	25,156
	Total	36,782	40,574	41,147	43,521	47,343	50,077
Medawachchiya	Existing	29,204	32,006	32,428	34,172	36,967	38,956
	New	17,702	19,526	19,801	20,943	22,782	24,097
	Total	46,906	51,532	52,229	55,115	59,749	63,054
Mihinthale	Existing	1,303	1,446	1,468	1,558	1,704	1,809
	New	-	-	-	-	-	-
	Total	1,303	1,446	1,468	1,558	1,704	1,809
Total	Existing	48,945	53,744	54,467	57,460	62,262	65,686
	New	36,046	39,808	40,377	42,735	46,534	49,253
	Total	84,991	93,552	94,844	100,195	108,796	114,939

Source: JICA Study Team

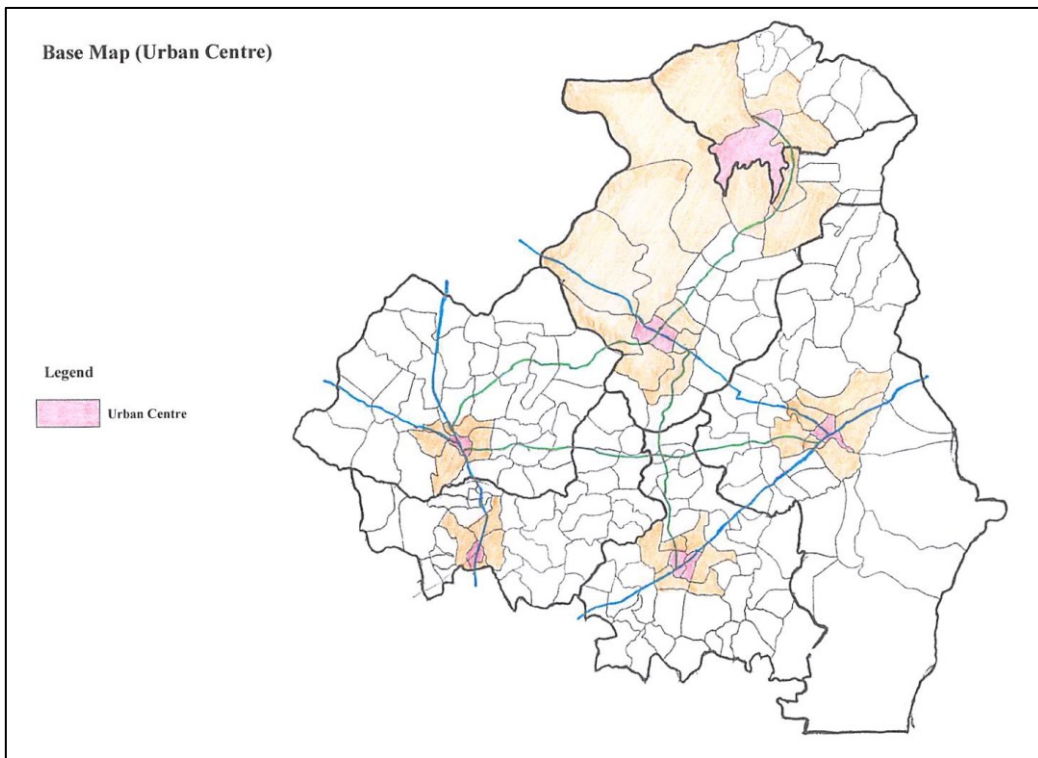


Figure 2.2-2 GNDs in Category A

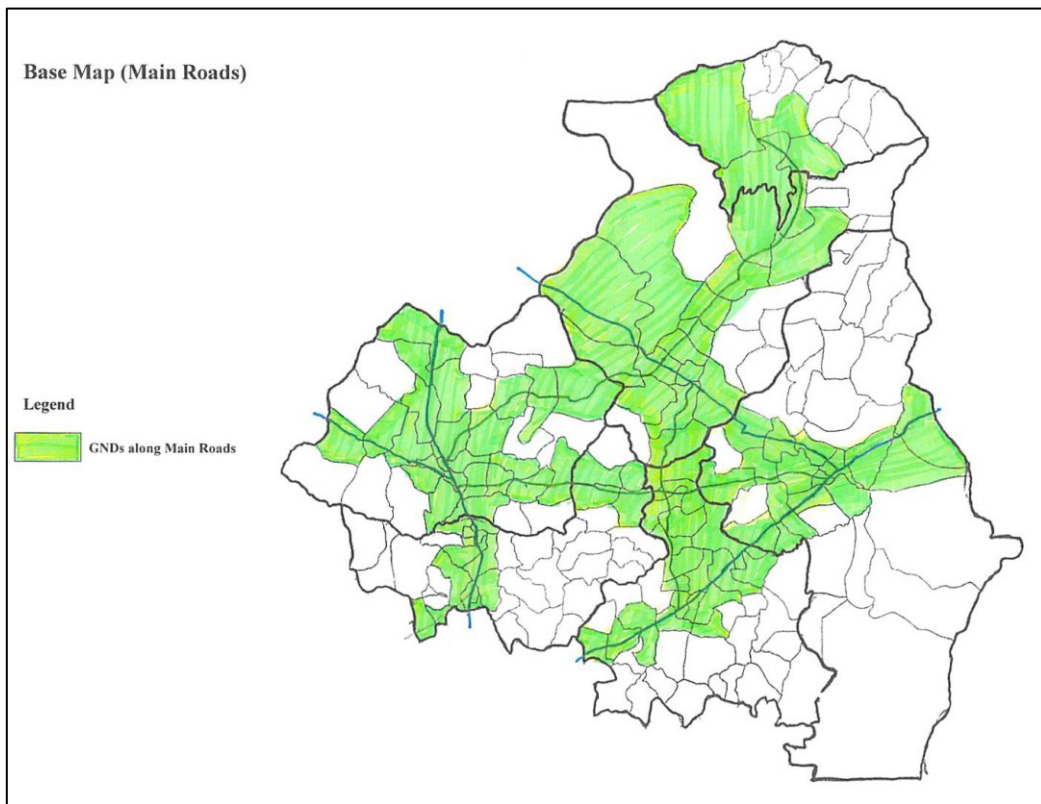


Figure 2.2-3 GNDs in Category D

(4) Served Population

Since the residents with high expectation for pipe borne water supply are willing to connect to a water supply system as soon as possible, the connection ratio to the system is assumed to be increased with a high increase rate during a few years soon after the completion of the system and thereafter it will become lower in general.

1) Existing Pipe Borne Water Supply Area

In the GNDs with an existing pipe borne water supply system, the coverage ratio was assumed to grow up from present coverage ratio to 100 % in 2034 lineally.

2) New Coverage Area

In the Phase 1 D/D, it was assumed that the rate of new connections in new coverage areas would be high in the early years of the project life. But this rate was assumed to decrease gradually and to follow the same pattern as of the existing supply areas after reaching a certain level of service coverage. In the Phase 1 D/D, the service coverage was assumed to be 75% in 2024. In the calculation of the S/S, said service coverage was decreased by 5 %, namely 70%, considering the delay of the Phase-1 project.

Table 2.2-3 Served Population Projection for Mahakanadarawa System

DSD	Area Category	Projected Served Population				
		2019	2020	2024	2030	2034
Service Coverage	Existing *	70%	72%	80%	92%	100%
	New	25%	35%	70%	88%	100%
	Total *	51%	56%	76%	90%	100%
Rambewa	Existing	15,568	16,103	18,363	22,133	24,921
	New	5,071	7,201	15,254	20,902	25,156
	Total	20,638	23,305	33,617	43,034	50,077
Medawachchiya	Existing	21,260	22,265	26,519	33,653	38,956
	New	4,881	6,930	14,660	20,048	24,097
	Total	26,141	29,195	41,180	53,702	63,054
Mihinhale	Existing	985	1,031	1,227	1,559	1,809
	New	-	-	-	-	-
	Total	985	1,031	1,227	1,559	1,809
Total	Existing	37,812	39,399	46,110	57,345	65,686
	New	9,952	14,132	29,914	40,950	49,253
	Total	47,764	53,531	76,024	98,295	114,939

Source: JICA Study Team

Note: Commissioning of WTP is assumed to be end of 2018.

*: Service coverage % for Existing and Total are the results of calculation.

(5) Per Capita Domestic Water Consumption

The policy in the F/S was also applied in the Phase-1 D/D. Based on the result of the F/S, per capita domestic water consumption in 2024 and 2034 are set as 86 LPCD, 91 LPCD respectively.

(6) Non-Domestic Water Demands

Non-domestic water demand such as commercial use was calculated as 35% of domestic water demand in the F/S. However, in the Phase 1 D/D, NWSDB agreed to apply 30% instead of 35 %. Therefore, the Phase 1 D/D set 30% of domestic water demand as Non-domestic water demand.

(7) Allowance for Unplanned Water Demands

Even though it was not considered in the F/S, allowance for unexpected water demand was considered as 1.5% of total water demand in the Phase 1 D/D.

(8) Non-Revenue Water

In the F/S, the ratio of non-revenue water was set at 25% of revenue water, which is equivalent to 20% of total water demand, through project years. In the Phase-1 D/D, the same ratio of 20% of total demand was applied for 2034. This ratio, however, was assumed to be increased from 10% at the commissioning expecting completeness of new facilities. The ratios in intermediate years were assumed to increase lineally.

(9) Daily Maximum, Hourly Maximum and Raw Water Intake Amount

In the Phase-1 D/D, daily maximum demand is modified to 110% of daily average demand from 120% in the F/S, while hourly maximum demand is modified to 160% of daily maximum demand from 200% in the F/S. These modifications were made in accordance with the NWSDB Design Manual (refer to extraction of the manual shown on following page). According to the D/D team, the peak load factor of 160% was decided considering the present situation of the service area. Actually it was difficult to measure the peak ratio because of intermittent water supply in the area.

Water loss at the each WTP was set at 5% as same as the F/S.

(10) Design Flow of Water Treatment Plants for Stage Construction

In the F/S, the capacity of each WTP in the initial stage (2024) was designed at 50 % of the capacity of target year (2034). In the Phase-1 D/D, completion of construction of the Mahakanadarawa WTP initial stage was planned in 2018⁵, about 60% of ultimate capacity would be completed.

(11) Water Demand

Based on the design criteria mentioned above, planned water demand was re-calculated as shown in **Table 2.2-4**. Comparing with the result of the F/S, 10% increase of water production capacity is necessary for 2034, but, for the first stage of construction work, the production capacity is desired to be increased by

⁵ Its completion was expected to be March 2018 in the F/S. Considering present status of the Project, however, the JICA Study Team assumed it will be the end of 2018.

28% of that in the F/S as shown in **Table 2.2-5**.

As also shown in **Table 2.2-5**, the WTP production capacity designed in the Phase-1 D/D will be sufficient in 2024, while planned capacity for 2034 is slightly less than requirement. However, lack of capacity is less than 1% and is possible to consider negligible at this moment. It shall be examined in the future.

Extract from Design Manual D2 Urban Water Supply and Sanitation March 1989 by NWSDB.

3.2.5 Peaking Factors

The maximum demand for water in a system varies from season to season depending on temperature and rainfall, with the highest demands naturally occurring on hot, dry days. In addition, the system demand varies throughout the day with peak system demands normally in the early morning and late afternoon.

The maximum day peaking factor in Sri Lanka is typically **1.1** (smaller urban < 20,000 population) to 1.25 (larger urban > 20,000 population) times the mean annual daily consumption, (In foreign countries with hot summers and a high use for garden watering the factor may be 2.0 or more). Facilities that should be designed for maximum day demand are:

- o Source works, intakes*
- o Transmission mains
- o Supply system pumping stations*
- o Treatment works*
- o Service reservoirs

ie. the complete supply system up to the service reservoirs.

The maximum hourly peaking factor depends on the hours of service per day, and the proportion of consumers with in-house storage tanks, which have the effect of levelling out peaks. Aim for providing a continuous 24-hour service unless there are particular constraints preventing this (i.e. water source or power restrictions). Intermittent supply is neither desirable from a public health point of view nor is it economical. However, it may become necessary to provide intermittent service when the available supply is inadequate to meet the demand. For a 24-hour system, where the majority of consumers have storage tanks, use a peak factor of 2.5 (smaller urban) to 2.0 (larger urban > 20 000) times the mean annual daily consumption. (See also Section 8.2)

* Note: where treatment is required, facilities handling raw water (i.e. source works, low lift **pumps** and mains, treatment plants) should be sized with a capacity of **1.05** to 1.1 times maximum day to allow for treatment losses.

Table 2.2-4 Water Demand Projection for Mahakanadarawa System

			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Total Population		Total	84,991	86,164	87,353	88,559	89,781	91,021	92,278	93,552	94,844	96,154	97,483	98,829	100,195	101,579	102,983	104,406	105,849	107,312	108,796	110,300	111,825	113,371	114,939
	Rambewa	Existing	18,438	18,692	18,950	19,211	19,475	19,744	20,016	20,292	20,572	20,855	21,143	21,434	21,730	22,029	22,333	22,641	22,954	23,270	23,591	23,917	24,247	24,582	24,921
		New	18,344	18,609	18,878	19,151	19,428	19,709	19,993	20,282	20,576	20,873	21,175	21,481	21,792	22,107	22,426	22,751	23,080	23,413	23,752	24,095	24,444	24,797	25,156
	Medawachchiya	Existing	29,204	29,589	29,978	30,373	30,774	31,179	31,590	32,006	32,428	32,856	33,289	33,727	34,172	34,623	35,079	35,542	36,010	36,485	36,967	37,454	37,948	38,449	38,956
		New	17,702	17,952	18,205	18,462	18,722	18,986	19,254	19,526	19,801	20,081	20,364	20,652	20,943	21,239	21,539	21,843	22,152	22,465	22,782	23,104	23,430	23,761	24,097
	Mihinthale	Existing	1,303	1,322	1,342	1,362	1,383	1,403	1,424	1,446	1,468	1,490	1,512	1,535	1,558	1,581	1,605	1,629	1,654	1,679	1,704	1,729	1,755	1,782	1,809
		New	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Target Population (persons)	a	Total	84,991	86,164	87,353	88,559	89,781	91,021	92,278	93,552	94,844	96,154	97,483	98,829	100,195	101,579	102,983	104,406	105,849	107,312	108,796	110,300	111,825	113,371	114,939
	Rambewa	Existing	18,438	18,692	18,950	19,211	19,475	19,744	20,016	20,292	20,572	20,855	21,143	21,434	21,730	22,029	22,333	22,641	22,954	23,270	23,591	23,917	24,247	24,582	24,921
		New	18,344	18,609	18,878	19,151	19,428	19,709	19,993	20,282	20,576	20,873	21,175	21,481	21,792	22,107	22,426	22,751	23,080	23,413	23,752	24,095	24,444	24,797	25,156
	Medawachchiya	Existing	29,204	29,589	29,978	30,373	30,774	31,179	31,590	32,006	32,428	32,856	33,289	33,727	34,172	34,623	35,079	35,542	36,010	36,485	36,967	37,454	37,948	38,449	38,956
		New	17,702	17,952	18,205	18,462	18,722	18,986	19,254	19,526	19,801	20,081	20,364	20,652	20,943	21,239	21,539	21,843	22,152	22,465	22,782	23,104	23,430	23,761	24,097
	Mihinthale	Existing	1,303	1,322	1,342	1,362	1,383	1,403	1,424	1,446	1,468	1,490	1,512	1,535	1,558	1,581	1,605	1,629	1,654	1,679	1,704	1,729	1,755	1,782	1,809
		New	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Coverage (%)	b = c / a	Total	33	34	35	36	37	38	46	51	56	62	67	73	76	78	81	83	86	88	90	93	95	98	100
		Existing	57	59	61	63	65	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96	98	100
		New	0	0	0	0	0	0	15	25	35	45	55	65	70	73	76	79	82	85	88	91	94	97	100
Served Population (persons)	c	Total	27,818	29,146	30,506	31,896	33,319	34,773	42,148	47,764	53,531	59,451	65,527	71,762	76,024	79,524	83,107	86,773	90,526	94,366	98,295	102,315	106,429	110,635	114,939
	Rambewa	Existing	12,125	12,588	13,056	13,537	14,028	14,530	15,043	15,568	16,103	16,650	17,209	17,780	18,363	18,959	19,567	20,189	20,823	21,471	22,133	22,808	23,498	24,202	24,921
		New	0	0	0	0	0	0	2,999	5,071	7,201	9,393	11,646	13,963	15,254	16,138	17,044	17,973	18,925	19,901	20,902	21,927	22,977	24,053	25,156
	Medawachchiya	Existing	14,833	15,688	16,564	17,460	18,378	19,317	20,277	21,260	22,265	23,293	24,344	25,420	26,519	27,644	28,793	29,969	31,170	32,398	33,653	34,936	36,247	37,587	38,956
		New	0	0	0	0	0	0	2,888	4,881	6,930	9,036	11,200	13,424	14,660	15,505	16,370	17,256	18,164	19,095	20,048	21,024	22,024	23,049	24,097
	Mihinthale	Existing	860	873	886	899	913	926	940	955	970	985	1,001	1,017	1,032	1,047	1,062	1,077	1,092	1,107	1,122	1,137	1,152	1,167	1,182
		New	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Per Capita Water Consumption (LPCD)	d		80.0	80.5	81.0	81.5	82.0	82.5	83.0	83.5	84.0	84.5	85.0	85.5	86.0	86.5	87.0	87.5	88.0	88.5	89.0	89.5	90.0	90.5	91.0
Domestic Water Consumption (m3/d)	e = c x d	Total	2,225	2,346	2,471	2,600	2,732	2,869	3,498	3,988	4,497	5,024	5,570	6,136	6,538	6,879	7,230	7,593	7,966	8,351	8,748	9,157	9,579	10,012	10,459
	Rambewa	Existing	970	1,013	1,058	1,103	1,150	1,199	1,249	1,300	1,353	1,407	1,463	1,520	1,579	1,640	1,702	1,767	1,832	1,900	1,970	2,041	2,115	2,190	2,268
		New	0	0	0	0	0	0	249	423	605	794	990	1,194	1,312	1,396	1,483	1,573	1,665	1,761	1,860	1,962	2,068	2,177	2,289
	Medawachchiya	Existing	1,187	1,263	1,342	1,423	1,507	1,594	1,683	1,775	1,870	1,968	2,069	2,173	2,281	2,391	2,505	2,622	2,743	2,867	2,995	3,127	3,262	3,402	3,545
		New	0	0	0	0	0	0	240	408	582	764	952	1,148	1,261	1,341	1,424	1,510	1,598	1,690	1,784	1,882	1,982	2,086	2,193
	Mihinthale	Existing	69	70	72	73	75	76	78	82	87	91	96	101	106	111	116	121	127	133	139	145	151	158	165
		New	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Non-Domestic Water Consumption	f = e x 30%		688	704	741	780	820	861	1,049	1,196	1,349	1,507	1,671	1,841	1,981	2,064	2,169	2,278	2,390	2,505	2,624	2,747	2,874	3,004	3,138
	Rambewa	Existing	291	304	317	331	345	360	375	390	406	422	439	456	474	492	511	530	550	570	591	612	634	657	680
		New	0	0	0	0	0	0	75	127	181	238	297	358	394	419	445	472	500	528	558	589	620	653	687
	Medawachchiya	Existing	356	379	403	427	452	478	505	533	561	590	621	652	684	717	752	787	823	860	899	938	979	1,020	1,064
		New	0	0	0	0	0	0	72	122	175	229	286	344	378	402	427	453	480	507	535	565	595	626	658
	Mihinthale	Existing	21	21	22	22	22	23	23	25	26	27	29	30	32	33	35	36	38	40	42	43	45	47	49
		New	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Allow. for Unexpected Water Consumption	g = (e+f) x 1.5%		43	46	48	51	53	56	88	78	88	98	109	120	127	134	141	148	155	163	171	179	187	195	204
	Rambewa	Existing	19	20	21	22	22	23	24	25	26	27	29	30	31	32	33	34	36	37	38	40	41	43	44
		New	0	0	0	0	0	0	5	8	12	15	19	23	26	27	29	31	32	34	36	38	40	42	45
	Medawachchiya	Existing	23	25	26	28	29	31	33	35	36	38	40	42	44	47	49	51	53	56	58	61	64	66	69
		New	0	0	0	0	0	0	5	8	11	15	19	22	25	26	28	29	31	33	35	37	39	41	43
	Mihinthale	Existing	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
		New	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Average Daily Water Consumption	h = e + f + g		2,936	3,096	3,260	3,430	3,605	3,785	4,616	5,263	5,933	6,629	7,349	8,096	8,627	9,077	9,540	10,019	10,511	11,020	11,543	12,083	12,639	13,211	13,801
Non-Revenue Water Demand	i	% in total	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.6%	11.3%	11.9%	12.5%	13.1%	13.8%	14.4%	15.0%	15.6%	16.3%	16.9%	17.5%	18.1%	18.8%	19.4%	20.0%
	volume	j = h / (1-i) - h	326	344	362	381	401	421	513	626	752	893	<												

Table 2.2-5 Water Demand for Mahakanadarawa System in F/S and S/S

Items	Unit	2024			2034		
		F/S	S/S	Ratio	F/S	S/S	Ratio
Design daily average water demand	m ³ /day	7,154	10,002	1.40	14,414	17,252	1.20
Design daily maximum water demand	m ³ /day	8,585	11,003	1.28	17,297	18,977	1.10
Design hourly maximum water demand	m ³ /day	17,170	17,605	1.03	34,594	30,363	0.88
Required WTP Production Capacity	m ³ /day	8,585	11,003	1.28	17,297	18,977	1.10
Proposed WTP Production Capacity	m ³ /day	8,950	11,200	1.25	17,900	18,800	1.05
Required Raw Water Intake	m ³ /day	9,014	11,582	1.28	18,162	19,976	1.10
Proposed Raw Water Intake Capacity	m ³ /day	9,400	11,800	1.26	18,800	19,800	1.05

Note: Required Raw Water Intake is calculated based on the Required WTP Production Capacity.

Proposed Capacities of Facilities are those designed in the Phase-1 D/D.

(12) Summary of Design Criteria

Design criteria and results of water demand projection calculated in the S/S are summarized in **Table 2.2-6**.

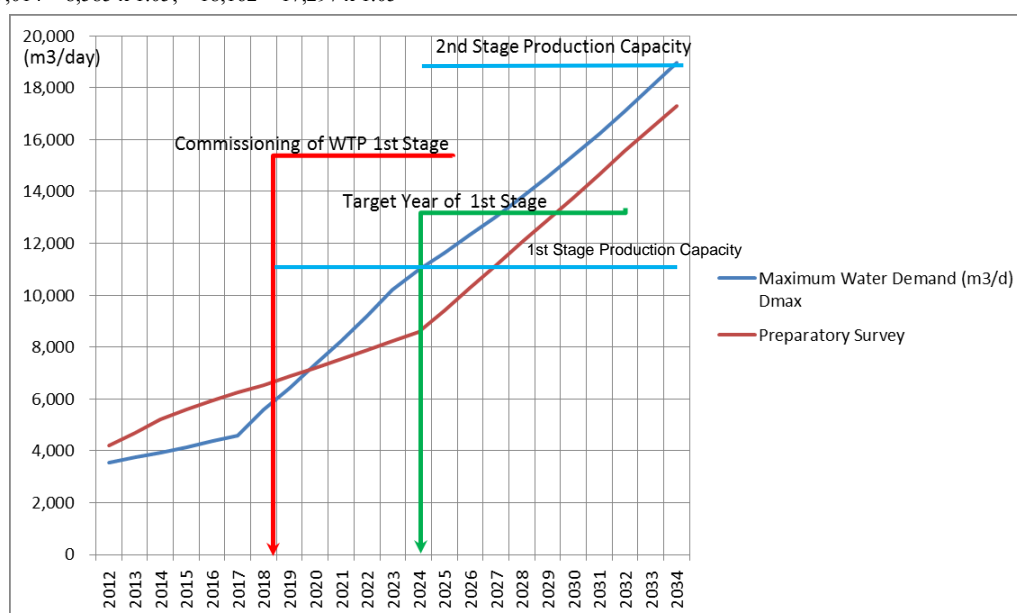
Figure 2.2-4 shows the relationship between water demand and water supply capacity through the target year 2034 projected in the S/S.

Table 2.2-6 Summary of Design Criteria for Mahakanadarawa System

Items	Unit	Calculation	S/S		F/S	
			2024	2034	2024	2034
Served Population	pop	a	46,110	65,686	70,097	111,900
Per Capita Water Consumption	LPCD	b	86	91	86/10	91/10
Non-Domestic Water Demands	%	c	30		35	
Allowance for Unplanned Water Demands	%	d	1.5		-	-
Non-Revenue Water (in total water demand)	%	e	13.8	20.0	20	
Design Daily Average Water Demand (Dave)	m ³ /day	$f = a \times b \times \frac{(1+c)}{x(1+d)/(1-e)}$	10,002	17,252	7,154	14,414
Design Load Factor to Dmax	%	g	110		120	
Design Daily Maximum Water Demand (Dmax)	m ³ /day	$h = f \times g$	11,003	18,977	8,585	17,297
Required WTP Production Capacity (Output)	m ³ /day	i	11,003	18,977	8,585	17,297
Proposed WTP Production Capacity (Output)	m³/day	j	11,200	18,800	8,950	17,900
Water Loss at Water Treatment Plant	%	k	5		5	
Required Raw Water Demand	m ³ /day	$l = i / (1-k)$	11,582	19,976	9,014*	18,162*
Required Raw Water Intake	m ³ /day	m	11,582	19,976	9,014	18,162
Proposed Capacity of Intake Facility	m³/day	n	11,800	19,800	9,400	18,800
Design Peak Factor	%	o	160		200	
Design Hourly Maximum Water Supply (Hmax)	m ³ /day	$p = h \times o$	17,605	30,363	17,170	34,594

*: Required Raw Water Demand in F/S = Required WTP Production x 1.05

$$9,014 = 8,585 \times 1.05; \quad 18,162 = 17,297 \times 1.05$$

**Figure 2.2-4 Demand and Supply of Mahakanadarawa System**

2.3 Water Demand Projection in the S/S for Wahalkada System

(1) Service Area

In the S/S, the service area for Phase 2 project is set as the same as planned in the F/S. That is; GNDs in Kebithigollewa, Horowpothana, Kahatagasdigiliya, and Padaviya DSDs except GND No.32 - Kurulugama and GND No.119 - Ihala Angunachchiya.

(2) Target Year

In the S/S, the target year for the Wahalkada System was set as 2034 with an interim target year of 2024 for staged construction as same as those in the F/S and the Phase-1 D/D.

(3) Projected Population

The projected population for the Wahalkada system was also revised in the S/S based on the results of 2012 Census with the same method described in 2.2 (3).

Results of re-calculation by DSD are summarized by water supply type as shown in **Table 2.3-1**.

Table 2.3-1 Population Projection for Wahalkada System

Area Category	Census	Projected Target Population				
	2012	2020	2021	2024	2030	2034
Padaviya						
Existing	12,822	13,516	13,605	13,877	14,438	14,825
New	10,176	10,931	11,030	11,330	11,956	12,393
Total	22,998	24,447	24,635	25,207	26,394	27,218
Kebithigollewa						
Existing	6,696	7,288	7,365	7,603	8,102	8,452
New	14,064	15,595	15,798	16,424	17,756	18,706
Total	20,760	22,883	23,163	24,028	25,858	27,158
Horowpothana						
Existing	9,430	11,144	11,379	12,116	13,737	14,938
New	26,465	31,065	31,694	33,660	37,968	41,146
Total	35,895	42,209	43,074	45,776	51,705	56,084
Kahatagasdigiliya						
Existing	21,638	24,812	25,240	26,571	29,451	31,545
New	18,701	21,303	21,653	22,738	25,078	26,772
Total	40,339	46,114	46,893	49,310	54,529	58,316
All						
Existing	50,586	56,759	57,590	60,167	65,727	69,759
New	69,406	78,894	80,175	84,153	92,759	99,017
Total	119,992	135,653	137,765	144,320	158,486	168,776

Source: JICA Study Team

(4) Served Population

The served population for the Wahalkada system was also revised in the S/S with the same method described in 2.2 (4).

Table 2.3-2 Served Population Projection for Wahalkada System

DSD	Area Category	Projected Served Population				
		2020	2021	2024	2030	2034
Service Coverage	Existing *	70%	72%	78%	91%	100%
	New	25%	40%	70%	88%	100%
	Total *	44%	53%	74%	89%	100%
Padaviya	Existing	8,760	9,160	10,388	12,985	14,825
	New	2,733	4,412	7,931	7,299	12,393
	Total	11,493	13,572	18,319	20,284	27,218
Kebithigollewa	Existing	5,480	5,668	6,256	6,056	8,452
	New	3,899	6,319	11,497	10,538	18,706
	Total	9,378	11,988	17,753	16,595	27,158
Horowpothana	Existing	7,996	8,391	9,658	9,221	14,938
	New	7,766	12,678	23,562	21,444	41,146
	Total	15,762	21,068	33,220	30,666	56,084
Kahatagasdigiliya	Existing	17,408	18,248	20,912	20,000	31,545
	New	5,326	8,661	15,917	14,541	26,772
	Total	22,734	26,909	36,829	34,540	58,316
All	Existing	39,644	41,467	47,215	48,262	69,759
	New	19,723	32,070	58,907	53,822	99,017
	Total	59,368	73,537	106,121	102,085	168,776

Source: JICA Study Team

Note: Commissioning of WTP assumed to be in October 2020.

*: Service coverage % for Existing and Total are the results of calculation.

(5) Per Capita Domestic Water Consumption

Based on the result of the F/S, per capita domestic water consumption in 2024 and 2034 were set as 86 LPCD and 91 LPCD respectively in the Phase-1 D/D for the Mahakanadarawa System. In the S/S, same policy was applied for the Wahalkada System.

(6) Non-Domestic Water Demands

In the S/S, non-domestic water consumption for the Wahalkada System was assumed to be 30% of domestic water consumption as same as that of the Phase-1 D/D for the Mahakanadarawa System.

(7) Allowance for Unplanned Water Demands

The S/S also assumed the unexpected water demand allowance as 1.5% for the Wahalkada System as same as that for the Mahakanadarawa System projected in the Phase-1 D/D.

(8) Non-Revenue Water

The S/S employed the same non-revenue water ratio for the Wahalkada System as the one for the Mahakanadarawa System in the Phase-1 D/D, i.e. 20% of total demand in 2034. Then the ratio was assumed to be increased from 10% at the commissioning year expecting completeness of new facilities. The ratios in intermediate years were assumed to increase lineally. Consequently the ratio in 2024 was 12.9 %. This ratio is slightly lower than that of the Mahakanadarawa System, i.e. 13.8 % because of difference of completion year.

(9) Daily Maximum, Hourly Maximum and Raw Water Intake Amount

Based on the discussions with NWSDB in the Phase-1 D/D, daily maximum volume is modified to 110% of daily average volume, while hourly maximum volume is modified to 160% of daily maximum volume. Water loss at the each WTP, is set at 5% of total treated water, the same as the F/S and the D/D.

(10) Design Flow of Water Treatment Plants for Stage Construction

In the F/S, the capacity of WTP in the initial stage (2024) was designed at 50 % of the capacity of target year (2034). In the S/S, the initial stage construction work was assumed to be completed in 2020 with about 55% of ultimate stage capacity.

(11) Water Demand

Based on the design criteria mentioned above, planned water demand was calculated in the S/S as shown in **Table 2.3-3**. The results are summarized in **Table 2.3-4** as a comparison with the F/S. As shown in the table, increased water production capacity by 4% is required in 2034, but the production capacity at the first stage of construction work is required to be 14% increase from the F/S. As shown in the table, the

proposed WTP production capacity in 2034 is less than the required WTP production capacity. The proposed WTP capacity was slightly less the required capacity. The proposed capacity for 2024 was decided to be the same as water rights agreed with the Irrigation Department. Though the proposed capacity for the year 2024, i.e. 15,000 m³/day, is not sufficient to satisfy the demand in the year, it can fulfil the demand by the year of 2023. The lack of capacity in 2024 will be 1.3%. If water right will not be increased in future, the lack of capacity will be 1.7% in 2034. After completion of Yan Oya Project, it is desirable to negotiate with the Irrigation Department to increase the water right.

Table 2.3-4 Water Demand for Wahalkada System in F/S and S/S

Items	Unit	2024			2034		
		F/S	S/S	Ratio	F/S	S/S	Ratio
Design daily average water demand	m ³ /day	11,098	13,819	1.25	22,392	25,334	1.13
Design daily maximum water demand	m ³ /day	13,318	15,201	1.14	26,870	27,867	1.04
Design hourly maximum water demand	m ³ /day	26,635	24,321	0.91	53,740	44,587	0.83
Required WTP Production Capacity	m ³ /day	13,318	15,201	1.14	26,870	27,867	1.04
Proposed WTP Production Capacity	m ³ /day	13,700	15,000	1.09	27,400	27,400	1.00
Required Raw Water Intake	m ³ /day	13,983	16,001	1.14	28,214	29,334	1.04
Proposed Raw Water Intake Capacity	m ³ /day	14,400	16,000	1.11	28,800	28,800	1.00

Note: Required Raw Water Intake is calculated based on the Required WTP Production Capacity.

Proposed Raw Water Intake Capacities in 2034 is set at the quantity of water rights, and Proposed WTP Production Capacity is decided based on it. Proposed water Production Capacity in 2024, 15,000 m³/day, was set based on the request of NWSDB. Proposed raw Water Intake Capacity in 2024 was decided based on the required WTP Production capacity.

Table 2.3-3 Water Demand Projection for Wahalkada System

		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Total Population		122,052	124,543	126,466	128,422	130,412	132,435	134,494	136,587	138,717	140,883	143,086	145,328	147,608	149,928	152,287	154,688	157,130	159,614	162,142	164,714	167,330	169,992	172,704
	Padaviya Existing	12,822	12,907	12,992	13,078	13,164	13,251	13,339	13,427	13,516	13,605	13,695	13,786	13,877	13,969	14,061	14,154	14,248	14,343	14,438	14,533	14,630	14,727	14,825
	New	10,176	10,267	10,360	10,453	10,547	10,642	10,737	10,834	10,931	11,030	11,129	11,229	11,330	11,432	11,535	11,639	11,744	11,850	11,956	12,064	12,173	12,282	12,393
	Kebithigollewa Existing	8,261	8,360	8,460	8,562	8,664	8,768	8,874	8,981	9,089	9,198	9,309	9,421	9,535	9,650	9,767	9,885	10,004	10,125	10,248	10,372	10,498	10,625	10,754
	New	14,064	14,246	14,431	14,619	14,809	15,001	15,197	15,394	15,595	15,798	16,004	16,213	16,424	16,639	16,856	17,077	17,300	17,527	17,756	17,989	18,225	18,464	18,706
	Horowpothana Existing	10,525	10,743	10,967	11,194	11,427	11,664	11,907	12,154	12,407	12,665	12,929	13,198	13,472	13,751	14,039	14,332	14,630	14,935	15,247	15,565	15,889	16,211	16,559
	New	26,465	27,000	27,546	28,103	28,672	29,252	29,844	30,449	31,065	31,694	32,336	32,991	33,660	34,342	35,038	35,749	36,474	37,213	37,968	38,739	39,525	40,327	41,146
	Kahatagasdigiliya Existing	21,638	22,011	22,391	22,777	23,170	23,570	23,976	24,390	24,812	25,240	25,676	26,120	26,571	27,031	27,498	27,974	28,458	28,950	29,451	29,961	30,480	31,008	31,545
	New	18,701	19,008	19,320	19,637	19,959	20,287	20,620	20,958	21,303	21,653	22,009	22,370	22,738	23,112	23,492	23,879	24,272	24,672	25,078	25,491	25,911	26,338	26,772
Population of GNDs excluded																								
32-Kurulugama	Kebithigollewa	1,585	1,593	1,621	1,650	1,679	1,708	1,739	1,770	1,801	1,833	1,865	1,898	1,932	1,966	2,001	2,036	2,072	2,109	2,146	2,184	2,223	2,262	2,302
119-Ihala Angunachchiya	Horowpothana	1,095	1,115	1,135	1,155	1,176	1,197	1,219	1,241	1,263	1,286	1,309	1,332	1,356	1,381	1,406	1,431	1,457	1,483	1,510	1,537	1,564	1,593	1,621
	Sub-Total	2,680	2,707	2,756	2,805	2,855	2,906	2,957	3,010	3,064	3,118	3,174	3,231	3,288	3,347	3,406	3,467	3,529	3,592	3,656	3,721	3,787	3,855	3,924
Target Population (persons)	a	119,992	121,836	123,710	125,617	127,557	129,530	131,536	133,577	135,653	137,765	139,912	142,097	144,320	146,581	148,881	151,221	153,601	156,023	158,486	160,993	163,542	166,137	168,776
	Padaviya Existing	12,822	12,907	12,992	13,078	13,164	13,251	13,339	13,427	13,516	13,605	13,695	13,786	13,877	13,969	14,061	14,154	14,248	14,343	14,438	14,533	14,630	14,727	14,825
	New	10,176	10,267	10,360	10,453	10,547	10,642	10,737	10,834	10,931	11,030	11,129	11,229	11,330	11,432	11,535	11,639	11,744	11,850	11,956	12,064	12,173	12,282	12,393
	Kebithigollewa Existing	6,896	6,767	6,839	6,912	6,986	7,060	7,135	7,211	7,288	7,365	7,444	7,523	7,603	7,684	7,766	7,848	7,932	8,016	8,102	8,188	8,275	8,363	8,452
	New	14,064	14,246	14,431	14,619	14,809	15,001	15,197	15,394	15,595	15,798	16,004	16,213	16,424	16,639	16,856	17,077	17,300	17,527	17,756	17,989	18,225	18,464	18,706
	Horowpothana Existing	9,430	9,629	9,832	10,039	10,251	10,467	10,688	10,914	11,144	11,379	11,620	11,865	12,116	12,372	12,634	12,901	13,174	13,452	13,737	14,028	14,325	14,628	14,938
	New	26,465	27,000	27,546	28,103	28,672	29,252	29,844	30,449	31,065	31,694	32,336	32,991	33,660	34,342	35,038	35,749	36,474	37,213	37,968	38,739	39,525	40,327	41,146
	Kahatagasdigiliya Existing	21,638	22,011	22,391	22,777	23,170	23,570	23,976	24,390	24,812	25,240	25,676	26,120	26,571	27,031	27,498	27,974	28,458	28,950	29,451	29,961	30,480	31,008	31,545
	New	18,701	19,008	19,320	19,637	19,959	20,287	20,620	20,958	21,303	21,653	22,009	22,370	22,738	23,112	23,492	23,879	24,272	24,672	25,078	25,491	25,911	26,338	26,772
Coverage (%)	b = o / a	22%	23%	24%	25%	26%	27%	27%	28%	44%	53%	63%	70%	74%	76%	79%	81%	84%	87%	89%	92%	95%	97%	100%
for Pipe Borne WS	Existing	53%	55%	57%	59%	61%	63%	66%	68%	70%	72%	74%	76%	78%	81%	83%	85%	87%	89%	91%	94%	96%	98%	100%
	New	0%	0%	0%	0%	0%	0%	0%	0%	25%	40%	55%	65%	70%	73%	76%	79%	82%	85%	88%	91%	94%	97%	100%
Served Population (persons)	o	26,589	28,081	29,612	31,182	32,791	34,441	36,132	37,866	59,368	73,537	88,148	99,073	108,121	111,861	117,351	123,196	129,200	135,366	141,698	148,202	154,879	161,736	168,776
	Padaviya Existing	5,737	6,099	6,465	6,836	7,211	7,591	7,976	8,366	8,760	9,160	9,564	9,974	10,388	10,808	11,233	11,663	12,098	12,539	12,985	13,437	13,894	14,356	14,825
	New	0	0	0	0	0	0	0	0	2,733	4,412	6,121	7,299	7,931	8,345	8,767	9,195	9,630	10,072	10,522	10,978	11,442	11,914	12,393
	Kebithigollewa Existing	4,086	4,249	4,415	4,585	4,757	4,933	5,112	5,294	5,480	5,668	5,861	6,056	6,256	6,458	6,665	6,875	7,089	7,306	7,527	7,753	7,982	8,215	8,452
	New	0	0	0	0	0	0	0	0	3,899	6,319	8,802	10,538	11,497	12,146	12,811	13,491	14,186	14,898	15,625	16,370	17,131	17,910	18,706
	Horowpothana Existing	5,288	5,586	5,895	6,216	6,547	6,891	7,247	7,615	7,996	8,391	8,799	9,221	9,658	10,111	10,578	11,062	11,562	12,079	12,614	13,166	13,738	14,328	14,938
	New	0	0	0	0	0	0	0	0	7,766	12,678	17,785	21,444	23,562	25,070	26,629	28,241	29,908	31,631	33,412	35,252	37,154	39,118	41,146
	Kahatagasdigiliya Existing	11,478	12,148	12,837	13,546	14,275	15,026	15,798	16,592	17,408	18,248	19,112	20,000	20,912	21,850	22,815	23,805	24,824	25,870	26,945	28,049	29,183	30,348	31,545
	New	0	0	0	0	0	0	0	0	5,326	8,861	12,105	14,541	15,917	16,872	17,854	18,864	19,903	20,971	22,068	23,197	24,356	25,547	26,772
Per Capita Water Consumption (LPOD)	d	80.0	80.5	81.0	81.5	82.0	82.5	83.0	83.5	84.0	84.5	85.0	85.5	86.0	86.5	87.0	87.5	88.0	88.5	89.0	89.5	90.0	90.5	91.0
Domestic Water Consumption (m3/d)	e = o x d	2,127	2,261	2,399	2,541	2,689	2,841	2,999	3,162	4,987	6,214	7,483	8,471	9,126	9,859	10,210	10,780	11,370	11,980	12,611	13,264	13,939	14,637	15,359
	Existing	2,127	2,261	2,399	2,541	2,689	2,841	2,999	3,162	3,330	3,504	3,684	3,869	4,060	4,258	4,462	4,673	4,890	5,115	5,346	5,585	5,832	6,086	6,348
	New	0	0	0	0	0	0	0	0	1,657	2,710	3,809	4,602	5,066	5,401	5,747	6,107	6,479	6,865	7,265	7,679	8,107	8,551	9,011
Non-Domestic Water Consumption	f = e x 30%	638	678	720	762	807	852	900	949	1,496	1,864	2,248	2,541	2,738	2,898	3,063	3,234	3,411	3,594	3,783	3,979	4,182	4,391	4,608
Allow. for Unexpected Water Consumption	g = (e+f) x 1.5%	41	44	47	50	52	55	58	62	97	121	146	165	178	188	199	210	222	234	246	259	272	285	300
Average Daily Water Consumption	h = e + f + g	2,806	2,983	3,166	3,353	3,548	3,748	3,957	4,173	6,580	8,													

(11) Summary of Design Criteria

Design criteria and results of Water Demand Projection calculated in the S/S are summarized in **Table 2.3-5**.

Table 2.3-5 Design Criteria for Wahalkada System

Items	Unit	calculation	S/S		F/S	
			2024	2034	2024	2034
Served Population	pop	a	106,121	168,776	100,393	161,468
Per Capita Water Consumption	LPCD	b	86	91	86/10	91/10
Non-Domestic Water Demands	%	c	30		35	
Allowance for Unexpected Water Demands	%	d	1.5		-	-
Non-Revenue Water (in total water demand)	%	e	12.9	20.0	20	
Design Daily Average Water Demand (Dave)	m ³ /day	$f = a \times b \times (1+c) \times (1+d) / (1-e)$	13,819	25,334	11,098	22,932
Design Load Factor to Dmax	%	g	110		120	
Design Daily Maximum Water Demand (Dmax)	m ³ /day	$h = f \times g$	15,201	27,867	13,318	26,870
Required WTP Production Capacity (Output)	m ³ /day	i	15,201	27,867	13,318	26,870
Proposed WTP Production Capacity (Output)	m³/day	j	15,000	27,400	13,700	27,400
Water Loss at Water Treatment Plant	%	k	5		5	
Required Raw Water Demand	m ³ /day	$l = i / (1-k)$	16,001	29,334	13,983*	28,214*
Required Raw Water Intake	m ³ /day	m	16,001	29,334	13,983*	28,214*
Proposed Capacity of Intake Facility	m³/day	n	16,000	28,800	14,400	28,800
Design Peak Factor	%	o	160		200	
Design Hourly Maximum Water Supply (Hmax)	m ³ /day	$p = h \times o$	24,321	44,587	26,635	53,740

*: Required Raw Water Demand in F/S = Required WTP Production x 1.05
 13,983 = 13,318 x 1.05; 28,214 = 26,870 x 1.05

Figure 2.3-1 shows relationship between water demand and water supply capacity through the target year 2034 projected by the S/S.

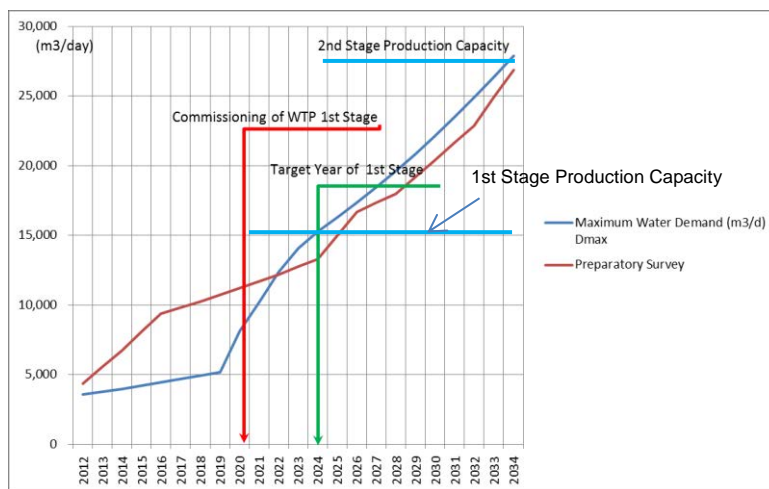


Figure 2.3-1 Demand and Supply of Wahalkada System

CHAPTER 3

REVIEW OF PHASE 1 PROJECT

Non-disclosure information

CHAPTER 4
REVIEW OF PHASE 2 PROJECT

Non-disclosure information

CHAPTER 5
IMPLEMENTATION PLAN

Non-disclosure information

CHAPTER 6

FINANCIAL AND ECONOMIC CONSIDERATIONS

Non-disclosure information

CHAPTER 7

OPERATION AND EFFECT INDICATORS

CHAPTER 7 OPERATION AND EFFECT INDICATORS

7.1 Results in Preparatory Survey

In the F/S, the operation and effect indicators were set as follows:

Table 7.1-1 Operation Indicators for ANWSP

Mahakanadarawa System

Indicators	Calculation Equation of Indicators	Target			Purpose
		Present 2012	2020	2024	
Served population (persons)	Served population by pipe borne water supply = (No. of connections) × (Average per HU population)	25,900	40,700	47,800	
	Served population by bowsers = (total population)	0	21,400	22,300	
	Total served population = Served population + Served population by bowsers	25,900	62,100	70,100	
Water distribution (m ³ /day)	Daily maximum water distribution = (the biggest one in the daily water distribution records throughout a year)	0	7,193	8,585	
	Daily average water distribution = (annual water distribution amount) / (annual days)	0	5,994	7,154	
Facility utilization rate (%)	Facility utilization rate (Max.) = (Daily maximum water production) / (treatment capacity) × 100	0	80	96	
	Facility utilization rate (Ave.) = (Daily average water production) / (treatment capacity) × 100	0	67	80	
Compliance rate of drinking standard for fluoride (%)	No. of samples with a fluoride concentration of below 0.6 mg/L / Total no. of samples × 100	~*1	100	100	*1 The drinking standard for fluoride is not complied to at 19 schemes out of 24 existing CBOs
NRW ratio (%)	NRW ratio = (NRW volume) / (water distribution) × 100	~*2	20%	20%	*2 Current NRW at NWSDB RSC(N/C) is 19.8% (2008)

Wahalkada System

Indicators	Calculation Equation of Indicators	Target			Purpose
		Present 2012	2020	2024	
Served population (persons)	Served population by pipe borne water supply = (No. of connections) × (Average per HH population)	26,900	64,100	74,700	
	Served population by bowsers = (total population)	0	24,600	25,700	
	Total served population = Served population + Served population by bowsers	26,900	88,700	100,400	
Water distribution (m ³ /day)	Daily maximum water distribution = (the biggest one in the daily water distribution records throughout a year)	0	11,203	13,318	
	Daily average water distribution = (annual water distribution amount) / (annual days)	0	9,336	11,098	
Facility utilization rate (%)	Facility utilization rate (Max.) = (Daily maximum water production) / (treatment capacity) × 100	0	82	97	
	Facility utilization rate (Ave.) = (Daily average water production) / (treatment capacity) × 100	0	68	81	
Compliance rate of drinking	No. of samples with a fluoride concentration of below 0.6 mg/L / Total no. of samples *100	~*1	100	100	*1 The drinking standard for fluoride is not complied to at

Indicators	Calculation Equation of Indicators	Target			Purpose
		Present 2012	2020	2024	
standard for fluoride (%)					13 schemes out of 20 existing CBOs
NRW ratio (%)	$\text{NRW ratio} = (\text{NRW volume}) / (\text{water distribution}) \times 100$	~*2	20%	20%	*2 Current NRW at NWSDB RSC(N/C) is 19.8% (2008)

Table 7.1-2 Effect Indicators for Water Supply**Mahakanadarawa System**

Indicators	Calculation Equation of Indicators	Target			Purpose
		Present 2012	2020	2024	
Population coverage by water supply	(Pipe borne water supply) Population coverage = (Served population) / (Administrative population) × 100	41%	58%	64%	Status of risk avoidance being suffered from fluorosis and CKD through shifting of water source from well water to tap water
	(Water delivery service by bowsers) Population coverage = (Served population) / (Administrative population) × 100	0 %	100%	100%	
	(Population coverage for an access to safe water) Population coverage = (Served population) / (Administrative population) × 100	31%	68%	72%	
Fluoride risk rate	(Fluoride risk rate) = 100 - (Population coverage for an access to safe water)	-	32%	28%	The current rate is 84.4% at the existing service area.
Per capita consumption	Per capita daily maximum consumption = (Daily maximum domestic consumption) / (Served population)	96 LPCD	101 LPCD	103 LPCD	Shifting of water source from well water to tap water
	Per capita daily average consumption = (Daily average domestic consumption) / (Served population)	80 LPCD	84 LPCD	86 LPCD	

Wahalkada System

Indicators	Calculation Equation of Indicators	Target			Purpose
		Present 2012	2020	2024	
Population coverage by water supply	(Pipe borne water supply) Population coverage = (Served population) / (Administrative population) × 100	28%	59%	65%	Status of risk avoidance being suffered from fluorosis and CKD through shifting of water source from well water to tap water
	(Water delivery service by bowsers) Population coverage = (Served population) / (Administrative population) × 100	0 %	100%	100%	
	(Population coverage for an access to safe water) Population coverage = (Served population) / (Administrative population) × 100	27%	67%	72%	
Fluoride risk rate	(Fluoride risk rate) = 100 - (Population coverage for an access to safe water)	-	33%	28%	The current rate is 71.2% at the existing service area.
Per capita consumption	Per capita daily maximum consumption = (Daily maximum domestic consumption) / (Served population)	96 LPCD	101 LPCD	103 LPCD	Shifting of water source from well water to tap water
	Per capita daily average consumption = (Daily average domestic consumption) / (Served population)	80 LPCD	84 LPCD	86 LPCD	

Source: F/S Final Report

7.2 Revised Indicators

The operation and effect indicators presented in the F/S includes those which are considered to be relatively hard to follow up, and several indicators have vague expressions with indistinct definition such like population who has access to safe drinking water in the project. Considering above problems, application of revised indicators are recommended for simplification of indicators as follows:

- (1) Served population (persons) : Population served by piped water supply system including those served by CBO water supply systems with NWSDB bulk water supply.
- (2) Water Supply Coverage (with surface water) (%) : Served Population with water originated in surface water / Total Administrative Population
- (3) Fluoride in Drinking Water (mg/L) : Fluoride concentration at tap
- (4) Rate of facility Utilization (%) : Daily Maximum Production Volume/ Capacity of Water Treatment Plant:

Table 7.2-1 shows those indicators by water supply system:

Table 7.2-1 Performance and Operation Indicators

Indicator	(2012)	Present (2015)	Target (2020)
Mahakanadarawa System			
Served Population	27,818	31,896	53,531
Water Supply Coverage (w/ Surface Water) (%)	0	0	56
Fluoride in drinking water (mg/L)	1.9 ³ (Jayashakthi CBO)	-	<1.0
Rate of Facility Utilization ² (%)	-	-	60
Wahalkada System			
Served Population	26,589	31,182	88,148
Water Supply Coverage (w/ Surface Water) (%)	0	0	63
Fluoride in drinking water (mg/L)	1.9 ³ (Senath CBO)	-	<1.0
Rate of Facility Utilization ² (%)	-	-	74

Note:

1: During the F/S, Census Population was not available. Figures in this table are based on the population in 2012 Census.

2: Mahakanadarawa; 6,685/11,200, Wahalkada; 11,163/15,000.

3: The Figure of 1.9 mg/L is detected from existing CBO water supply systems in the project area as the analysed maximum value obtained in the Preparatory Survey. This figure exceeded the drinking water quality standard of Sri Lanka 2013 (<1.0 mg/L) (refer to **Appendix 7.2-1**, and **Appendix 7.2-2**).

CHAPTER 8

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

Chapter 8 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

8.1 Project Summary

8.1.1 Project Title

Anuradhapura North Water Supply Project (ANWSP) Phase 2.

8.1.2 Project Summary

The project was planned to provide safe drinking water in the northern part of Anuradhapura in Sri Lanka. It was separated into two phases; Phase 1 for Mahakanadarawa scheme and Phase 2 for Wahalkada scheme. The current main water source in the target area is groundwater and it is usually supplied by small-scale piped water supply systems or from individual wells. The groundwater in the area contains high concentration of hardness and sometimes contains high concentration of fluoride. It is believed that the bad water quality brings about endemic diseases such as fluorosis and CKDs. For this reason, the NWSDB has decided to establish a water supply system in the area using an alternative water source from irrigation tanks, namely artificial reservoirs.

The planned project will provide a positive impact to the people in the area by improving their living standards. On the other hand, the project might have negative impacts on the natural environment and social conditions. The F/S identified the project in Category B because the adverse effects were manageable and not serious.

8.2 Purpose of the S/S

The F/S was carried out in 2012, and accordingly, the Phase 1 project has started D/D. It is supposed that the problem identified at Phase 1 could occur again at Phase 2 because these two projects have close similarity. Prior to starting Phase 2 project, JICA decided to review the current environment of the project and study the lessons from preceding Phase 1, in order to minimize adverse effects and maximize benefit.

8.2.1 Task of the S/S

1) Review the environmental and social impact by the project with the modified plan and design

There are some modification of the plan and design of the project. The JICA Study team studies about the necessary additional consideration that could be created by the modification.

2) Study the Phase 1 about the land acquisition and resettlement

The JICA Study team evaluates the procedure and progress of land acquisition and resettlement of the Phase 1. The result will be utilized for the Phase 2 project.

3) Check the current status of the land acquisition and resettlement

The phase 2 plans to construct four pumping stations, five ground reservoirs and sixteen elevated water tanks as well as one WTP. The JICA Study team checked the owner of the land, the current status of land acquisition, presence of squatters, and clarify the potential problem to the project and make recommendations of the measures to be taken.

8.3 Result

8.3.1 Review of the Government Policies and Regulations

It has passed about three years after the F/S, and the changes of the policies and regulations which have been created during this period should be examined. The change of regime occurred at the election on early January 2015, but a new president follows his predecessor's policy in regard to environmental and social issues. There has not been any major change of policies and laws. **Table 8.3-1** shows the policies related to the environmental and social issues.

Table 8.3-1 Sri Lanka Policies for Environmental and Social Issues

<p>National Environment Policy – 2003</p> <p>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.</p>
<p>National Forestry Policy – 1995</p> <p>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.</p>
<p>The National Policy on Wildlife Conservation – 2000</p> <p>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.</p>
<p>National Air Quality Management Policy – 2000</p> <p>The policy aims to maintain good air quality to reduce morbidity due to air pollution and in turn reduce national health expenditures.</p>

<p>National Watershed Management Policy – 2004</p> <p>The policy aims to conserve, protect, rehabilitate, sustainably use and manage the watersheds while managing their environment characteristics with the involvement of people.</p>
<p>Cleaner Production Policy – 2004</p> <p>The objective of this policy is to incorporate the cleaner production concept and practices into all development sectors of the country.</p>
<p>National Biosafety Policy – 2005</p> <p>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.</p>
<p>National Policy on Wetlands – 2005</p> <p>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.</p>
<p>National Policy on Sand as a Resource for the Construction Industry – 2006</p> <p>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.</p>
<p>National Policy on Elephant Conservation – 2006</p> <p>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 conflict.</p>
<p>National Policy on Solid Waste Management – 2007</p> <p>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.</p>

Source: CEA, Professor in Forestry and Environmental Science of University of Sri Jayewardenepura

From the viewpoint of the environmental and social issues, the project should be aware many of Ordinances, Acts and Regulations to follow. **Table 8.3-2** and **Table 8.3-3** are summaries with the updating information.

Table 8.3-2 Act and Ordinance to Consider

Name	Last amendment	Contents	Administration
National Environmental (Amendment) Act,	2000	• Provision for the protection and management of the environment	CEA
Forest (Amendment) Act	2009	• Amendment of Forest Ordinance • Conservation, protection, and sustainable management of forest resources • Provisions for community involvement in forest management and benefit sharing through forest agreements.	Forest department
Fauna and Flora Protection (Amendment) Act	2009	• Amendment of Fauna and Flora Protection Ordinance • Provisions for protection of certain species of fauna outside reserves and prohibition and control of export of some wild animals. • Provisions for protection of some identified Protected Trees	Department of Wildlife Conservation
National Heritage and Wilderness Areas Act	1988	• Special protection to the forest areas that harbour unique ecosystems, genetic resources, or outstanding natural features	Forest Department
Soil Conservation Act	1996	• Provision for the conservation of soil resources, for the prevention or mitigation of soil erosion and for the protection of land against damage by floods and drought	Department of agriculture
Land Acquisition Act	1986	• Provision for the acquisition of lands and servitudes for public purposes and to provide for matters connected with or incidental to such provision.	Department of land
Urban Development Authority (Amendment) Act	1984	• Amendment of Urban Development Authority Law • Provision for preserving and promoting landscaping	UDA
Antiquities (Amendment) Act	1998	• Amendment of Antiquities Ordinance • Reservation of Antiquities	Department of Archaeology
Factories (Amendment) Act	2002	• Provision for the safety and welfare of workers in factories	Department of Labour

Source: CEA, Forest Department, Professor in Forestry and Environmental Science of University of Sri Jayewardenepura

Table 8.3-3 Regulations to Follow

Category	ID	Date of Gazette	Remarks
Environment Protection	Order published under the Gazette Notification No. 1533/16	25.01.2008	the Prescribed Activities for which a License is Required
	Order published under the Gazette Notification No. 1534/18	01.02.2008	<ul style="list-style-type: none"> • Issue of Environmental Protection License for Emission or Disposal of Waste • Issue of License for the Management of Waste
	Regulations published under the Gazette Notification No. 850/4	20.12.1994	<ul style="list-style-type: none"> • Regulation of Ozone depleting materials • The permissible ambient air quality standards
Water Quality	Specification for Potable Water Quality SLS 614:2013	2013	• Drinking water quality standards under Sri Lanka Institute of Standards (SLS)
	Proposed Ambient Water Quality Standards	2001	• Proposed standard prepared by CEA
	Regulations published under the Gazette Notification No. 1534/18	01.02.2008	<ul style="list-style-type: none"> • License for discharge, emission or disposal of waste/scheduled waste management • Discharge standards
Air Quality	Regulations published under the Gazette Notification No. 1295/11	30.06.2003	• Vehicular Exhaust Emission Standards
	Order published under the Gazette Notification No. 1557/14	09.07.2008	• List of vehicle exhaust emission standards
	Regulations published under the Gazette Notification No. 1562/22	15.08.2008	• Permissible Ambient Air Quality Standards in relation to class of Air Pollutants
	Amended Regulations published under the Gazette Notification No. 1887/20	05.11.2014	• Air emission, fuel & vehicle Importation standards
Noise	Order published under the Gazette Notification No. 924/12	23.05.1996	• permissible Noise Level
	Order published under the Gazette Notification No. 973/7	30.04.1997	• Amendment above
	Order published under the Gazette Notification No. 1738/37	29.12.2011	• National Environmental (vehicle horns) Regulations
Waste Management	Order published under the Gazette Notification No. 1466/5	10.10.2006	• Prohibition of Polythene or any Polythene product
	Regulations published under the Gazette Notification No. 1534/18	01.02.2008	<ul style="list-style-type: none"> • License for discharge, emission or disposal of waste/scheduled waste management • Discharge standards
	Order published under the Gazette Notification No. 1627/19	10.11.2009	• Municipal Solid Waste Regulations

Source: CEA, web site of Government of Sri Lanka (<http://www.lawnet.lk/>)

There are no legal basis for the enforcement of the water quality standards for drinking water and ambient water. The ambient water quality standard is still a proposed guideline.

8.3.2 Change of Environmental Standards

The project has to observe the criteria and standards for the protection of environment, human health and security. The important standards were listed up in the F/S report. And the activities of the proposed project were carefully examined the compliance with standards.

After three years, a couple of standard sets have been revised, i.e., drinking water standard and discharge standards for Petrol Vehicles.

8.3.2.1 Specification for Potable Water (SLS 614)

This is a standard for drinking water approved by the Sectoral Committee on Agricultural and Food Products. It had been effective since 1983 with the authorization by Sri Lanka Standards Institution (SLSI) and revised in 2013 for the first amendment. The new criteria were reviewed with the latest scientific information, accumulated study and knowledge. The old version of standards had two kinds of criteria for some parameters as ‘Highest desirable level’ and ‘Maximum permissible level’. But new version of the standards only has one criteria for each parameter. Other notable differences are the change of criteria concentration for some parameters, such as fluoride (1.5 mg/l to 1.0 mg/l), arsenic (0.05 mg/l to 0.01 mg/l), and addition of some parameters like nickel, total dissolved solid etc. The table for comparison between 1983 version and 2013 version is shown as **Table 8.3-4**. SLS 614 (2013) is attached as **Appendix 8.3-1**.

Table 8.3-4 Sri Lanka Drinking Water Standard in 1983 and 2013

Physical and organoleptic requirements

PARAMETER		Unit	SLS 614 1983		SLS 614 2013	
			Highest Desirable level	Maximum permissible level	Requirement (Maximum)	
Electrical conductivity at 25°C	EC	µs/cm	750	3500		
Total solids		mg/l	500	2000		
Colour		(Hazen Units)	5	30	15	↗
Taste			Unobjectionable	-	Unobjectionable	
Odour			Unobjectionable	-	Unobjectionable	
Turbidity		NTU	2	8	2	=
pH			7.0–8.5	6.5–9.0	6.5–8.5	

Chemical requirement

PARAMETER		Unit	SLS 614 1983		SLS 614 2013	
			Highest Desirable level	Maximum permissible level	Requirement (Maximum)	
Aluminium	Al	mg/l			0.2	New
Free Ammonia	NH ₃	mg/l	-	0.06	0.06	=
Albuminoid ammonia		mg/l			0.15	New
Anionic detergents (as MBAS)		mg/l			0.2	New
Calcium	Ca	mg/l	100	240	100	=
Chloride	Cl	mg/l	200	1200	250	↗
Chemical Oxygen Demand	COD	mg/l	-	10	10	=
Copper	Cu	mg/l	0.05	1.5	1.0	↗
Fluoride	F ⁻	mg/l	0.6	1.5	1.0	↘
Free Residual Chlorine		mg/l	-	0.2	1	↗
Iron	Fe	mg/l	0.3	1	0.3	=
Magnesium	Mg	mg/l	30	150	30	=
Manganese	Mn	mg/l	0.05	0.5	0.1	↗
Nitrate	NO ₃ ⁻	mg/l	-	45	50	↗
Nitrite	NO ₂ ⁻	mg/l	-	0.01	3	↗
Nickel	Ni				0.02	New
Grease & Oil			-	1	0.2	↘
Phenolic compounds			0.001	0.002	0.001	=
Sodium	Na				200	New
Sulphate	SO ₄ ²⁻	mg/l	200	400	250	↗
Total Alkalinity (as CaCO ₃)		mg/l	200	400	200	=
Total dissolved solid	TDS				500	New
Total Hardness (as CaCO ₃)		mg/l	250	600	250	=
Total Phosphates	PO ₄ ³⁻	mg/l	-	2	2.0	=
Zinc (Zn) (mg/l)	Zn	mg/l	5	15	3.0	↘

Limits for toxic substances

PARAMETER		Unit	SLS 614 1983		SLS 614 2013	
			Highest Desirable level	Maximum permissible level	Requirement (Maximum)	
Arsenic	As	mg/l	-	0.05	0.01	↘
Cadmium	Cd	mg/l	-	0.005	0.003	↘
Chromium	Cr	mg/l	-	0.05	0.05	=
Cyanide	CN	mg/l	-	0.05	0.05	=
Lead	Pb	mg/l	-	0.05	0.01	↘
Mercury	Hg	mg/l	-	0.001	0.001	=
Selenium	Se	mg/l	-	0.01	0.01	=

Table 8.3-5 Sri Lanka Drinking Water Standard in 1983 and 2013 (continued)

Bacteriological requirement		SLS 614 1983		SLS 614 2013	
Total Coliforms / 100 ml		Absent in (i) 95% of the samples in a year and (ii) in any two consecutive samples	10	3 for treatment works and piped distribution systems, 10 for individual or small community supplies	
E.Coli/100ml		Absent	Absent	Absent	

Source: SLS 614 (1983) and SLS 614 (2013)

NWSDB continues the monthly monitoring of water quality at Wahalkada tank. **Table 8.3-6** is a summary of the monitoring results from June 2012 to October 2015. It is a list of maximum, minimum observed value and average of all results during the monitoring period. The whole report is attached as **Appendix 8.3-2**.

Table 8.3-6 Summary of Monitoring Result of Wahalkada Tank Water

	parameter	standard	max	min	average
1	Colour (Hazen Unit)	15	83	13	33
2	Turbidity (NTU)	2	57.6	2.47	14
3	pH	6.5 - 8.5	8.67	6.73	8
4	Electrical conductivity at 25°C (µs/cm)	-	360	180	255
5	Chloride (as Cl ⁻) - mg/L	250	60	12	29
6	Total Alkalinity (as CaCO ₃) -mg/L	200	180	60	95
7	Total Hardness (as CaCO ₃) -mg/L	250	182	48	94
8	Nitrate (as N) -mg/L	11.3*	4.8	0	0.71
9	Nitrite (as N) -mg/L	0.91*	0.3	0.001	0.01
10	Sulphate (as SO ₄ ²⁻) - mg/L	250	8	1	2
11	Fluoride (as F ⁻) - mg /L	1.0	0.44	0.12	0.27
12	Phosphate (as PO ₄ ³⁻) -mg/L	2.0	0.89	0.05	0.28
13	Total Iron (as Fe) -mg/L	0.3	0.99	0	0.14
14	Total Coliform /100 ml	3	820	0	153
15	Escherichia Coli /100 mL	0	296	0	52

:* converted from standards

Source: NWSDB- RSC-NC

Concentration of fluoride has not exceeded the requirement. The parameters which exceeded the standard value are colour, turbidity, iron and bacteriological parameters are able to be removed by the usual water treatment procedure. NWSDB monitors the 15 parameters shown in the table. Toxic substances are not measured by usual NWSDB monitoring. The F/S team measured toxic substances from December 2011 to June 2012, and all reported results satisfied the requirements of the updated standards.

8.3.2.2 Air Emission, Fuel and Vehicle Importation Standards

The Air Emission standards was established in 2003 and amended in 2008. It was again amended in 2014. The type of vehicle is changed and criteria value of emission gas is revised. A copy of Gazette is attached as **Appendix 8.3-3**.

Table 8.3-7 Discharge Standards for Petrol Vehicles

Issued year	Type of Vehicle	Pollution Standard		Remarks
		Carbon Monoxide (CO (% vol.))	Hydrocarbon HC (ppm v/v)	
2008	Petrol wo/cc	a. > 5 years 3.0 < 5 years	1200	Low idling
	Petrol w/cc	2	400	
2014 (New)	Petrol Vehicles	3.0	1000	Both idling and 2500 RPM/no load
	Petrol Motor Cycles	4.0	1000	
	Petrol Motor Tricycles	4.0	6000	

Where:

wo/cc - Without catalytic converter

w/cc - with catalytic converter

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

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

Source: Gazette Notification No. 1887/20-2014

Table 8.3-8 Discharge Standards for Diesel Vehicles

Issued year	Type of Vehicle	Smoke Capacity % (k factor m-1)	
		Idle	Load
2008			
	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)
		Emission Standards Remarks /K Factor (m-1) based on Smoke Capacity	
2014	Diesel Vehicles	4.0	On Snap Acceleration Abbreviations

K factor: Absorption Coefficient

Source: Gazette Notification No. 1887/20-2014

8.3.3 Approval

This project is not requested EIA and IEE. The any projects to establish industrial activities, which are not subject to EIA are advised to obtain Environmental Recommendation from the Central Environmental Authority (hereinafter referred to as “CEA”) for the proposed sites. The purpose of environmental recommendation is to minimize the environmental impact with respect to the zoning plans of relevant

local authorities. The document contains the conditions, and the project should take mitigation measures to satisfy the conditions.

Environmental Recommendation for the Phase 2 project was issued by the CEA NCR (North Central Region) office on 23rd September 2015, with the reference to the application form which had been submitted to CEA by NWSDB. The copy is attached as **Appendix 8.3-4**. NWSDB received Environmental Recommendation on the date of 23rd February 2013 previously, which was valid for a year. NWSDB again submitted the application and received updated one. The conditions noted here are exactly same as before so that CEA's standpoint for the project is not changed. This document provides the permission to the project proponent to carry out the proposed project under the conditions. NWSDB should obtain Environmental Protection License (EPL) 3 months before starting operation.

8.3.4 Current status of the Land Acquisition for the Phase 2

NWSDB completed all clearance of the land necessary for the Phase 1 project. NWSDB also completed the resettlement and compensation for the encroaching one household in the Mahakanadarawa WTP site according with the World Bank safe guard policy. NWSDB valued the house worth LKR 977,421 based on the reacquisition price, and decided to provide doubled price as LKR 2,000,000 which included the cost of construction of new house on sympathetic grounds. The owner accepted the offer willingly. The NWSDB Project Management Unit (herein after referred to as "PMU") officials monitored the correctness of the procedure and gave the assistance to the house owner to move to the new constructed house in the proposed land of the Division Secretary There was no grievance throughout the processes. The report of compensation, photos of new house and oath of the house owner are attached as **Appendix 8.3-5**.

NWSDB has started the land acquisition procedure for the Phase 2 project. **Table 8.3-9** shows current status of proposed sites of Phase 2. The ownership transfer of sites is proceeding smoothly. Currently, there is no possibility of resettlement and NWSDB will pay the effort to avoid relocation of resident in future. But if needs arise, NWSDB will follow the JICA guidelines of resettlement.

The S/S team visited the sites and observed the situation. The brief description of observation and photo of each site are shown in Photo 8-1. There is no encroachment. The many of sites are covered by shrubs, bush and secondary forest. Therefore, the possibility of encroachment in the future is less.

Table 8.3-9 Current Status of Land Acquisition (as of 3rd November 2015)

No	Name of Site	Major Facilities*	Area (m ²)	Current Owner	Present Status of Land Clearance
1	Kahatagasdigiliya	WR, WT, PH, CH, GR, OF, SQ,	7,000m ²	NWSDB	ok
2	Hamillewa	WT, CH, SQ	4,000m ²	Government	Approval letter to be received from Divisional Secretary (DS).
3	Rathmalgahawewa	WT, CH, SQ	2,000 m ²	Government	Land commission's Approval to be received for prepares a survey plan.
4	Horowpothana	WR, WT, PH, GR, CH, OF, WS, SQx2	8,000 m ²	NWSDB	ok
5	West Horowpothana	WT, CH, SQ	4,000 m ²	FOREST Dpt	Approval granted by the Forest Conservator. Position to be transferred. Constructions can be commenced under the supervision of Divisional Forest Officer (DFO).
6	North Horowpothana	WT, CH, SQ	2,000 m ²	FOREST Dpt	Approval granted by the Forest Conservator. Position to be transferred. Constructions can be commenced under the supervision of DFO.
7	Weerasole	WR, PH, GR, CH, SQ	4,000 m ²	FOREST Dpt	Approval granted by the Forest Conservator. Position to be transferred. Constructions can be commenced under the supervision of DFO.
8	Kebithigollewa	WR, WT, PH, GR, WS, CH, SQx2, OF	9,000 m ²	NWSDB	ok
9	KAH-KEB	WT, CH, SQ	2,000 m ²	Government	Local authority approval to be received.
10	Kahatagollewa – 1	WT, CH	2,000 m ²	Government	Local authority approval was received.
11	Kahatagollewa – 2	WR, PH, GR, SQ,	4,000 m ²	Government	Local authority approval was received.
12	Bogahawewa	WT, OF, CH, SQx2	4,000 m ²	Government	Lease application and relevant documents to be forwarded to Land Commissioner (LC) through the Provincial Land Commissioner (PLC) by DS.
13	Wahalkada - 1	Water Treatment Plant, WT	40,000 m ²	FOREST Dpt	Approval from the Forest department was received. Annual rental to be paid amount of LKR 160,000.00 to the Forest Department.
14	Wahalkada – 2	Intake and PH	2,000 m ²	FOREST Dpt	Approval granted by the Forest Conservator. Position to be transferred. Constructions can be commenced under the supervision of DFO.
15	Mahakanadarawa System service area	Water Tower (750m ³)	Approx.. 4,000 m ²	Not yet identified	Sites are not yet identified. They shall be identified during Phase 2 D/D stage. It will be selected in a property of Forest department or local government property for obtaining clearance smoothly.
16	Mahakanadarawa System service area	Water Tower (250m ³)	Approx.. 2,000 m ²	Not yet identified	Same to above.
17-19	Wahalkada System service area	Water Tower (250m ³) x 3	Approx.. 2,000 m ² each	Not yet identified	Same to above.

*: Abbreviations

WR; Ground Reservoir, WT; Water Tower (Elevated Tank), PH; Pump House, CH; Chlorination House, GR; Generator Room, OF; Office, SQ; Staff Quarters,

Source: NWSDB- RSC-NC

Kahatagasdigiya (7,000m²) Tower and reservoir

NWSDB owns and have water tower and small treatment system.









Halmillewa (4,000m²) Tower







Next to the private residence



Rathmalgahawewa (2,000m ²) Tower	
Road side	
	
Horowpothana (8,000m ²) Tower and reservoir	
NWSDB owns, one old water tower exists	
	
	

West Horowpothana (4,000m ²) Tower	
Sides of private residence	
	
North Horowpothana (4,000m ²) Tower	
Road side, unauthorized dumping	
	
Kebithigollewa (9,000 m ²) Tower and reservoir	
NWSDB owns, Building and water tower for CBO exist	
	

KAH-KEB (2,000m ²) Tower	
Road side	
	
Kahatagollewa (4,000m ²) Tower	
	
Bogahawewa (4,000 m ²) Tower	Weerasole (4,000m ²) Tower and quarters
	

Wahalkada WTP (40,000m ²)	
Plant site	
	
Wahalkada wewa	Irrigation canal
	
Wahalkada WTP intake	
	

8.4 Lessons learned from Phase 1 Project

The Phase 2 project is quite similar to the Phase 1 project, such as background, design policy, environmental and social conditions, etc. The Phase 2 project could learn from the lessons from Phase 1 project and minimize the problems.

8.4.1 Issues of Effluent Management

The water treatment system generates effluent from the treatment process. The amount of the effluent is reduced as much as possible by use of recycling system. The largest amount of the effluent generated through usual operation is separated water from sludge at sedimentation tanks. The sludge from sedimentation tanks is transferred to thickener tanks and the thickened sludge is introduced to drying beds. The separated water at the thickener is transferred to a backwash waste tank for recycling. The water in sludge will be evaporated on the drying bed, and underdrain from drying beds is discharged after discharge water quality will meet the requirement. The diagram of the system is described in the **Figure 8.4-1**.

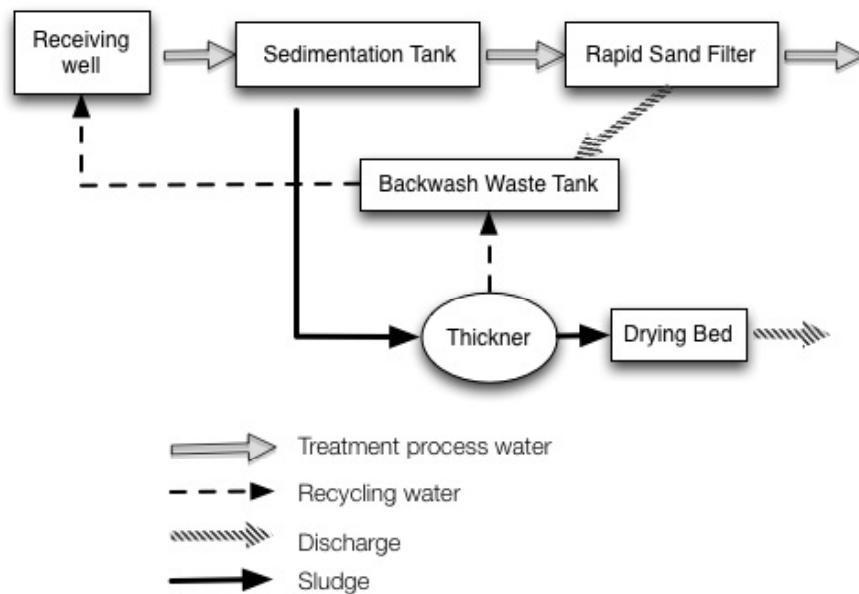


Figure 8.4-1 Diagram of Treatment Process

Source: F/S Final Report

The Irrigation Department does not allow NWSDB to discharge effluent into nearby irrigation canal even if the water quality meets the effluent standards. The Irrigation Department requested that the discharge water quality has to meet the drinking water quality standards because the residents living alongside the

canal usually use the canal water for drinking and cooking purpose.

The Phase 1 D/D team carried out the study and prepared the report titled “Proposed Mahakanadarawa WTP Effluent Discharge Method”. The report concluded that the NWSDB would discharge water to a drainage canal which connects to the larger stream; Weli Oya.

In case of the Wahalkada WTP, similarly, NWSDB will be requested to take measures for effluent management. NWSDB can treat effluent in order to satisfy the drinking water quality standard with the additional treatment processes or, discharge water to the drainage canal. Both procedures decrease the negative impact caused by the effluent.

About sludge management, NWSDB is practicing at other treatment plant such as the Thuruwila WTP in Anuradhapura. NWSDB makes a contract of sludge disposal which includes the services of collection, transport, carrying into the dumping site, with the approval letter of the landowner. The dumping yard is inspected and approved by the NWSDB who bear the cost by O&M budget. Phase 2 will follow the same procedure.

8.4.2 Issues of Water Intake Design

The project was requested to construct the water intake at the irrigation canal because the Irrigation Department did not allow any construction work at the weir of tank. The Irrigation Department will let the water flow only the amount of drinking water treatment use during non-irrigation season. Therefore, the Irrigation Department requested NWSDB to bear the cost to automate the main gate due to the difficulty of the manual gate operation of the Mahakanadarawa scheme. Similar request might come to Wahalkada. In case of the Wahalkada, there is unlined extent at upper stream of the proposed intake point. It is expected that the Irrigation Department will request NWSDB to campshed the upper distance of the intake point.

The man-made canal and channel have the reserved land at the both sides. NWSDB can construct the conveyance conduit across the reservation of canal. There is no issue about the land clearance with the Irrigation Department on the water intake.

8.4.3 Protest Movement

During the F/S period, there were multiple protest movement at the surroundings of the Wahalkada WTP planned site. The F/S was conducted after severe draughts, and the sentiments of farmers were so negative. Besides, the false rumour spread. It resulted in the growth of opposition thought against the sharing water of irrigation to drinking water use. The fact that they are not the direct beneficiaries is

considered one of the reasons of negative impression. NWSDB held the meetings to explain to resident consecutively in order to develop understanding about the Project and importance of safe water supply. The project director visited the temple in Wahalkada several times, and explained the details of the Project to residents and a monk of the temple who was the leader of the protest activities, and made them aware about benefit of the Project. The meeting record is not remained, but after that, every conflict seemed settled down. The Phase 1 project has not faced such protest activities. On the other hand, the new development plan of irrigation system is ongoing in the vicinity of the Wahalkada, which is named Yan Oya Project. The potential irrigation area will be expanded and some extent of the area presently covered by the Wahalkada is also covered by the new project. **Figure 8.4-2** shows the plan of Yan Oya Project.

The specifications of the dam of Yan Oya are as follows.

Reservoir capacity	169 million m ³
Length of main dam	2.34 km
Length of saddle dam	3.56 km
Length of left bank canal	22 km
Irrigable area under left bank canal	4,190 ha
Number of benefit families	14,000
Length of right bank canal	14 km
Irrigable area under right bank canal	1,812 ha

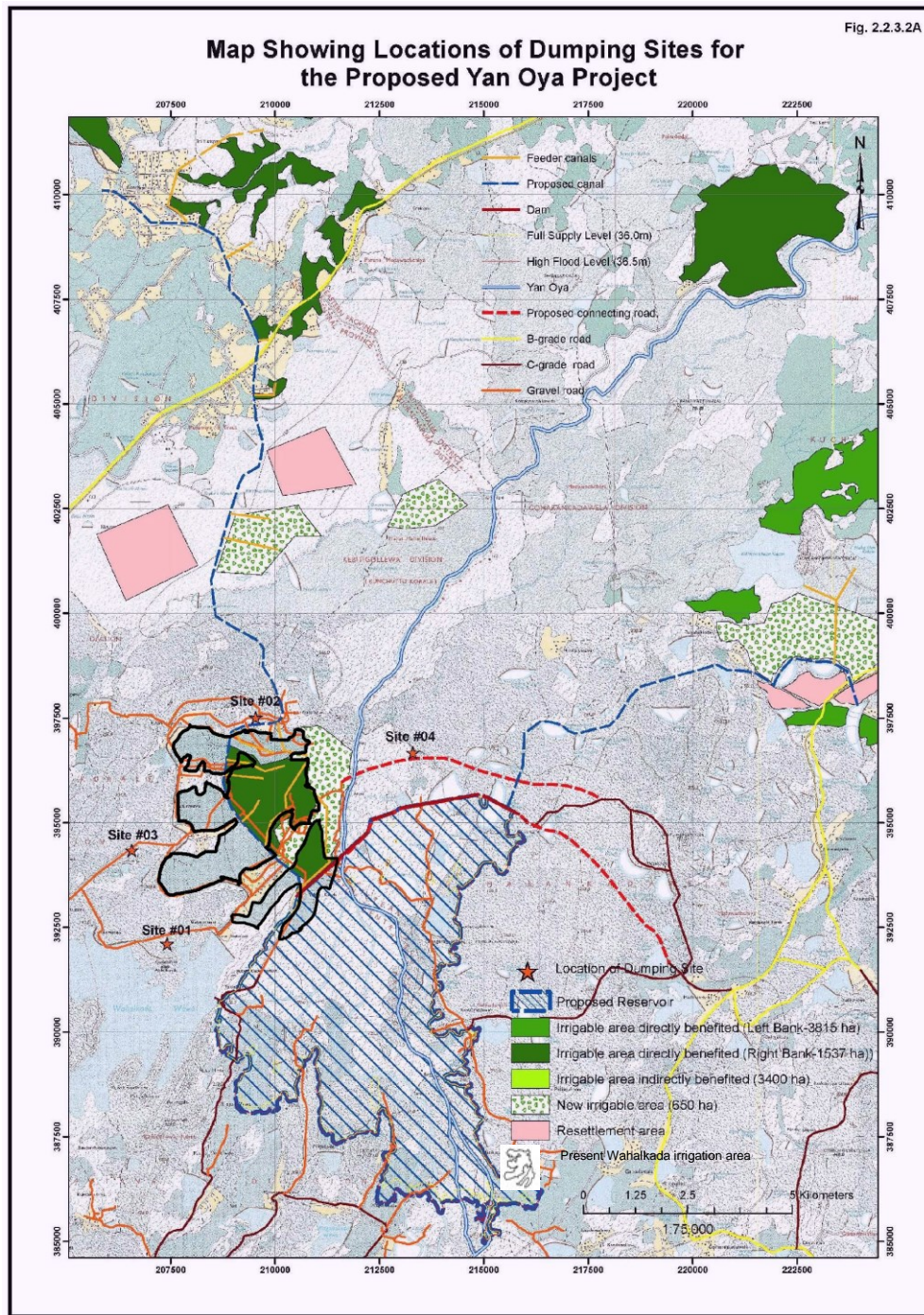


Figure 8.4-2 Present Irrigation Area of Wahalkada and Planned Irrigation Area of Yan Oya Project

Revision of the Figure in 'Yan Oya Project Environmental Impact Assessment Final Report'

8.4.4 Pipe laying at Road Reservation

There was some confusion about the pipe laying at roadside in Phase 1. The roads are categorized into five groups in Sri Lanka like as follows.

- Road A and B: Under responsibility of Road Development Authority (RDA)
- Road C and D: Under Provincial Road Development Authority (PRDA)
- Road E: Under local government

According to the information obtained interview of Chief Engineer of the RDA-NCR, the road development or improvement in the Phase 2 Project area has finished already. PRDA has a plan to develop or rehabilitate roads in the area, but there is no specific plan until now. The road reservation and building limit are discussed at National Thoroughfares Act (**Appendix 8.4-1** and **8.4-2**). The Act states that the construction work can be conducted within the reservation with the permission of Executive Engineer of the authority. Therefore, the pipelines of the Project can be laid within the road reservation. If there is any damage on the road and/or shoulder by the construction work, the contractor will have an obligation of restoration. The land acquisition beside the road is not required.

8.5 Environmental Management

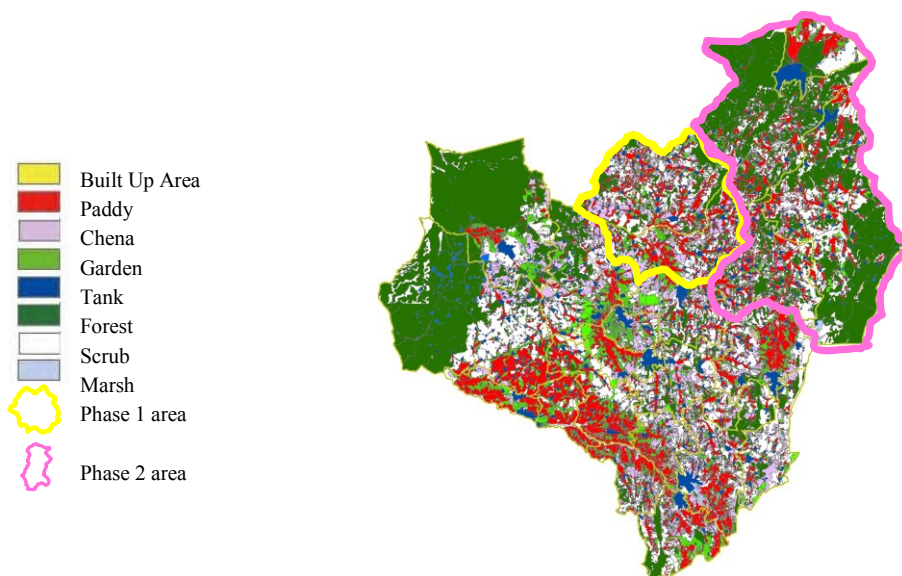
The environment of the project area has not changed significantly for these three years. Therefore, the reported contents of environmental and social consideration in the F/S report are still effective. The environmental management and mitigation measures are part of the report and the concept is succeeded by the Environmental Management Plan (EMP).

The EMP is included in the requirement of a contract package. The JICA Study team obtained the copy of the EMP of Phase 1 (**Appendix 8.5-1**). The EMP is also included in bidding document and contractor has an obligation to take care of this issue.

The EMP of Phase 1 consists of 9 chapters and it directs the environmental protection measures. It explains the project background and environmental and social requirement of Sri Lanka from Chapters 1 to 5, organizational arrangement of implementing EMP in Chapter 6, environmental monitoring in Chapter 7, public consultation activities in Chapter 8, and environmental monitoring plan in Chapter 9. The document requests the contractor to appoint an Environmental and Safety Officer (ESC) and establish an Environmental Team for the implementation of the EMP. After completion of construction, the responsibility of the monitoring will stay with NWSDB and relevant stakeholders.

The location of the planned project sites are not in any protected area. But the main part of the project site

is forest and rich of nature. **Figure 8.5-1** is a land use map of Anuradhapura. The area surrounded by yellow colour line indicates Phase 1 project area and the area surrounded by the pinkish colour line indicates Phase 2. Phase 2 project area is located in forest-rich area compared with Phase 1, so that the protection of flora and fauna is important. The main possible adverse effects to be considered at any project for fauna and flora are loss or separation of living place, disturbance of living, and danger of life. Pipeline of water supply is usually laid underground, so that the laid pipe is not effective environmentally and socially. On the other hand the pipe laying construction work could affect negatively to the fauna and flora. In same sense, the negative effect is considerable at the construction mainly, but not significant at the operation stage for the water supply project. The JICA Study team observed a traffic sign notifying elephant crossing. The most effective preventive action to traffic accident is training and education of site workers and drivers. The awareness raising program is very effective and the EMP put the importance on the educational program. Many of mitigation measures are listed in the document and the responsibility in implementation is assigned for every activities. The strong monitoring and appropriate advising by supervising stakeholders should be conducted as the document requests.



Source: NWSDB-NCR

Figure 8.5-1 Land Use Map of Anuradhapura

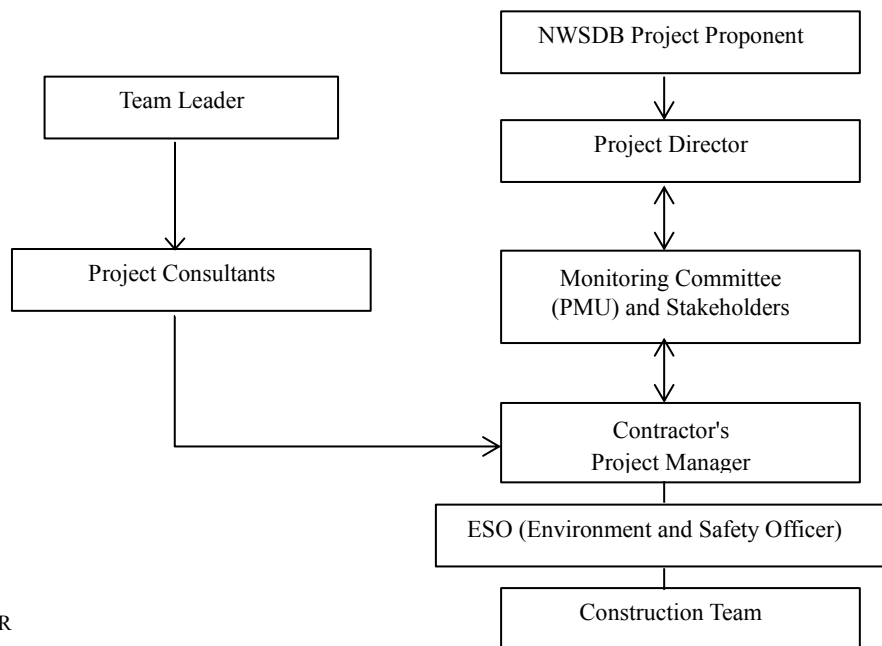
The revised EMP draft is attached as **Appendix 8.5-2**.

8.6 Environmental Monitoring and Implementation Framework

The monitoring item for the project activity, expected impact, mitigation measures, responsibility, frequency, etc. are clearly mentioned in the EMP of Phase 1. The EMP is prepared to meet the requirements in final report of the F/S, and it seems acceptable for the environmental and social impact

mitigation.

The Contractor is to submit his/her proposal for the Environmental Management Implementation Plan (EMIP) at the beginning of the contract and obtain the Engineer's approval and is to employ a competent Officer (Health & Safety / Accident Prevention) to monitor the EMP requirements. The contractor will submit a monthly environment and safety status report on the basis of EMIP, and is requested to conduct internal auditing in every six months. **Figure 8.6-1** shows the proposed organizational arrangement for the implementation of the EMP in the report.



Source: NWSDB-NCR

Figure 8.6-1 Proposed Organizational Arrangement

The PMU is a kind of monitoring committee under the Project Director and responsible for the implementing environmental monitoring.

The concerns of stakeholders such as EPA, Forest department, Wildlife department, etc. should be secured. There is not mentioned the frequency of the stakeholder meeting. The revised Environmental Monitoring Plan is attached as **Appendix 8.6-1** and revised Monitoring Form is attached as **Appendix 8.6-2**.

The current Phase 1 Project management framework is shown in **Figure 8.6-2** and **Figure 8.6-3**.

Figure 8.6-2 shows the organization structure of the PMU. **Figure 8.6-3** shows the structure of the Project Manager’s Office.

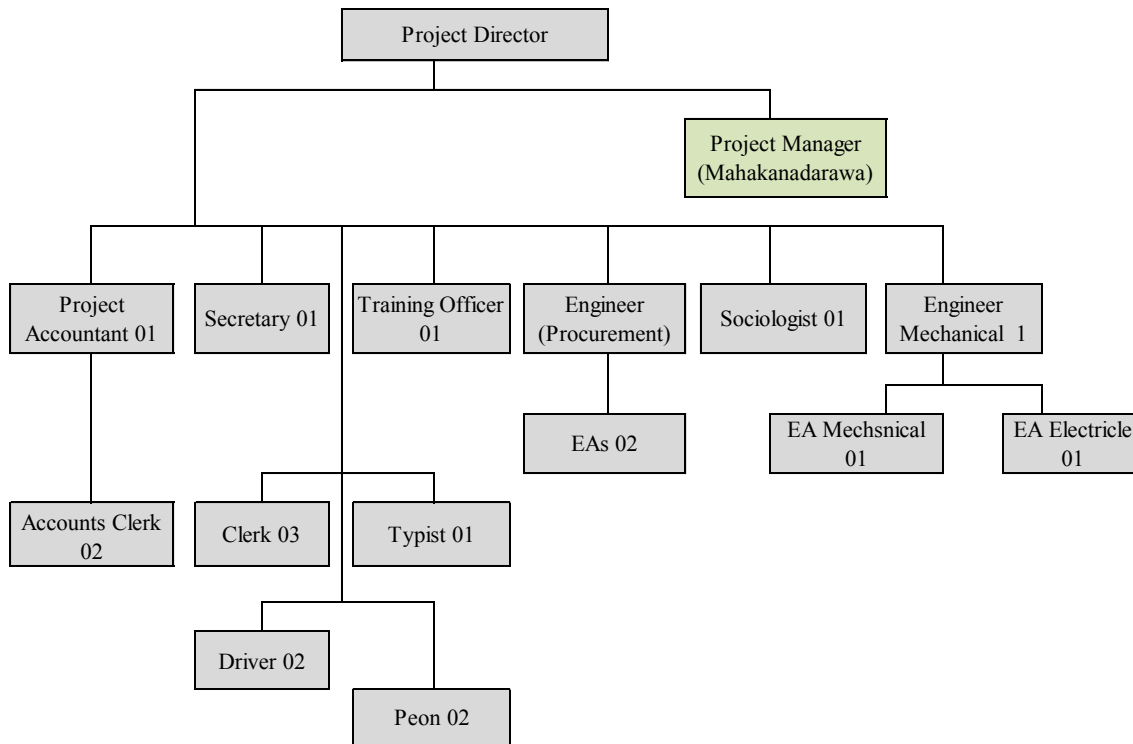


Figure 8.6-2 Project Management Unit (PMU)

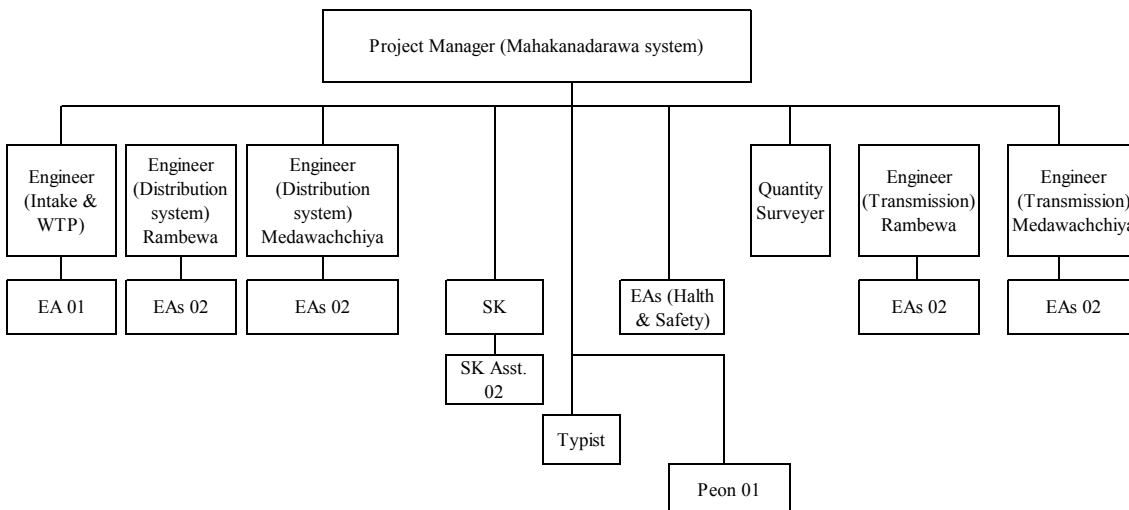


Figure 8.6-3 Organization Chart of Project Manger’s Office

The person who is responsible for the environmental and social issues has not been decided as of the end of November 2015. The PMU has a plan to assign one engineer to meet the requirement of the EMP. The monitoring during construction stage shall be secured so that EMP and the EMIP are effectively working. The monitoring during the operation stage will be conducted by NWSDB in compliance with the stakeholders.

8.7 Environmental Check List

Table 8.7-1 describes the necessary considerations with the difference of the project scope between the F/S and the S/S.

Table 8.7-1 Necessary Considerations with Review of Phase 2

Item		Stage of study		Description	Impact
		F/S	S/S		
Water treatment capacity		13,700m ³ /day	15,000m ³ /day	The increase of capacity and addition of facilities don't need the increase of land always. Phase 1 solves the same issues by the arrangement of facilities. Phase 2 will be able to solve it same way and impact will not be significant.	Same
Treatment procedure		Coagulating sedimentation	Dissolved Air Flootation and Granular Activated Carbon Filtration		
Elevated tanks and reservoirs for isolated area		0	5 (2 in Phase 1) (3 in Phase 2)	The new project land will be acquired. The locations are in remote area and the resettlement is avoidable by selecting unused lands. Impact to the natural environment should be carefully considered.	Increase negative but minor
Length of pipe works	Transmission	117.3 km	126.1 km	Laying pipe at road doesn't require land. The longer construction distance will create the negative impact during construction stage.	Increase negative but minor
	Distribution -sub	633.0 km	720.7 km		
Supply procedure to isolated area		Bowser supply	Piped supply	Users can access water dramatically easier. They are free from inconvenience of water fetching.	Positive impact

The treatment procedure was changed in the Phase 1 D/D, and the D/D team managed the increase of facilities by adjusting arrangement of facilities within a proposed land. Phase 2 also solves the problem by taking same way, and extension of land will not be required.

The supply method for remote areas was changed from bowser supply to piped supply. It requires the increase of elevated tanks. Tentatively, the JICA Study team estimated 2 towers for Phase 1 and 3 towers for Phase 2. The extent of the land will be about 2,000m² for each tower and the location will be finalized in D/D for Phase 2. Because the location of target area is in a remote area, NWSDB will be able to find suitable project sites easily without problem of land acquisition.

NWSDB and the Irrigation Department reached an agreement about water extraction volume and signed in August 2012 on Minutes of Understanding (**Appendix 8.7-1**). In this document, the agreed extraction volume for the Wahalkada WTP was mentioned as 10,500 m³/day in 2016 and 28,800m³/day in 2034. The long-term requirement volume (2034) is not changed but short-term requirement was changed. NWSDB has to confirm the increased amount of water use with the Irrigation Department.

The review of JICA checklist with the S/S is shown in **Table 8.7-2**. And the revised checklist for Phase 2 is attached as **Appendix 8.7-2**.

Table 8.7-2 Environmental Checklist

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures) in F/S	Yes: Y No: N	Results of Review in S/S
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) ongoing	(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) Required clearances are as follows; • Clearance of Archaeological dept. (5 new sites are remaining) • Clearance of Irrigation dept. (obtained) • Clearance of Forest dept. (letter for release of forest reserve is preferable) • Clearance of CEA (obtained)	(a) N/A (b) N/A (c) N/A (d) Y	(a) (b) (c) No Change (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) ongoing (b) ongoing	(a) Protest against extracting water is revealed. The water board carried out the explanation session on 7th August. After election (8th September), Water Board will hold the stakeholder meeting. (b) The water intake procedure is changed due to the comment of the Irrigation Dept.	(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.	(a) Y	(a) No Change

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures) in F/S	Yes: Y No: N	Results of Review in S/S																																																																												
2 Pollution Control	(1) Air Quality	(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?	(a) N (b) N	(a) Neutralization facility for spill protection is established. The gas leak detectors are placed and it can automatically run the neutralization instrument with the detection. (b) Sri Lankan Occupational Health Standards for chlorine does not exist. The facility will be designed to satisfy the American standards. Operation of exhaust fan achieves the standard requirement.	(a) N (b) N	(a) (b) No Change																																																																												
		<p style="text-align: center;">Occupational Safety and Health Guideline for Chlorine</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>ppm</th> <th>mg/m3</th> <th></th> </tr> </thead> <tbody> <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> </tbody> </table> <p style="text-align: center;">Ambient Air Quality</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2">Pollutant</th> <th rowspan="2">Averaging Time*</th> <th colspan="2">Maximum</th> <th rowspan="2">Method of measurement</th> </tr> <tr> <th>µgm-3</th> <th>ppm</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1 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 Gravimetric or Beta Attenuation</td> </tr> <tr> <td>24 hrs.</td> <td>100</td> <td>—</td> </tr> <tr> <td rowspan="2">2 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 Gravimetric or Beta Attenuation</td> </tr> <tr> <td>24 hrs.</td> <td>50</td> <td>—</td> </tr> <tr> <td rowspan="3">3 Nitrogen Dioxide (NO₂)</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>8 hrs.</td> <td>150</td> <td>0.08</td> </tr> <tr> <td>1hr.</td> <td>250</td> <td>0.13</td> </tr> <tr> <td rowspan="3">4 Sulphur Dioxide (SO₂)</td> <td>24 hrs.</td> <td>80</td> <td>0.03</td> <td rowspan="3">Pararosanilene Method or equivalent Pulse Fluorescent</td> </tr> <tr> <td>8 hrs.</td> <td>120</td> <td>0.05</td> </tr> <tr> <td>1hrs.</td> <td>200</td> <td>0.08</td> </tr> <tr> <td>5 Ozone (O₃)</td> <td>1 hr.</td> <td>200</td> <td>0.1</td> <td>Chemiluminescence Method or equivalent Ultraviolet</td> </tr> <tr> <td rowspan="3">6 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>1 hr.</td> <td>30,000</td> <td>26</td> </tr> <tr> <td>Any time</td> <td>58,000</td> <td>50</td> </tr> </tbody> </table>							ppm	mg/m3		Permissible exposure limit	1	3	US dept of Labor	Advisable limit	0.5	1.5	NIOSH	Evaluation standard	0.5	1.5	Japan	Pollutant	Averaging Time*	Maximum		Method of measurement	µgm-3	ppm	1 Particulate Matter - Aerodynamic diameter is less than 10 µm in	Annual	50	—	Hi-volume sampling and Gravimetric or Beta Attenuation	24 hrs.	100	—	2 Particulate Matter - Aerodynamic diameter is less than 2.5 µm in	Annual	25	—	Hi-volume sampling and Gravimetric or Beta Attenuation	24 hrs.	50	—	3 Nitrogen Dioxide (NO ₂)	24 hrs.	100	0.05	Colorimetric using saltzman Method or equivalent Gas phase	8 hrs.	150	0.08	1hr.	250	0.13	4 Sulphur Dioxide (SO ₂)	24 hrs.	80	0.03	Pararosanilene Method or equivalent Pulse Fluorescent	8 hrs.	120	0.05	1hrs.	200	0.08	5 Ozone (O ₃)	1 hr.	200	0.1	Chemiluminescence Method or equivalent Ultraviolet	6 Carbon Monoxide (CO)	8 hrs.	10,000	9	Non-Dispersive Infrared Spectroscopy"	1 hr.	30,000	26	Any time
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	(2) Water Quality	(a) Do pollutants, such as SS, BOD, COD contained in effluents discharged by the facility operations comply with the country's effluent standards?	(a) Y	(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 discharge will satisfy the Sri Lankan standards.	(a) Y	(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 discharge will satisfy the Sri Lankan standards. Irrigation Department might request to meet the drinking water standards. The use of drainage canal will be required.																																																																																																																																															
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	(3) Wastes	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed in accordance with the country's regulations?	(a) Studying	(a) The sludge treatment system is designed.	(a) Y	(a) No Change																																																																																																																																															
	(4) Noise and Vibration	(a) Do noise and vibrations generated from the facilities, such as pumping stations comply with the country's standards?	(a) Y	(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 are shown below.	(a) Y	(a) No Change																																																																																																																																															

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	(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.	(a) N	(a) No Change																																	
	(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.	(a) N	(a) No Change																																	
3 Natural Environment	(2) Ecosystem	<p>(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?</p> <p>(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?</p> <p>(c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem?</p> <p>(d) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by project will adversely affect aquatic</p>	<p>(a) N</p> <p>(b) studying</p> <p>(c) studying</p> <p>(d) N</p>	<p>(a) Some part of project area is located in the forest but it is not special forest.</p> <p>(b) Ecological survey is ongoing. The result of literature survey does not indicate the existence of endangered species.</p> <p>(c) The significant ecological impact is not expected currently. The study is ongoing.</p> <p>(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.</p>	<p>(a) N</p> <p>(b) N</p> <p>(c) N</p> <p>(d) N</p>	<p>(a) Some part of project area is located in the forest but it is not special forest.</p> <p>(b) There are no endangered species.</p> <p>(c) The significant ecological impact is not expected.</p> <p>(d) The project takes water from irrigation canal so the adverse effect to the aquatic environment is limited. Furthermore, the purpose of the</p>																																	

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		environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?				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 for the purpose of irrigation. The project will share a part of current water use, so the effect is negligible.	(a) N	(a) No Change
3 Natural 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, and 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) Y (b) Studying (c) Studying (d) Studying (e) Y (f) Studying (g) Studying (h) Studying (i) Y (j) Y	(a) Three houses are located in the proposed site. RAP will be prepared in accordance with the guidelines. (b) Studying (c) Studying (d) Studying (e) Sri Lanka has 'National Involuntary Resettlement Policy' approved by Cabinet in 2001. And there is no big gap from JICA Guideline. (f) Studying (g) Studying (h) Studying (i) Monitoring plan will be included in the RAP. (j) Grievance mechanism will be included in the RAP.	(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 finally, 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.

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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) Y (b) N	(a) Currently, the farmers in the area feel that the water supply capacity is not sufficient, but the other parallel going project for integration of irrigation system will increase the water supply in the area and the total water demand will be secured. (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.	(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.
4 Social Environment	(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.	(a) N	(a) No Change
	(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.	(a) N	(a) No Change
	(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.	(a) N/A (b) N/A	(a), (b) No Change
	(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,	(a) N (b) Y (c) Y (d) Y	(a) NWSDB follows the Labour 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.	(a) N (b) Y (c) Y (d) Y	(a), (b), (c), (d). No Change

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		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?				
	(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.	(a) Y (b) Y (c) Y (d) Y	(a), (b), (c), (d). No Change
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	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.	(a) Y (b) (c) (d) ongoing (d) Y	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.

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5 Others	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 uses the existing facilities for irrigation. There is no item to conflict with the Dam and River Projects checklist.	(a) N/A	(a) No Change
6 Note	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.	(a) N/A	(a) No Change

8.8 Recommendation

There are some ongoing development projects for irrigation, and the negative feeling of the farmers seems settled down. However, NWSDB has to continue the discussions with stakeholders. Sharing information of the project activities and progress, explanation of positive and negative aspects honestly are important for succeeding the project. The meeting records of these discussions should be kept.

The environmental adverse effect is generally limited in a water supply project. The impact is mainly created at the construction period. Therefore the EMP and the EMIP are important, and the establishment of monitoring body and its active contribution are highly appreciated. The project site is outside of the natural reserves or other protected area, however, the all concerning parties should be aware of protection of environment.

Currently, there are no squatters and illegal cultivation at the planned project sites. Many of sites are covered by the trees and bushes and difficult to start living. However, NWSDB is better to establish a signboard, fence or some kind of notice at the land to reduce the possibility of the encroachment. The clear statement of the cut-off date is recommended. After cut-off date, the compensation is not required on the basis of the JICA guideline requirement and safe guard policy OP 4.12 of World Bank.

If the additional land is required for the reviewed project activities, the land acquisition will not be problem without the case of protected area and reserved forest. In such case, the prompt decision of the land selection is required.

APPENDICES

CHAPTER 7

OPERATION AND EFFECT INDICATORS

Appendix 7.2-1 Water Quality of CBO Water Supply Systems

S/N	Name of CBO	Water Source	Water Quality								
			T. Hardness (CaCO ₃ , mg/L)	Iron (Fe, mg/L)	Manganese (Mg, mg/L)	Fluoride (F-, mg/L)	Odour	Color (Hazen Unit)	Turbidity (NTU)	pH	E. Conductivity (µS/cm)
Mahakanadarawa Water Supply System Area											
01	Sw ashakthi CBO	S	-	-	-	0.85	None	Clear	0.05	7.86	860
02	Ikra CBO	D-1, S-1	-	-	-	0.83	None	Clear	0.06	7.72	950
03	Arunalu CBO	S	-	-	-	0.59	Fishy	Clear	0.1	7.93	940
04	Samagi CBO	D	-	-	-	1.01	None	Clear	0	7.76	930
05	Ekamuthu CBO	S	-	-	-	0.32	None	Clear	0.08	7.74	700
	Ekamuthu CBO - Katukaliyaw a		-	-	-	1.19	-	Clear	0.03	7.77	880
06	Rangiri CBO	D	-	-	-	0.88	None	Clear	0.03	7.79	1080
07	Nildiadahara CBO	S	360/280	-	-	0.72	-	Clear	0.15	7.77	740
08	Eksath CBO	S	340	-	-	0.4/0.78	None	Clear	-	-	-
09	Mahasen CBO	S	80	-	-	0.39	-	clear	0.08	7.6	730
10	Dimuthu CBO	S	312	-	-	0.57	-	Clear	0.12	7.91	610
11	Pragathi CBO	S	344	-	-	1.38	-	Clear	0.05	7.7	1450
12	Jayashakthi CBO	D	-	-	-	1.9	None	Clear	0.06	7.76	1570
13	Samagi CBO	D	332/270/330	-	-	1.08	None	Clear	0.07	7.8	1000
14	Samagi CBO	S	-	-	-	0.5	-	<5	0.02	-	590
15	Ekamuthu CBO	D	-	-	-	0.81	-	<5	0.03	-	650
16	Ran Arulnalu CBO	D	490/720/640	0.03/-/-	-	1.55/1.1/0.36	-	-	-	-	-
17	Isuru CBO	D	High	-	-	0.98	None	Clear	0.05	7.84	1060
18	Randiya Dhahara CBO	S	-	-	-	1.15	None	Clear	0.09	7.76	840
19	Nelum CBO	S	-	-	-	1.11	None	Clear	0.05	7.86	970
20	Diriyamatha CBO	S	250/261/284	-	-	0.83	-	Clear	0.1	7.75	700
	Diriyamatha CBO - Mahakubugollaw a	S	-	-	-	0.69	-	Clear	0.12	7.79	870
21	Gemunu CBO	S	-	-	-	0.75	-	<5	0.21	-	950
22	Sisila Diyadahara CBO	S	-	-	-	0.76	None	Clear	0.06	7.86	880
23	Diriya Shakthi	S	373/342	-	-	0.86	None	Clear	0.1	7.64	1220
24	Ridi Nadee	S	-	-	-	0.21	None	Clear	0.06	7.75	610
Wahalkada Water Supply System Area											
25	Shakthi CBO	D	324	3.3	-	0.1	-	N/A	-	-	-
26	Al-Naja	D	-	-	-	-	-	-	-	-	-
27	CBO not formed & Scheme Not implemented										
28	Parakum CBO	D	108	0.14	-	1.04	-	Clear	0	7.76	740
29	Suw asehana CBO	D	1.13	-	-	1.13	-	Clear	0.07	7.76	740
30	Suw asetha CBO	S	-	-	-	0.96	-	Clear	0.04	7.63	740
31	Vajira CBO	D	262/204	-	-	1.5/1.54	-	-	-	-	-
32	Pragathi CBO	D	-	-	-	0.58	None	Clear	0.08	7.54	1430
33	Janasetha CBO	S	-	-	-	1.37	-	Clear	0.01	7.85	670
34	Sobasisila CBO	S	-	-	-	0.67	-	Clear	0.02	7.64	810
35	Randiya	S-2	-	-	-	0.31	-	Clear	0.14	7.76	760
36	Nilmini	D	-	-	-	-	-	-	-	-	-
37	Senath CBO	D	-	-	-	1.9	None	Clear	0.02	7.75	1240
38	Eksath CBO	S	296	-	-	1.62	None	Clear	0.02	7.78	860
39	Praja Shakthi	D	-	-	-	0.42	None	Clear	0.01	7.85	520
40	Apsara	S	-	-	-	1.35	-	Clear	0.14	7.69	1380
41	Pinbindu CBO	R	Rainwater supply implimented in 60 Households. No Piped Water Supply								
42	Sham Sham	-	-	-	-	-	-	-	-	-	-
43	Ekamuthu CBO	S	264	-	-	0.14	-	Clear	0.05	7.6	640
44	Pradeepa	D	448	-	-	0.82	-	Clear	0.01	7.8	1150
45	Upul CBO	D	290	-	-	0.92	-	Clear	0	7.83	1000
46	Jalasavi	D	-	-	-	1.58	-	Clear	0.02	7.74	1330
47	Tristar CBO	D	300	-	-	0.001	-	2.5>	4.1	8.3	-
48	Alhidra CBO	D	300	-	-	0.04	N/A	2.5	1.3	6.9	-
49	Adhikw a CBO	D	280	-	-	0.7	N/A	-	-	-	-
50	Hansajala CBO	S	442	-	-	1.8	N/A	<5	1	7.6	-
Sri Lanka Standard SLS 614:2013			250	0.3	0.1	1	#	15	2	6.5-8.5	-
Sri Lanka Standard SLS 614:1983							#: Unobjectionable				750/3500

S: Shallow Well, D: Deep Well, R: Rain water tank, Figures after “-” means number of water source. Shaded figure exceeds standard value.

Appendix 7.2-2 List of CBO Water Supply Systems

S/N	Name of CBO	Location			Population of GND			Population served
		DS	GND	Village	No of Village Covered	No of Village Excluded	Population in Service GND	
Mahakanadarawa Water Supply System Area								
01	Swashakthi CBO	Rambewa	Kendewa (97), Galkandagama (85)	Kendewa	3	-	3000	755
02	Ikra CBO	Rambewa	Ikkirigollawa (102)	Ikkirigollawa	3	-	-	3015
03	Arunalu CBO	Rambewa	Sangilikandarawa (111)	Sangilikandarawa	5	-	-	915
04	Samagi CBO	Rambewa	Thalgahawewa (84)	Thalgahawewa	2	0	-	660
05	Ekamuthu CBO	Rambewa	Wahamalgollawa (109)	Wamalgollawe	1	-	-	1220
06	Rangiri CBO	Rambewa	Wewalkatiya (82)	Wewalkatiya	2	-	-	590
07	Nildiyadahara CBO	Rambewa	Maha Kandarawa yaya -01 (94)	Maha Kandarawa Yaya	1	-	1080	715
08	Eksath CBO	Rambewa	Katukeliya (106)	Katukeliya	3	-	1080	575
09	Mahasen CBO	Rambewa	Mahakandarayaya - 02 (93)	Weliwewa	3	-	-	755
10	Dimuthu CBO	Rambewa	Ihala Kolangaswewa (87)	Ihala Kolangaswewa	3	-	1050	325
11	Pragithi CBO	Rambewa	Bala Honda Wewa(86), Ihala olangaswewa (87)	Bala Hondawewa	4	-	885	635
12	Jayashakthi CBO	Medawachchiya	Katuwela (66)	Katuwela	3	1	-	1090
13	Samagi CBO	Medawachchiya	Halambagaswewa (70)	Halambagaswewa, Palukandawewa	2	-	-	935
14	Samagi CBO	Medawachchiya	Ataweeragollewa (56)	Pahala Thammannagama, Kubukkollawa,	3	-	1580	540
15	Ekamuthu CBO	Medawachchiya	Hirulugama (54)	Hirulugama	1	-	-	855
16	Ran Arulnal CBO	Medawachchiya	Wiralmurippu (64)	Wiralmurippu, Kulikkada	2	-	1375	945
17	Isuru CBO	Medawachchiya	Kadawathgama (60)	Kadawathgama	3	-	2640	895
18	Randiya Dhahara CBO	Medawachchiya	Unagaswewa (75)	Unagaswewa	3	-	-	520
19	Nelum CBO	Medawachchiya	Kirigalwewa (72)	Kirigalwewa	4	-	-	680
20	Diriyamatha CBO	Medawachchiya	Maha Kumbugollawa (46)	Maha Kumbugollawa, Kuda Halmillawa	3	-	-	890
21	Gemunu CBO	Medawachchiya	Maha Divulwewa (57)	Maha Divulwewa	1	2	-	345
22	Sisila Diyadahara CBO	Medawachchiya	Kidawarankulama (42)	Kidawarankulama	2	-	-	935
23	Diriya Shakthi	Medawachchiya	Periyakulama (49), Yakkawewa (50)	Periyakulama	3	1	-	675
24	Ridi Nadi	Medawachchiya	Athakade (55)	Athakade	2	1	-	600
25	Shakthi CBO	Medawachchiya	Ayyatigewewa (24)	Ayyatigewewa	1	-	2015	1165
Wahalkada Water Supply System Area								
26	Al-Naja	Kebitigollewa	Muslim Attaweerawewa (32)	Attaweerawewa (Paranagama, Aluthgama, Kurulugama)	2	-	2050	Connection not given yet
27	CBO not formed & Scheme Not implemented	Kebitigollewa	Gonumariyaya (25)	Gonumariyaya	-	-	-	-
28	Parakum CBO	Padaviya	Parakramapura(06), Buddhangala(05), Elikumbulagala (07)	Parakirampura Town	11	5	-	2820
29	Suwasehana CBO	Padaviya	18 Kanuwa (02)	18 Kanuwa, Deewara Gammanan, Isipathana gama	3	-	1750	945
30	Suwasetha CBO	Padaviya	Bogahawewa (14)	Bogahawewa	6	-	1750	910
31	Vajira CBO	Kahadagasdigiliya	Maha Kumbukwewa (222)	Maha Kumbukwewa	2	-	-	665
32	Pragathi CBO	Kahadagasdigiliya	Moragahawela (202)	Moragahawela	3	1	-	640
33	Janasetha CBO	Kahadagasdigiliya	Ratmalgahawewa(225), Paalishpothana(224), Kirigallawa (226)	Palispothana	5	5	1500	920
34	Sobasisila CBO	Kahadagasdigiliya	Pandarella(210), Panwella (211)	Kokabe, Panderellawewa, Panwella, Thimbiriwewa	4	3	-	875
35	Randiya	Kahadagasdigiliya	Ranpathwila (196)	Rotapukuna	2	-	-	1130

Appendix 7.2-2 List of CBO Water Supply Systems (cont'd)

S/N	Name of CBO	Location			Population of GND			Population served
		DS	GND	Village	No of Village Covered	No of Village Excluded	Population in Service GND	
36	Nilmini	Kahadagasdigiliya	Kokmaduwa(201)	Kokmaduwa	1	3		795
37	Senath CBO	Kahadagasdigiliya	Gonamaruwewa (223)	Gonamaruwewa, Nelugolla Kade	2	1		385
38	Eksath CBO	Kahadagasdigiliya	Turukkuragama (234), Maha Kiri Ibbawa (233)	Aluthwattha, Galwala, Hijra Mawatha	4	3		470
39	Praja Shakthi CBO	Kahadagasdigiliya	Mahawewa (221)	Wirandagollawa, Mahawewa	5	1		810
40	Apsara	Kahadagasdigiliya	Meekumbukwewa (212)	Meeminnawala, Aluthwewa, Kumbukwewa	3	-		1480
41	Pinibindu CBO	Kahadagasdigiliya	Ambagahawewa (213)	Rainwater supply implemented in 60 Households. No Piped Water Supply				
42	Sham Sham	Kahadagasdigiliya	Weligollawa (218), Kuncha Halmillawa (219)	Weligollawa, Kunchahalmillawa, Ihalamillawa	3	-		210
43	Ekamuthu CBO	Kahadagasdigiliya	Kumbukgollawa (209)	Kumbukgollawa	1	2		380
44	Pradeepa	Horowpothana	Wadigewewa (126)	Wadigewewa	5	1		805
45	Upul CBO	Horowpothana	Parangiadiya (149)	Parangiadiya	2	-		905
46	Jalasavi	Horowpothana	Kapugollewa (140)	Kapugollewa	2	1		785
47	Tristar CBO	Horowpothana	Agunuchchiya (119)	Parangiadiya	2	1		215
48	Alhidra CBO	Horowpothana	Anolondawewa (138)	Alondawewa	2	1		730
49	Adhikwa CBO	Horowpothana	Weerasole (139)	Weerasole	1	1		-
50	Hansajala CBO	Horowpothana	Maradankadawala (133)	Maradankadawala	3	2		565

CHAPTER 8

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

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

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

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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 upto date 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.

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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 *Escherichia 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

Part 10 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.

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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.	Characteristic	Requirement	Method of test
(1)	(2)	(3)	(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 °C ± 2 °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

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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 ₆ H ₅ OH)	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.

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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.

SLS 614 : 2013

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 :

$$\text{NH}_3 = \text{N} \times 1.216$$

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.

SLS 614 : 2013

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.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI which includes surveillance inspection of the factory, testing of both factory and market samples.

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.



Printed at SLSI (Printing Unit)

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Technology & Research.

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.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and Administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in return are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

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.

Wahalkada Raw - Water Quality Report

No	Region	Sample location	Date	Color (HAZEN UNIT)	Turbidity (NTU/FTU)	pH	Electrical conductivity at 25 (µs/cm)	Chloride (as Cl) - mg/L	Total Alkalinity (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 (HAZEN UNIT)	Turbidity (NTU/FTU)	pH	Electrical conductivity at 25 (µs/cm)	Chloride (as Cl ⁻) - mg/L	Total Alkalinity (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	Fluoride (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

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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 Environmental Act, No. 47 of 1980 read with Section 23J and 23K of the aforesaid Act.

SUSIL PREMAJAYANTHA,
Minister of Environment and Renewable Energy.

Colombo,
17th October 2014.

Regulations

The National Environmental (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 Environmental 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 1980.” ;



2A I කොටස : (I) ඡේදය - ශ්‍රී ලංකා ප්‍රජාතාන්ත්‍රික සමාජවාදී ජනරජයේ අති විශේෂ ගැසට් පත්‍රය - 2014.11.05
PART I : Sec. (I) - GAZETTE EXTRAORDINARY OF THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA - 05.11.2014

(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 ³) 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

මධ්‍යම පරිසර අධිකාරිය

மத்திய சுற்றாடல் அதிகாரசபை

Central Environmental Authority



ඔබේ යොමුව
உமது தொடர்பு
Your Ref.

අපේ යොමුව
எமது தொடர்பு
Our Ref.

දිනය
திகதி
Date

NCPO/AD/08/07/15/2015

පරිසර පියස , 104, ඩෙන්සිල් කොබ්බෑකඩුව මාවත, බත්තරමුල්ල, ශ්‍රී ලංකාව.

2015-09-23 "பரிசுர 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.

Handwritten signature and date:
2-10-15

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

- Handwritten notes:*
Revi (Eas)
sent letter
copy of letter
to AECU (DAIUA)
we file
- 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)

Chairman	Tel : 2872361, 2872348 Fax : 2872347	Director General	Tel : 2872359 Fax : 2872608	Gen. Office	Tel : 2872278, 2873447, 7877277-280, 2873448 Hot Line : 2888999	Complain Unit :	071 3603333
Deputy Director Generals	HRD. Admin & Finance Division Tel : 2865296 Fax : 2877515	Envt. Pollution Control Division	Tel : 2873453 Fax : 2872605	Envt. Mgt & Assess. Division	Tel : 2872388 Fax : 2872296	Envt. Edu. & Awareness Division	Tel : 2872297 Fax : 2872609
Directors Tel Fax	2872607 (Admin), 7877290 (Finance) 2872301 (HRD), 7877288 (Planning) 2872601 (Admin), 2863984 (Finance)	2873452 (EPC), 2872606 (Lab) 2882335 (WM)	2872346 (NRM), 2876643 (EIA) 2867263 (R&D) Fax : 2872296	2867266 (EEA) Fax : 2872609 Media Unit : 2873449	2872604 (Legal) (Western Province) Tel: 2862831 Fax : 2865293		



- 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 20 μ m (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

Appendix 8.3-5 Compensation Report

Non-disclosure Information

*Thoroughfares (Amendment)
Act, No. 9 of 1988*

[Certified on 25th March, 1988]

L.D.—O. 24/85

AN ACT TO AMEND THE THOROUGHFARES ORDINANCE

BE it enacted by the Parliament of the Democratic Socialist Republic of Sri Lanka as follows : —

1. This Act may be cited as the Thoroughfares (Amendment) Act, No. 9 of 1988. Short title.

2. Section 4 of the Thoroughfares Ordinance (hereinafter referred to as the " principal enactment ") as amended by Law No. 37 of 1973, is hereby repealed and the following new section substituted therefor : — Replace-
ment of
section 4
&Chapter

'Appoint-
ment and
powers &c, of
officers and
servants.

4. (1) There may be appointed all such officers and servants as may be necessary for the purposes of this Ordinance.

(2) Subject to the general direction and control of the Director, the Chief Engineer of each region and the Executive Engineer of each division shall be responsible for the administration of this Ordinance in his region or division.

(3) In this Ordinance—

- (a) " region ", when used with reference to a Chief Engineer, means the area for which he is appointed ;
- (b) " division ", when used with reference to an Executive Engineer, means the area for which he is appointed.

(4) It shall be lawful for the Director to discharge any function assigned to the Chief Engineer by this Ordinance and it shall be lawful for the Chief Engineer to discharge any function assigned to the Executive Engineer by this Ordinance.

(5) It shall be lawful for the Director to authorize in writing any officer of the Department not being the Chief Engineer or the Executive Engineer to discharge any function assigned to the Chief Engineer or the Executive Engineer by this Ordinance, and it shall be lawful for such officer to discharge that function.

CA 101438—8,340 (02/88)

2

*Thoroughfares (Amendment)
Act, No. 9 of 1988*

Amendment of section 7 of the principal enactment.

3. Section 7 of the principal enactment is hereby amended by the substitution for the words, "on behalf of the Government" wherever such words occur in that section of the words, "on behalf of the Authority".

Insertion of new sections 7A, 7B, 7C and 7D in the principal enactment.

4. The following new sections are hereby inserted immediately after section 7 and shall have effect as sections 7A, 7B, 7C and 7D of the principal enactment :-

" Persons to make use of road only on the authority of agreement.

7A. No person shall for the purpose of any public service or any private enterprise or object make use of a road or thoroughfare to which this Ordinance applies or execute any work, or set up or maintain any plant or erection therein, except under, and in accordance with the terms and conditions of an agreement referred to in section 7 :

Provided that before any excavation or digging or cutting of any road is allowed to commence in pursuance of any such agreement, the cost of reinstatement or repair of such road after such excavation or digging or cutting, as estimated by the Chief Engineer, together with an additional deposit amounting to ten per cent of the estimated cost of such reinstatement or repair, shall be paid to the Chief Engineer :

Provided further that the requirement for the payment of the additional deposit referred to in the proviso shall not apply in the case of a Government department.

Persons to backfill hole or trench.

7B. Any person who has entered into an agreement under section 7 and who excavates, digs, cuts or does any other thing which causes damage to a road, shall, immediately after the completion of the work for which such excavation, digging or cutting was necessary, and in no case later than any time stipulated therefor in the agreement under section 7, backfill to a level indicated by the Executive Engineer, the trench or hole created by his excavation, digging or cutting, in layers of such compaction as specified by

*Thoroughfares (Amendment)
Act, No. 9 of 1988*

3.

the Executive Engineer, and using fill material approved by the Executive Engineer. Upon the Executive Engineer being satisfied that the backfilling has been satisfactorily completed, the additional deposit of ten per cent referred to in section 7A shall be refunded to the promotor :

Provided that, in the event of such person failing to carry out the backfilling within the time stipulated in such agreement or in the event of the backfilling not being completed in the manner directed by the Executive Engineer, then the Executive Engineer may cause the backfilling to be completed and shall set off the cost of backfilling against the amounts deposited under section 7A.

Contra-
vention of
section 7A
an offence.

7c. Any person who makes use of any road or thoroughfare to which this Ordinance applies or executes works or maintains any plant or erection therein in contravention of section 7A shall be guilty of an offence and shall on conviction be liable to a fine not exceeding ten thousand rupees.

Abate-
ment of
obstruc-
tions.

7d. Notwithstanding anything contained in any agreement referred to in section 7 or anything contrary in any written law, it shall be lawful for the Executive Engineer to issue notice to any person who has in pursuance of an agreement referred to in section 7 caused an obstruction to any road or thoroughfare, to remove or abate such obstruction to the satisfaction of the Executive Engineer, within such time as may be specified in that behalf and if such person fails or neglects to remove or abate such obstruction within such time or if such person cannot be traced, it shall be lawful for the Executive Engineer or any person authorized by him, to remove or abate such obstruction and recover the costs incurred thereby in the manner provided in section 33. No compensation shall be payable to such person for any breach of such agreement occasioned by such removal or abatement."

4

*Thoroughfares (Amendment)
Act, No. 9 of 1988*

Amendment
of section
24 of the
principal
enactment.

5. Section 24 of the principal enactment is hereby amended as follows :—

(1) by the repeal of subsection (1) of that section and the substitution therefor of the following subsection :—

‘ (1) From and after the date on which this subsection comes into force it shall not be lawful for any person—

(a) except under the authority of a licence granted by the Executive Engineer of the division, to erect any building, boundary wall, gateway or any other structure or construct a basement or other underground structure or dig a well, pond or shaft, within a limit (hereinafter referred to as the “building limit”) of—

(i) fifteen metres from the centre of the road in the case of a road declared by the Director to be an “ A ” class road in charge of the Department of Highways by notification published in the Gazette ;

(ii) twelve metres from the centre of the road in the case of a road declared by the Director to be a “ B ” class road in charge of the Department of Highways by notification published in the Gazette ;

(iii) seven decimal point five metres from the centre of the road in the case of a road declared by the Director to be a “ C ” or “ D ” class road in charge of the Department of Highways by notification published in the Gazette;

(b) except under the authority of a licence granted by the Executive Engineer of the division to re-erect, or to make any addition to, any building, boundary wall, gateway or any other structure or

Thoroughfares (Amendment) .5
Act, No. 9 of 1988

any basement or other underground structure or any well, pond or shaft within the building limit of any such road :

Provided, however, that nothing in the preceding provisions of this subsection shall be deemed to apply to any repairs effected to any building, boundary wall, gateway or any other structure or basement, other underground structure or any well, pond or shaft existing on the date this subsection comes into force; not being repairs to any building, boundary wall or gateway for effecting which a license was necessary prior to the coming into force of this subsection; and

- (2) in subsection (2) by the substitution for the expressions "building, boundary wall or gateway", or "building, wall or gateway" wherever such expressions occur in that subsection of the expressions "building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft".

6. The following new section is hereby inserted immediately after section 24 and shall have effect as section 24A of the principal enactment : —

Insertion of new section 24A of the principal enactment.

"No building approval to be granted without permission of the Executive Engineer.

24A. No authority whose approval is required for the erection or re-erection of a building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft shall grant such approval for the erection or re-erection of a building within the building limit specified in section 24 unless such erection or re-erection has been authorized by a licence granted under that section. "

7. The following new section is hereby inserted immediately after section 25 and shall have effect as section 25A of the principal enactment : —

Insertion of new section 25A in the principal enactment

"Declaration of a reservation for anew

25A. On the recommendation of the Director, the Minister may, by Order published in the *Gazette*, declare that the area of land depicted in a survey plan described in such Order in sufficient detail, and specifying the

6 *Thoroughfares (Amendment)*
Act, No. 9 of 1988

length *and* breadth of the road, as to facilitate identification, is intended to be used for the construction of a public road of such class as is specified in the Order. Upon the publication of the Order in the *Gazette*, the provisions of this Ordinance prohibiting the erection or re-erection of any building, boundary wall, gateway or other structure or any well, pond or shaft, within the building limits applicable to the class of road specified in the Order shall apply to and in relation to the width of the area of land specified in such Order. ”.

Replacement
of section
26 of the
principal
enactment.

8. Section 26 of the principal enactment is hereby repealed and the following new section substituted therefor :—

“ Procedure
to be
followed
upon
contravention
of section 24.

26. (1) If any person erects or re-erects any building, boundary wall, gateway or other structure or any basement, or other underground structure, or any well, pond or shaft or makes any addition to any building, boundary wall, gateway or other structure or any basement, or other underground structure or any well, pond or shaft in contravention of any of the provisions of section 24, the Executive Engineer shall, by written notice require such person to demolish or remove such building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft or any addition thereto, on or before such day as shall be specified in such notice, not being less than seven days from the date thereof.

(2) It shall be the duty of the person on whom a notice is issued under subsection (1) to comply with any requirement specified in such notice within the time specified therein, or within such extended time as may be granted by the Executive Engineer, on application made in that behalf.

Thoroughfares (Amendment) 7
Act, No. 9 of 1988

(3) (a) Where in pursuance of a notice issued under subsection (1), any building, boundary wall, gateway, or other structure or any basement or other underground structure or any well, pond or shaft, is 'not demolished or removed, within the time specified in the notice or within such extended time, as may have been granted by the Executive Engineer, the Executive Engineer may apply to the Magistrate to make a mandatory order, authorizing the Executive Engineer to demolish or remove such building, boundary wall, gateway or other structure or any basement, or other underground structure, or any well, pond or shaft, and the Magistrate on issuing notice on the person, who had failed to comply with the requirement of the Executive Engineer under subsection (1), to demolish or remove such building, boundary wall, gateway, or other structure, or any basement, or other underground structure or any well, pond or shaft, may, if he is satisfied to the same effect, make order accordingly.

(b) If such person undertakes to demolish or remove such building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft, the Magistrate may if he thinks fit, postpone the operation of the Order for such time not exceeding two months as he thinks sufficient for the purpose, of giving the person an opportunity of demolishing or removing such building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft.

(4) Where a mandatory order has been made under subsection (3), it shall be the duty of the police authorities to render all necessary assistance to the Executive Engineer in carrying out the order.

*Thoroughfares (Amendment)
Act, No. 9 of 1988*

(5) The Executive Engineer shall be entitled to recover any reasonable expenses incurred by him in demolishing or removing any building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft in pursuance of an order made by the Magistrate under subsection (3). "

Amendment
of section
27 of the
principal
enactment.

9. Section 27 of the principal enactment is hereby amended by the substitution for the expression "building, boundary wall or gateway" wherever such expression occurs in that section (except in paragraph (d) thereof) of the expression " building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft ".

Amendment
of section
28 of the
principal
enactment.

10. Section 28 of the principal enactment is hereby amended as follows : —

(1) by the substitution, in subsection (1) of that section for the expression " any building, boundary wall or gateway" wherever that expression occurs in that subsection, of the expression " building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft " ;

(2) by the substitution, in paragraph (a) of subsection (2) of that section, for the expression "building, boundary wall or gateway " wherever that expression occurs in that subsection, of the expression "building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft" ;

(3) by the substitution, in paragraph (b) of subsection (2) of that section-

(i) for the expression " building, boundary wall or gateway " wherever such expression occurs in that paragraph (except in sub-paragraph (ii) thereof) of the expression " building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft " ; and

Thoroughfares (Amendment), 9
Act, No. 9 of 1988

(ii) for the words " in the case of a boundary wall or gateway, "appearing in sub-paragraph (ii) thereof, the words "in the case of a boundary wall, gateway or other structure or any basement or other underground structure or any well, pond or shaft " ; and

(4) by the substitution in subsection (3) of that section for the expression, " building, boundary wall or gateway " wherever that expression occurs in that section, of the expression, " building, boundary wall, gateway or other structure or any basement: or other underground structure or any well, pond or shaft " .

11. Section 30 of the principal enactment is hereby amended in subsection (2) thereof by the substitution, for the expression " building, boundary wall or gateway " occurring in that section of the expression, "building, boundary wall, gateway or other structure or any basement or other underground structure or any well, pond, or shaft " .

Amendment of section 30 of the principal enactment.

12. Section 33 of the principal enactment is hereby amended by the substitution for the words "It shall be lawful for the Executive Engineer to give order verbally or by notice' in writing, to any person obstructing or encroaching upon- any thoroughfare, forthwith to remove or abate the same ; and if any such person to whom such order shall have been given shall refuse or neglect to comply with the same within a reasonable time," of the words " It shall be lawful for the Executive Engineer to give order by notice in writing, to any person obstructing or encroaching upon any thoroughfare, forthwith to remove or abate the same on or before a specified date ; and if any such person to whom such order shall have been given shall refuse or neglect to comply with the same, " .

Amendment of section 33 of the principal enactment.

13. The following, new section is hereby inserted immediately after section 33 and shall have effect as section 33A of the principal enactment :-

Insertion of new section 33A in the principal enactment.

"Action where resistance is anticipated, 33A. For the purpose of the application of the provisions of the State Lands (Recovery of Possession). Act, No. 7 of 1979 to any road to which this Ordinance applies-

(a) every written notice given under section 33 of this Ordinance shall be deemed to be a notice served under section. 3 of that Act ;

10

Thoroughfares (Amendment)
Act, No. 9 of 1988

- (b) the expression " competent authority " in that Act shall be deemed to include a reference to the Director, the Chief Engineer and the Executive Engineer ;
- (c) the expression " State Land " shall be deemed to include a reference to every road to which this Ordinance applies. "

Amendment
of section
35 of the
principal
enactment.

14. Section 35 of the principal enactment 'is hereby amended as follows :—

(1) by the substitution for the words " fifty rupees " occurring in that section of the words " five thousand rupees " ;

(2) by the addition, immediately after paragraph (8) of that section, of the following new paragraphs which shall have effect as paragraphs (9); (10) and (11) of that section :-

" (9) whosoever shall cause the opening of any culvert, bridge or side drain to be completely or partially blocked to prevent, obstruct or impede the free passage of water through it or causes a structure to be erected, a dam to be built, or the ground to be raised, or carry out any other act in any land contiguous to a road in the vicinity of a culvert or a bridge, so as to cause any interruption to or impede the free flow of water through a culvert, bridge or side drain ;

(10) whosoever shall cause damage to a thoroughfare by any excavation of any thoroughfare without authority or by the excavation of any land adjoining or near any thoroughfare ;

(11) whosoever shall drive, tow or cause to be moved along or across any public road a vehicle which has a device for traction other than wheels or tyres and which bears directly on the road surface. "

Thoroughfares (Amendment)
Act, No. 9 of 1988

11

15. The following new sections are hereby inserted immediately after section 35 and shall have effect as sections 35A and 35B of the principal enactment :—

Insertion
of new
Sections
35A and
35B in the
principal
enactment.

“ Continuing
offences,

35A. Any person convicted of an offence under section 35 shall, if the offence is continued after conviction, be liable to a fine not exceeding two hundred rupees for each day during which such offence is continued after conviction.

Abatement
of injuries
to thorough-
fares.

35B. Notwithstanding, the provisions, of section 35, it shall be lawful for the Executive Engineer to order either verbally or in writing any person who is committing or who has committed any act referred to in section 35, to forthwith abate the same, and if such person to whom such order is given shall refuse or neglect to comply with the order within the period specified therein, or if there be any doubt as to the proper person to whom such order should be given, it shall be lawful for the Executive Engineer or any person authorized in writing in that behalf by the Executive Engineer, to enter or cause to enter any house, garden, enclosure or other premises with such persons, instruments and things as may be necessary and to do or cause to be done therein all such things as may be necessary for such abatement ; and the Executive Engineer may recover the costs incurred in such abatement, in the manner provided in section 33 for the recovery of costs therein mentioned. ”

-16. Section 37 of the principal enactment is hereby amended as follows :—

Amendment
of section
37 of the
principal
enactment.

- (1) by the substitution for the words “ less than four feet of the length of such drain ” occurring in that section, of the words “ less than 25 metres of the length of such drain, and which shall provide an opening the cross section of which shall not be less than 3720 square centimetres or such other area as the Executive Engineer may, by notice in writing direct. ” and

*Thoroughfares (Amendment)
Act, No. 9 of 1988*

- (2) by the substitution for the words "costs therein mentioned", of the following :—

" Costs therein mentioned :

Provided that if the Executive Engineer gives notice to the public of the intention to construct or excavate such a drain the preceding provision of this section shall apply in the same manner as if there was a drain in existence by the side of such road. "

Amendment
of section
38 of the
principal
enactment.

17. Section 38 of the principal enactment is hereby amended as follows : —

- (1) by the substitution for the words " fifty rupees " occurring in that section, of the words " five thousand rupees " ;

- (2) in the proviso to paragraph (2) of that section-

(a) by the substitution for the words " one rupee " wherever those words occur in that proviso, of the words " seventy-five rupees " ; and

(b) by the substitution for the words " thirty cents ", of the words " ten rupees " ;

- (3) by the deletion in paragraph (9) of that section of all the words from " and shall allow " to " removal thereof " ; and

- (4) by the insertion, immediately after paragraph (14) of that section, of the following new paragraphs which shall have effect as paragraphs (15), (16) and (17) of that section :-

" (15) whoever shall erect any sign board, direction board, or hoarding on a thoroughfare without the permission of the Executive Engineer ;

(16) whosoever without lawful authority shall tie a rope or wire or lay a tube or a pipe or any other thing across or alongside any road ;

(17) whosoever without lawful authority shall wash any carriage, motor vehicle, cart, or other thing or any cattle or any other animal on any road ; "

*Thoroughfares (Amendment)
Act, No. 9 of 1988*

13

18. The following new sections are hereby inserted immediately after section 38 and shall have effect as sections 38A and 38B of the principal enactment : —

Insertio
of new
sections
38A and 38B
in the
principal
enactment.

⁴ Continuing offences.

38A. Any person convicted of an offence under section 38 shall, if the offence is continued after conviction, be liable to a fine not exceeding two hundred rupees for each day during which such offence is continued after conviction.

Abatement of nuisances on thoroughfares.

38B. Notwithstanding the provisions of section 38, it shall be lawful for the Executive Engineer to order either verbally or in writing any person committing or who has committed any act referred to in section 38, to forthwith abate the same, and if such person to whom such order is given shall refuse or neglect to comply with the order within the period specified therein, or if there be any doubt as to the proper person to whom such order should be given, it shall be lawful for the Executive Engineer or any peace officer to take all such action as may be necessary to abate such nuisance, including the taking into custody and removal of any animal, vehicle, object or thing which is the cause of, or contributory to, such nuisance and the Executive Engineer may recover the costs incurred thereby in the manner provided in section 33 for the recovery of costs."

19. The following new section is hereby inserted immediately after section 39 and shall have effect as section 39A of the principal enactment : —

Insertion
of new
section 39A
in the
principal
enactment.

⁴ Regulations.

39A. (1) The Minister may make regulations for or in respect of all or any of the following matters : —

- (a) the general specifications to which the construction of any public road or bridge should conform ;

1 4

*Thoroughfares (Amenament)
Act, No. 9 of 1988*

- (b) the prevention of ribbon development along public roads ;
- (c) the regulation, control and management of access to principal thoroughfares ;
- (d) the maximum load and other related characteristics of vehicles which may be permitted for use on a public road or any class of public road ;

(2) Every regulation made under subsection (1) shall be published in the Gazette and shall come into operation on the date of such publication or on such later date as may be specified in the regulation.

(3) Every regulation made under subsection (1) shall as soon as convenient after its publication in the Gazette, be brought before Parliament for approval. Every regulation not so approved shall be deemed to have been rescinded as from the date of such disapproval but without prejudice to anything previously done thereunder.

(4) The date on which any regulation is deemed to be so rescinded shall be published in the Gazette.

(5) The contravention of any regulation shall be an offence under this Ordinance and shall be punishable with a fine not exceeding five thousand rupees. "

20. Section 40 of the principal enactment is hereby amended as follows :—

(1) by the insertion? immediately before the definition of " canal " occurring in that section, of the following new definition : —

' " Authority " means' the Road Development Authority established by the Road Development Authority Act, No. 73 of 1981. ' ;

Amendment
of section
40 of the
principal
enactment.

[Certified on 01st December, 2008]

L. D. — O. 34/2004

AN ACT TO PROVIDE FOR THE PLANNING, DESIGN, CONSTRUCTION, DEVELOPMENT, MAINTENANCE AND ADMINISTRATION OF AN INTEGRATED PUBLIC ROAD NETWORK IN SRI LANKA; TO PROVIDE THE LEGAL FRAMEWORK NECESSARY TO FACILITATE PRIVATE SECTOR INVESTMENT AND PARTICIPATION IN ROAD CONSTRUCTION, DEVELOPMENT AND MAINTENANCE; TO ASSIST THE PROVINCIAL COUNCILS AND LOCAL AUTHORITIES IN THE DEVELOPMENT AND MAINTENANCE OF ROADS; TO PROMOTE AND FACILITATE COMMUNITY BASED ORGANISATIONS ENGAGED IN THE CONSTRUCTION, MAINTENANCE AND MANAGEMENT OF ROADS AND PUBLIC ROADS; AND TO PROVIDE FOR MATTERS CONNECTED THEREWITH OR INCIDENTAL THERETO.

Preamble:

WHEREAS it is the National Policy of Sri Lanka to formulate and implement within Sri Lanka a policy in relation to its National Highways whereby the Government is committed to provide for its citizens a modernised and integrated public road network operative within Sri Lanka, which network will be the result of a process of planning, design, construction, maintenance, development and administration:

NOW THEREFORE BE it enacted by the Parliament of the Democratic Socialist Republic of Sri Lanka as follows:—

1. This Act may be cited as the National Thoroughfares Act, No. 40 of 2008 and shall come into operation on such date as the Minister may appoint by Order published in the Gazette (hereinafter referred to as "the appointed date").

Short title and date of operation.

PART I

GENERAL

Application of the Act.

2. Subject to the provisions hereinafter provided, this Act shall apply to all national highways and to all roads and all public roads declared under section 4, other than roads maintained and administered respectively by a Provincial Council or a local authority.

2—PL 003220—4.250 (09/2008)



PARLIAMENT OF THE DEMOCRATIC SOCIALIST REPUBLIC OF SRI LANKA

NATIONAL THOROUGHFARES ACT, No. 40 OF 2008

[Certified on 01st December, 2008]

Printed on the Order of Government

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Administration of the Act.

3. (1) The Road Development Authority established under Act, No. 73 of 1981, (hereinafter referred to as "the Authority") shall subject to the general directions and policy guidelines of the Minister, have the exclusive power of implementation and administration of the provisions of this Act in consultation with such other government departments or institutions as may be referred to in this Act.

(2) The Authority may also exercise all or any of the powers conferred upon the Authority by the Road Development Authority Act, No. 73 of 1981 in the implementation and administration of the provisions of this Act.

Declaration of a road as a public Road.

4. (1) The Minister may in consultation with the District Road Network Development Co-ordinating Committee established under section 8, by Order published in the *Gazette* declare a road to be a public road :

Provided that, any road which prior to the coming into operation of this Act has been declared to be a public road, shall from and after the date of the coming into operation of this Act, be deemed to be a public road, within the meaning of this section.

(2) Every public road declared under subsection (1) shall vest in the Authority and accordingly every such public road shall be administered and maintained by the Authority.

(3) For the purposes of this Act a public road includes a canal or river.

Powers of officers and servants.

5. (1) Subject to the general direction and control of the Authority, the Director-General, the Provincial Director, Chief Engineer and Executive Engineer of the Authority shall be responsible for the implementation and administration of the provisions of this Act.

(2)(a) It shall be lawful for the Director-General to delegate any function assigned to him by this Act, to the Provincial Director, Chief Engineer, Executive Engineer, any officer of the Authority or any community based organization as the case may be.

(b) It shall be lawful for the Provincial Director to delegate any function assigned to him by this Act, to the Chief Engineer or Executive Engineer or any community based organization as the case may be.

(c) It shall be lawful for the Chief Engineer to delegate any function assigned to him by this Act, to the Executive Engineer or any community based organization as the case may be.

(d) It shall be lawful for the Executive Engineer to delegate any function assigned to him by this Act to any community based organization.

(e) It shall be lawful for the Director-General to authorize any officer of the Authority, not being the Provincial Director, Chief Engineer or the Executive Engineer or a community based organization to discharge any function assigned by this Act to the Director-General, Provincial Director, Chief Engineer, Executive Engineer or the community based organization as the case may be.

PART II

ADVISORY BODIES

6. (1) There shall be established a Road Network Development Advisory Council (hereinafter Referred to as the "Advisory Council") consisting of the following:—

Establishment of Road Network Development Advisory Council.

- (a) *Ex officio* members —
 - (i) the Secretary to the Ministry of the Minister in charge of the subject of Highways, who shall be the Chairman of the Advisory Council;

- (ii) a representative from the Civil Engineering Department of the University of Sri Lanka, Moratuwa, nominated by the Head of the Department;
- (iii) a representative of the Institute of Chamber of Construction Industries nominated by the Institute;
- (iv) a representative of the Chamber of Commerce nominated by the Chamber;
- (v) a representative of the Institute of Engineers of Sri Lanka established under the Institute of Engineers of Ceylon Act, No. 17 of 1968, nominated by the Institute;
- (vi) the Director-General of the National Physical Planning Department or his representative;
- (vii) the Inspector-General of Police or an officer not below the rank of Deputy Inspector-General nominated by him;
- (viii) a representative of the Land Use Policy Planning Division of the Ministry of Lands nominated by the Minister in charge of the subject of Lands;
- (ix) a representative of the National Planning Department of the Ministry of the Minister in charge of Finance, nominated by such Minister;
- (x) a representative of the Ministry of the Minister in charge of the subject of Industries, nominated by such Minister;
- (xi) a representative of the Ministry of the Minister in charge of the subject of Tourism, nominated by such Minister;

- (xii) a representative of the Ministry of the Minister in charge of the subject of Transport, nominated by such Minister;
 - (xiii) the Surveyor-General or his representative;
 - (xiv) a representative from the Institute of Town Planners established by the Town Planners Act, No. 23 of 1986, nominated by the Institute; and
 - (xv) the Commissioner of Motor Traffic Commissioner or an officer not below the rank of an Assistant Commissioner of Motor Traffic nominated by him;
- (b) five members nominated by the Minister from among persons who are qualified and have experience in the fields of economics, infrastructure development, banking, power and energy, telecommunication and law.
- (2) The functions of the Advisory Council shall be—
- (a) to advise the Minister in the formulation of the Hierarchical Public Road Network Policy of Sri Lanka (hereinafter referred to as “the Network Policy”) including bridges and ferry services with a view to, facilitate travel time and providing easy movement with improved facility;
 - (b) to advise the Minister on the development of a hierarchical road network strategy designed to improve the quality of the roads;
 - (c) to advise the Minister on measures required to be taken in relation to road research, road planning, road development technology and road safety measures;

- (d) to tender advise when required to do so on matters relating to planning of roads, national highways, expressways and restricted access highways that may be referred to the Advisory Council by the Authority;
- (e) to tender advise on any other matter that may from time to time be referred to the Advisory Council by the Minister.
- (3) (a) Every member of the Advisory Council shall be appointed by the Minister and shall, unless he earlier vacates office by death, resignation or removal hold office for a period of three years from the date of appointment and shall be eligible for re-appointment. The Minister may, if he considers it expedient to do so, by Order published in the *Gazette*, remove from office any member of the Advisory Council for reasons assigned therefor.
- (b) A member of the Advisory Council may at any time resign his office by letter to that effect addressed to the Minister.
- (c) Where any member of the Advisory Council dies, resigns or is removed from office, the Minister may appoint any other person to be a member in place of the member who dies, resigns or is removed from office.
- (d) A member appointed under paragraph (c) shall, unless he earlier vacates office by death, resignation or removal, hold office for the unexpired period of the term of office of his predecessor.
- (e) The Advisory Council may discharge its functions notwithstanding any vacancy among its members or any defect in the appointment of any such member.
- (f) Eight members of the Advisory Council shall constitute a quorum for any meeting of the Advisory Council

and subject to the provisions of this Act, the Advisory Council may regulate the procedure in regard to its meetings and the transaction of business at meetings.

- (g) The members of the Advisory Council may be paid such remuneration as may be determined by the Minister in consultation with the Minister in charge of the subject of Finance.

7. (1) There shall be established a District Road Network Development Co-ordinating Committee (hereinafter referred to as the "District Co-ordinating Committee") for each District in Sri Lanka consisting of the following members—

District Road
Network
Development
Co-ordinating
Committee.

- (a) all Cabinet Ministers and other Ministers appointed by the President of Sri Lanka under the Constitution, from among the members of Parliament who represent that District in Parliament;
- (b) the Chief Minister of the relevant provincial Council;
- (c) all Ministers in the Board of Ministers of the relevant Provincial Council;
- (d) all members of the Parliament representing the relevant District;
- (e) all members of the Provincial Council representing the relevant District;
- (f) all Heads of Local Authorities within the relevant District;
- (g) Chief Secretary of the relevant Provincial Council;
- (h) District Secretary of the relevant District.

- (i) all Divisional Secretaries of the relevant District;
 - (j) relevant Provincial Director of the Road Development Authority who shall be the Secretary of the District Co-ordinating Committee;
 - (k) all District Heads of all Government Agencies of the relevant district;
 - (l) a representative from each of the Community Based Organizations formed by the road user communities in the Districts.
- (2) The Minister may nominate a person from among the members referred to in paragraphs (a) and (b) to be the Chairman of the District Co-ordinating Committee.

(3) The functions of the District Co-ordinating Committee shall be—

- (i) to formulate an Integrated Road Network Development and Maintenance Action Plan for the District;
- (ii) to co-ordinate and supervise all road network development and maintenance activities, within the District;
- (iii) to direct with the concurrence of the Minister, any Government Agency or any person to undertake any road network development project or scheme within the District and to regulate and supervise the implementation of such projects or schemes;
- (iv) to recommend the Minister to undertake and execute the road development projects including new constructions or any widening or deviation of an existing road.

(4) The Integrated Road Network Development and Maintenance Action Plan specified in subsection (3) means a plan specifying road development projects in the District to be undertaken by the Road Development Authority, the relevant Provincial Council, the relevant local authorities and other relevant agencies. Such Plan shall be prepared for a period of five years and shall include a Schedule of the required capital for the implementation of the development and maintenance projects set out therein.

(5) The provisions of subsection (3) of section 6 shall *mutatis mutandis* apply to and in relation to the period of membership, vacation of membership, appointment of a member to a vacant post in the District Co-ordinating Committee and other related matters of a District Co-ordinating Committee.

PART III

NATIONAL HIGHWAYS

Declaration of National Highways.

8. (1) The Minister may by Order published in the *Gazette* declare any road or public road or classes of roads or public roads to be a national highway or national highways, as the case may be.

(2) The Minister may declare a road or a public road as a national highway under subsection (1) if he is satisfied that—

- (a) the road or public road crosses at least one provincial boundary and connects two or more provincial centres and is a principal thoroughfare for long distance movement of vehicular traffic;
- (b) the road or public road connects two trunk roads on which the volume of vehicular traffic is more than two hundred and fifty vehicles per day;
- (c) the road or public road passes through important town centres;

- (d) the road or public road has strategic bridge crossing points across major rivers, providing connection to other national highways;
- (e) the road or public road provides access to a place of national importance or a special project of the government; or
- (f) the road or public road provides access to an institution, structure, site or area the subject matter of which is set out in the List II (Reserved List) of the Constitution.

Declaration of Expressways &c.

9. (1) The Minister may by Order published in the *Gazette* designate a national highway declared in terms of section 8, to be—

- (a) an expressway; or
 - (b) a restricted access highway.
- (2) For a national highway to be designated as an expressway or as a restricted access highway, as the case may be, under subsection (1)—

- (a) the national highway should be designed specially for high speed movement of vehicular traffic with minimum interference to such high speed traffic movements;
- (b) the national highway should not serve the properties bordering it.
- (3) The Minister may designate a national highway to be an expressway under subsection (1), if he is satisfied that the number of interchanges that affects high speed movement of vehicular traffic along that national highway is minimal.

(4) The Minister may designate a national highway to be a restricted access highway under subsection (1), if he is satisfied that the number of interchanges affecting high speed movement of vehicular traffic along that national highway is relatively more in number.

10. (1) Every declaration under sections 8 and 9 shall—

- (a) be accompanied by a plan—
 - (i) specifying the land area which comprises the national highway;
 - (ii) specifying the interchanges along the national highway;
 - (iii) specifying the components of the national highway;
 - (iv) specifying the building limits and the length and breadth of the right of way; and
- (b) specify the name by which such national highway shall be identified.

Requirements of a declaration under sections 8 and 9.

PART IV

USER-FREE NATIONAL HIGHWAYS

11. (1) The Minister may by Order published in the *Gazette*, designate the whole or part of an expressway, as a user fee national highway.

Minister to designate user fee national highways.

(2) The designation referred to in subsection (1) may if so required, specify a period during which such designation shall be in operation.

Authority to enter into agreements regarding user fee national highway.

12. (1) The Authority may enter into an agreement with any person including a Government Department, Public Corporation or Private Institution (hereinafter in this part referred to as the "operator") in respect of the design, construction, operation, maintenance, development and overall management of a user fee national highway.

(2) The Director-General may by Order published in the *Gazette* delegate to the operator such powers, duties and functions of the Authority as may be specified therein. The Director-General may notwithstanding such delegation continue to exercise, perform and discharge the powers, duties and functions so delegated.

(3) The agreement referred to in subsection (1) may provide for—

- (a) the provision of funds for financing the design, construction, operation, development and maintenance of a user fee national highway or part thereof;
- (b) the purchase, lease or assignment of land for a user fee national highway;
- (c) the operation, management, maintenance and improvement of a user fee national highway;
- (d) the allocation of rights, liabilities and duties of each party to the agreement;
- (e) the mode of adjusting of transactions in conformity with foreign currency fluctuations and inflation;
- (f) the re-negotiation of the terms of such agreement and provisions for contingencies;
- (g) the mode of collecting user fees from the users of the user fee national highway;

(h) the payment of remuneration of the operators and other employees;

(i) the allocation and distribution of income derived from the fees referred to in paragraph (g);

(j) the specifying of performance requirements, performance measures and consequences arising from failure to meet such performance requirements; and;

(k) the settlement by conciliation or arbitration of disputes relating to the agreement including mandatory procedures, evidentiary provisions and allocation of the cost of conciliation or arbitration.

13. The Minister may prescribe the fees to be levied from all vehicles used in a user fee national highway and may prescribe different fees for different categories of vehicles. The Minister may also prescribe the categories of vehicles exempted from the payment of the fee.

Minister to prescribe fees to be levied for user fee national highway.

14. (1) The driver of a vehicle used on a user-fee national highway shall pay the fee referred to in section 13 at the prescribed places and to the prescribed persons.

Driver of a vehicle on a user fee national highway to pay the fee.

(2) The driver of a vehicle who contravenes the provisions of subsection (1) shall commit an offence and shall on conviction after summary trial by a Magistrate be liable, in the case of —

(a) first offence to a fine not exceeding five thousand rupees ; and

(b) second or subsequent offence to a fine not exceeding fifty thousand rupees.

PART V

ACQUISITION OF LAND FOR CONSTRUCTION OF ROADS

Construction of a new road.

15. (1) The Minister may, on the recommendation of the relevant District Road Network Co-ordinating Committee, or Provincial Council or Local Authority as may be relevant, or the appropriate Divisional Secretary of the relevant area or Community Based Organization operating within such area, authorize —

- (a) the construction of a new road or a public road ; or
- (b) the widening of an existing road or public road or any deviations to such road or public road.

(2) The Minister shall, where he authorizes the construction of a new road or public road under subsection (1) direct the Authority to prepare a survey plan depicting the land area required for the construction of such road or public road, specifying the length and breadth of such road, including its reservations and its building limits.

(3) The Minister shall, where he authorizes the widening, improvement or any deviation of a road or a public road under subsection (1) direct the Authority to prepare a survey plan depicting the land required for such road or public road widening or for such deviation specifying the new length and breadth of such road, including its reservations and its new building limits.

(4) The Minister shall by Order published in the *Gazette* declare the land area or any interest therein depicted in the survey plan referred to in subsection (2) or subsection (3) as the case may be, to be a road reservation or a public road reservation as the case may be.

(5) Upon publication of the Order in the *Gazette*, the provisions of this Act, relating to the prohibition of the erection or re-erection of any structures within a building limit shall apply to and in relation to the area of land specified in such Order.

Construction of new National Highways.

16. (1) The Minister may on the recommendation of the Advisory Council or the Authority or the Director-General as the case may be, authorize the construction of a new national highway.

(2) The Minister shall where he authorizes the construction of a new national highway direct the Authority to prepare a survey plan of the proposed national highway depicting the area of land required for construction of such national highway including the facilities for recreation, leisure, marketing and other ancillary services, the length and breadth of such national highway, the reservations and the building limits, proposed interchanges and intersections along such highway, if any.

(3) The Minister may on the recommendation of the Advisory Council or the Authority or the Director General authorize the widening improvement or deviation of an existing national highway.

(4) The Minister shall where he authorizes widening improving or deviation of a national highway under subsection (3), direct the Authority to prepare a survey plan depicting the area of land that is required for such widening or for such deviation, including the facilities for recreational, leisure, marketing and other ancillary services specifying the new length and breadth of such national highway including its reservation and its new building limits and interchangers and intersections if any.

(5) The Minister shall by Order published in the *Gazette* declare the land area or any interest therein depicted in the survey plan referred to in subsection (2) or subsection(4), as the case may be, to be a national highway reservation.

(6) Upon publication of the Order in the *Gazette*, the provisions of this Act relating to the prohibition of the erection or re-erection of any structures within a building limit shall apply to and in relation to the area of land specified in such Order.

Prohibition of development work within a road reservation.

17. Upon declaration of a road reservation or a public road reservation or a national highway reservation under this part of the Act, no development work shall be executed or caused to be executed by any Government agency or any other person within the area so declared as a reservation, except with the prior written approval of the Authority.

Application of the Land Acquisition Act.

18. (1) Where any land or any interest in land is declared as a road reservation or a public road reservation or as national highway reservation, as the case may be —

- (a) such land or interest therein shall for the purposes of the Land Acquisition Act (Chapter 460) be deemed to be required for a public purpose ; and
- (b) that land or interest therein may be acquired under the Land Acquisition Act (Chapter 460) by the Government for the Authority.

(2) Where the President is of opinion, upon the recommendation of the Minister, that any land or interest in land on which a reservation is declared to be a road reservation or a public road reservation or a national highway reservation is required for the purpose of carrying out a "public road project" or a "national highway project" as the case may be, and that such project would serve the just requirements of the general welfare of the people, the President may by Order published in the *Gazette*, declare such land or interest in land on which a road reservation is declared, as the case may be, as specified therein, is required for the purpose of such project.

(3) Upon the publication of the Order under subsection (2), the provisions of sections 3, 4, 5, 6, 7 and 8 of the Urban Development Projects (Special Provisions) Act, No 2 of 1980 shall *mutatis mutandis* apply to and in relation to the acquisition of the land under the provisions of this Act.

Acquisition of land vested in a Local Authority.

19. (1) Where the Minister certifies that any land or interest in land in any road reservation, or public road reservation or national highway reservation vested in a Local Authority, is required for the purposes of this Act, the Minister, in consultation with the Minister in charge of the subject of Local Government in the relevant Provincial Council may, by Order published in the *Gazette* vest such land or interest in such land in the Authority, with effect from such date as shall be specified in the Order, subject to such conditions, if any, as may be so specified.

(2) An Order made under subsection (1) shall confer on the Authority absolute title to any land or interest in land and to any buildings or structures on such land as are specified in such Order with effect from the date specified therein, free from all encumbrances. Compensation shall be payable by the Authority in respect of such land or interest in such land or buildings or other structures thereon.

Special grants under Crown Land Ordinance.

20. (1) Where any crown land or part thereof is required for any of the purposes specified under this part of this Act, such purpose shall be deemed to be a purpose for which a special grant or lease to be made under section 6 of the Crown Lands Ordinance (Chapter 454).

(2) All assets including any right of way over all national highways and other structures in the possession of, or which are being used by the Authority on the date immediately preceding the appointed date and which are specified in an Order made by the Minister and published in the *Gazette*, shall be transferred to and shall vest in the Authority with effect from the appointed date.

Purchasing of land for re-settlement.

21. (1) The Authority may with the approval of the Minister and with the consent of the owners purchase any land or any interest therein specified in the survey plan and the Order referred to in sections 15, 16 and 19 of this Act.

(2) The Authority may with the approval of the Minister purchase any land required for re-settlement of persons displaced or affected due to the implementation of any of the provisions of this Act.

Determination to be made by a Committee.

22. Purchase price of a land under section 21 and other related matters shall be determined by a Committee comprising —

- (a) the Secretary to the Minister in charge of the subject of Highways or his representative ;
- (b) the Secretary to the Minister in charge of the subject of Finance or his representative ;
- (c) the Secretary to the Minister in charge of the subject of Lands or his representative ;
- (d) the Chief Valuer or his representative ;
- (e) the registered licensed Valuer nominated by the Institute of Valuers.

Power of Authority to alienate land.

23. (1) The Authority may with the approval of the Minister for the purpose of maintenance of a road or a public road or a national highway, alienate any land or any interest therein held by the Authority, subject to such terms and conditions as may be determined by the Minister.

(2) The provisions of the Crown Lands Ordinance shall not apply in relation to the alienation of any land by the Authority under this section.

(3) For the purposes of this section alienation includes sale, lease, rent, rent purchase or grant.

Part VI

EXECUTION OF WORKS

24. The direction and control of all work to be undertaken under this Act shall be vested in the Director-General subject to the general direction and control of the Authority.

Direction and control of works to be vested in Director-General.

25. (1) The Minister on the recommendation of the Authority or the Director-General acting under the delegation of powers to him by the Authority may, by Order published in the *Gazette* order —

Minister may order temporary closure of a road, public road or a national highway.

(a) the temporary or permanent closure of —

- (i) an existing road or a public road or national highway ; or
- (ii) a section of a road or a public road or national highway ; or
- (iii) a bridge on a road or a public road or national highway ; or

(b) substitution of an alternate route or alternate section of a road, in lieu of an existing section of a road or a public road or a national highway.

(2) In the execution of any order under this section if it becomes necessary to acquire any land for such purpose, such land shall be deemed to be required for a public purpose and the provisions of Part V shall apply to and in relation to such acquisition.

26. (1) No person, Government Department, local authority or any other institution shall use the reservation of a road a public road or a national highway for the purpose of carrying on any gas, water, electricity, telecommunication or any other service, without the prior written approval of the Director General, Provincial Director, Chief Engineer or Executive Engineer of the Authority as the case may be.

No services to be carried on a road, a public road or a national highway without the permission of the Authority.

(2) The Authority may, with the approval of the Minister, charge a rental from any person referred to in this section for using a road reservation, a public road reservation or a national highway reservation for any of the services referred to in this section.

(3) Minister may from time to time on recommendation of the Advisory Council, prescribe the appropriate rental to be charged and other matters relating to charging of rental under this section.

(4) The Director-General, the Provincial Director, the Chief Engineer or the Executive Engineer as the case may be, may on behalf of the Authority enter into agreements, subject to the provisions of any special enactment in that behalf and subject to the approval of the Minister, with any person or Government Department, local authority or any other institution to authorize and regulate the use by such person or Government Department or local authority or any other institution of any road reservation, a public road reservation or a national highway reservation for the purpose of carrying on gas, water, electricity, telecommunication or any other service.

(5) In the event of the widening or the improvement or deviation of a road, a public road or a national highway, the Director-General or the Provincial Director or the Chief Engineer or the Executive Engineer, as the case may be, may by notice require any person to remove or shift any physical structure or pipe line erected or laid by such person at the own cost of that person within the time period specified in the notice.

(6) Where the Executive Engineer is unable or unwilling to remove any obstruction referred to in this section due to any resistance or if the person responsible for causing such obstruction cannot be found the Executive Engineer may make an application in that behalf to the Magistrate's Court having jurisdiction.

(7) The Magistrate may after considering the facts of the case, direct the fiscal to remove such obstruction forthwith.

(8) The provisions of this section shall from and after the appointed date, apply to any person, Government Department, local authority or other institution using any road reservation, public road reservation or a national highway reservation for any of the purposes connected with the supply of any of the services specified in the aforesaid provisions of this section, subject however to the provisions of paragraph (a) of subsection (2) of section 90 of this Act.

27. (1) No person shall, for the purpose of any public service, or private enterprise, make use of a road or a public road or a national highway or execute any work thereon, or set up or maintain any plant or erection thereupon, except under and in accordance with, the terms and conditions of agreement referred to in section 26:

No public service, or private enterprise, to make use of a road or a public road or a national highway without authority.

Provided that before any excavation, digging or cutting of any road, any public road, or any national highway is allowed to commence in pursuance of any such agreement, the cost of restoration or repair of such road, public road or national highway after such excavation, digging or cutting as estimated by the Chief Engineer, and an additional refundable deposit as prescribed by the Director-General shall be paid to the Authority :

Provided further, if there is any additional cost incurred by the Authority outside of any amount estimated, such amount shall be deducted from the additional refundable deposit paid to the Authority and the balance remaining shall be thereafter be refunded.

(2) Any person who contravenes or fails to comply with any provision of this section shall be guilty of an offence, and shall, on conviction after summary trial by a Magistrate be liable to a fine not exceeding fifty thousand rupees.

- (b) constructing, excavating, repairing, clearing or improving any bridge, causeway, earth retaining structure, culvert, drain, fence or ditch thereupon ; and
- (c) erecting of temporary quarters or repairing any building for the use of any such officer and his workmen.

(2) Any officer or servant authorized by the Director-General may at all reasonable times of the day and upon notifying the occupier thereof, of their intention, enter upon any land adjacent to any existing or proposed road, public road or national highway to search for, dig, cut, take and carry away water, timber, brushwood, stone gravel, sand or any other material from any land adjacent or near to any existing or proposed road or highway or national highway for the purpose of —

- (a) surveying, measuring, tracing, making, working, opening, altering, turning, repairing, clearing, improving or fencing thereupon ;
- (b) constructing, repairing, clearing or improving any bridge, causeway, culvert, earth retaining structure, fence or ditch thereupon ; and
- (c) erecting or repairing any temporary quarters or building for the use of any such officer and his workmen and labourers.

30. (1) In the event of the necessity arising to effect emergency repairs to a road, a public road or to a national highway, it shall be lawful for any officer or servant authorized by the Director-General to carry away from any land in the vicinity of any such road, public road or national highway, any material, which is required for such purpose.

Right of entry to lands in the vicinity of a road, a public road or a national highway.

28. (1) Notwithstanding anything contained in any agreement referred to in section 26 or anything to the contrary in any other written law, it shall be lawful for the Executive Engineer to issue notice to any person who has, in pursuance of an agreement referred to in section 26, caused an obstruction to any road, any public road or any national highway, or caused obstruction to the widening or improvement or deviation of a road, a public road, or a national highway, to remove or abate such obstruction to the satisfaction of the Executive Engineer, within such period of time as may be specified in that notice.

(2) Where such person fails or neglects to remove or abate such obstruction or to remove or shift such physical structure or pipeline, within such period of time it shall be lawful for the Executive Engineer or any person authorized by him to remove or abate such obstructions or to remove or shift such physical structure or pipeline and recover the costs incurred in that connection.

(3) No compensation shall be payable to such person for any breach of such agreement resulting from such removal or abatement or shifting, as the case may be.

29. (1) Any officer or servant authorized by the Director-General may at all reasonable times of the day, and upon notifying the occupier thereof of their intention, enter upon any land adjacent to any existing or proposed road, public road or national highway or upon any land to be declared in future as new road reservation, new public road reservation or new national highway reservation with all necessary vehicles, equipment, tools and other requisites and perform all acts and things as may be necessary for the purpose of —

- (a) surveying, measuring, tracing, working, opening, altering, turning, repairing, clearing, improving or fencing thereupon ;

Executive Engineer may remove obstructions.

Certain persons to be empowered to survey, measure &c., a road, a public road or a national highway.

(2) An officer or servant authorized by the Director-General to carry out any activity under the provisions of subsection (1) shall not be deemed to be a trespasser.

(3) No officer or servant authorized by the Director General under the provisions of subsection (1) shall obtain any material from any land if such materials can be conveniently obtained from any adjacent state land.

(4) The Authority shall pay to the owner of the land from which any material has been removed reasonable compensation for the material so removed and for any damage caused in obtaining and transporting the same.

(5) An officer or servant authorized by the Director-General under the provisions of subsection (1) shall take all safety measures for fencing or barricading of pits and quarries from where any such materials had been removed.

Erection of temporary buildings on land for construction of a road, a public road or a national highway.

31. (1) It shall be lawful for any officer or servant authorized by the Director-General when carrying out a survey for the improvement or construction of any road, any public road or any national highway, bridge, causeway, culvert or earth retaining structure, or carrying out improvements or repairs thereto, or constructing any new road, new public road or new national highway, bridge, causeway, culvert or earth retaining structure, to make and erect temporary buildings on any land adjacent thereto for the accommodation of such officers, workmen, machinery and equipment.

(2) No officer or servant authorized by the Director-General under the provisions of subsection (1), shall erect a building on any land under cultivation or on any developed land if there is suitable waste land or state land within close proximity available for the purpose.

(3) The Authority shall pay reasonable compensation for the use of such land for any damages done thereto, to the owner of such land.

Rubble and waste to be disposed on adjacent land.

32. (1) When surveying for a new road, public road, national highway, bridge, causeway, culvert or earth retaining structure or during the progress of work connected with the maintenance, repair or construction of a road, public road, national highway, bridge, causeway, culvert or earth retaining structure, or clearing any earthship, it shall be lawful for any officer or servant authorized by the Director-General to dispose of any rubble or waste material by dumping the same on any land adjacent thereto.

(2) An officer or servant authorized by the Director General under the provisions of subsection (1) shall take all necessary steps to avoid unnecessary hardship to the owner or occupants of such land.

Construction of temporary roads.

33. It shall be lawful for any officer or servant authorized by the Director-General to make a temporary road for the diversion of traffic through an adjacent land at any time during —

- (a) closure of bridge, causeway, culvert or earth retaining structure for repairs or re-construction ; or
- (b) closure of a road, a public road or a national highway or section of a road, a public road or a national highway for rehabilitation or reconstruction :

provided that such diversion shall not require the demolition of any building nor encroach on any enclosed garden or yard.

Cutting, topping &c. of trees to facilitate construction of a road, a public road or a national highway.

34. It shall be lawful for any officer or servant authorized by the Director-General to cut and remove all trees, bushes, shrubs, branches, leaves or roots that cause damage to a road, a public road or a national highway and obstruction to the passage of traffic, street lighting, visibility, road signs, traffic light signals and road furniture, and for that purpose to enter upon any land or premises with the

necessary workmen, tools and equipment for the cutting, lopping and the removal of such trees, bushes, shrubs, branches or roots, as the case may be.

35. It shall be lawful for any officer or servant authorized by the Director-General to put up or make fences, barricades, ditches, drains or bank alongside any road, public road or national highway.

36. An officer or servant authorized by the Director-General shall have power to make, scour, cleanse and keep open all ditches, drains, culverts and bridge openings, water courses. No owner or occupier of any adjacent lands shall do any act or thing that would interfere with or cause damage to the aforesaid acts.

37. (1) Any person who sustains any loss or damage as a result of the exercise by any officer or servant authorized to carry out any act, in the exercise of any power conferred by this Act shall be entitled to receive compensation for the same.

(2) A person referred to in subsection (1) shall make an application to the Divisional Secretary of the area within a period of three months from the date on which the alleged damage had been caused requesting the payment of compensation for the same. No application made after this period shall be considered for this purpose.

(3) Where the amount of compensation cannot be agreed upon then such amount may be decided by arbitration by the arbitrator appointed by the Divisional Secretary.

38. Any officer or servant exercising or discharging any power or function under this Act, who behaves or conducts himself in a vexatious manner or resorts to violence shall be guilty of an offence, and shall be liable on conviction after summary trial by a Magistrate to a fine not exceeding twenty five thousand rupees.

Erection of fences &c., alongside a road, a public road or a national highway.

Drains &c. to be kept open if so required for the construction of a road, a public road or a national highway.

Authorized officers to pay compensation for damage to property.

Vexatious conduct of officers.

PART VII

PROTECTION OF ROADS, PUBLIC ROADS AND NATIONAL HIGHWAYS

39. (1) The owner or occupier of a land which abuts or adjoins a national highway declared to be as expressway or restricted access highway shall not—

Owners or occupiers of land adjacent to a national highway have no right of access thereto

(a) enjoy the right of access to, or egress from, the expressway or restricted access highway ;

(b) have any right of passage, right of use or right of way between the land and the expressway or restricted access highway ; and

(c) be entitled to any rights which in anyway affect the expressway or restricted access highway.

(2) The Authority shall, before declaring a national highway to be an expressway or a restricted access highway, provide appropriate alternate access to an owner or occupier whose access is curtailed under subsection (1).

(3) Any person who acts in contravention of the provisions of subsection (1), shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate, in the case of first offence for a fine not exceeding ten thousand rupees and in the case of second or subsequent offence to a fine not exceeding one hundred thousand rupees.

40. (1) Notwithstanding the provisions of any other written law, no person shall commence any building, or erect any wall, fence or any other structure alongside any road, public road or national highway or place any temporary fence or enclosure on or alongside, any road, public road or national highway, for commencing or repairing any such building, fence, wall or any other structure, without giving one calendar month's notice in writing to the Executive Engineer of such intention.

No building to commence on land adjacent to a road, a public road or a national highway without notice.

(2) Where any person fails to give notice under subsection (1), it shall be lawful for the Executive Engineer with the sanction of the Chief Engineer to cause any such building to be demolished or any such fence, wall or structure to be dismantled and removed and to recover the costs of such removal from such person:

Provided that any such demolition, dismantling and removal shall be carried out only upon giving the owner or occupier adequate notice of such impending demolition, dismantling and removal as the case may be.

Obtaining permission for erection of temporary enclosures.

41. (1) It shall be lawful for the Executive Engineer to permit any person on payment of a fee to temporary use any part of a road, public road or national highway, to erect a temporary fence or enclosure in order to carry out demolition, repair or construction work to his house or building, including the right to erect decorations of a temporary character subject to following conditions :—

- (a) that the person to whom permission is granted shall at night-time keep a light of sufficient intensity upon the premises for so long as such temporary enclosure or structure is in existence ; and
- (b) that sufficient room on the road, public road or national highway shall be made available for the movement of traffic and pedestrians without hindrance.

(2) Any public officer connected with the distribution of any service to the public may, notwithstanding the provisions of section 40 or subsection (1) of section 41 make temporary use of any part of a road, public road or a national highway.

Building limits alongside a road, a public road or a national highway to be declared by Order.

42. (1) The Minister may by Order published in the Gazette specify the building limit alongside a road, public road or a national highway or part of a road, a public road or a national highway.

(2) Where a building limit of a road, a public road or a national highway has not been specified under subsection (1), the building limit for that road or public road or national highway shall be —

- (a) fifteen metres from the Centre of the carriageway of that national highway ;
- (b) seven decimal point five metres from the centre of the carriageway of that public road ; and
- (c) five metres from the centre of the carriageway of that road.

(3) No person shall after the appointed date except under the authority of licence granted by the Executive Engineer erect, re erect or make any addition to any building, gateway or any other structure or construct a basement or other underground structure or dig a well, pond shaft or any other structure (hereinafter in this Part of this Act referred to as "structure") within a building limit.

(4) (a) No licence, for the erection of any structure, shall be granted under subsection (3) by the Executive Engineer within ten (10) metres from the centre of a carriageway of national highway within a town limit and seven point five (7.5) metres from the centre of a carriageway of a national highway outside a town limit.

(b) For the purpose of this subsection the word "structure" does not include a boundary wall.

(c) No licence for the erection of any structure shall be granted under subsection (3) by the Executive Engineer between the limits prescribed in paragraph (a) and the

building limit, unless he is satisfied that the prohibition against the erection of any structure within such limit will cause serious hardship to the owner of the land on which such structure is to be erected and the written consent of the Provincial Director for the granting of the licence is obtained by the Executive Engineer. The Provincial Director shall not give such consent unless he is satisfied, having regard to the width of the road, public road or national highway, the visibility available for traffic and the proper upkeep of the road, public road or national highway, that the enforcement of the aforesaid prohibition is not for the time being essential.

(d) It shall be a condition of any licence granted by the Executive Engineer under subsection (3) for the erection of any structure that no compensation shall be payable—

- (i) in respect of such structure or part thereof within such building limit if such land is acquired under the Land Acquisition Act (Chapter 460) ; or
- (ii) in respect of any improvement or adaptation of the remaining part of such structure after the severance or removal of such structure within such limit for any purpose whatsoever.

(e) It shall be a condition of any licence granted by the Executive Engineer under subsection (3) for the re-erection of, or for any addition, any structure that if possession for the public use is taken at any time of the land on which such structure is situated or if such land is acquired under the Land Acquisition Act (Chapter 460), the compensation payable in respect of such structure shall be determined in accordance with the provisions of sections 46 and 47.

(5) (a) The Executive Engineer shall not grant a licence under subsection (3), without the approval of the Provincial Director where the structure is of religious significance.

(b) Where the Executive Engineer seeks approval under paragraph (a), the Provincial Director shall hold an appropriate inquiry in respect of the matter, before granting the approval.

(c) Where the Provincial Director refuses approval under this subsection he shall give reasons in writing for such refusal.

(6) (a) Full particulars of every licence granted under subsection (3) including particulars of the condition set out in subsection (4) and of the land and the structure to which the condition relates and the value thereof shall be entered by the Executive Engineer in a register to be kept for the purpose at his office ; and the Executive Engineer shall cause a certified copy of every such entry to be registered in the office of the Registrar of lands having jurisdiction over the area in which such land is situated. The Registrar of Lands shall register all such copies free of any charge or duty.

(b) Upon the registration of any entry under paragraph (a), the conditions attached to such licence shall be binding upon the land and the structure affected thereby in accordance with the tenor of such condition, and to whomsoever the ownership or possession of the land, building or structure may at any time pass.

(c) Every register kept under paragraph (a) at the office of the Executive Engineer shall be made available for inspection to any person interested at any time when the office is open for the transaction of business.

43. Notwithstanding any provision in any other written law no Agency nor Authority whose approval is required for the erection of a structure shall grant approval for the erection of a structure within the building limit specified in section 42 unless such erection has been authorized by a licence granted by the Executive Engineer in accordance with the provisions of this Act.

Building approval only on obtaining licence of Executive Engineer.

Modification of building limit.

44. The Minister may, upon the recommendation of the Authority or the Director-General by Notice published in the Gazette modify or extend the building limit in respect of any road, public road or national highway or part of a road, a public road or a national highway :

Provided however, that the Authority or the Director-General shall, before making such recommendation, have regard to the convenience of the public and to the need for preserving and continuing the amenities of the locality and for ensuring that the modification or extension shall not increase the cost of any proposed scheme for the development, diversion, deviation or widening of the road, public road or national highway or part of the road, public road or national highway or any part of the road, public road or national highway as the case may be which will be affected by such modification.

Procedure to be followed in case of erection of structures in contravention of section 42.

45. (1) If any person erects any structure or makes any addition to an existing structure in contravention of the provisions of section 42, the Executive Engineer shall, by written notice, require such person to demolish or remove such structure or any addition thereto on or before such date as may be specified in such notice, being a date not earlier than seven days from the date thereof.

(2) It shall be the duty of the person on whom a notice is issued under subsection (1) to comply with the requirements specified in such notice within the time specified therein or within such extended time as may be granted by the Executive Engineer, on application made in that behalf.

(3) (a) Where in pursuance of a notice issued under subsection (1), any structure, is not demolished or removed, within such time or extended time as the case may be, the Executive Engineer may apply to the Magistrate for a Mandatory Order, authorizing the Executive Engineer to cause such structure to be demolished or removed;

(b) The Magistrate, may if he is satisfied as to the existence of the facts, issue notice on the person who had failed to comply with the requirements of the notice issued by the Executive Engineer under subsection (1) to demolish or remove such structure and thereafter make order accordingly;

(c) If the person who had erected the structure in contravention of the provisions of section 42, undertakes to demolish or remove such structure, the Magistrate may, if he thinks fit, postpone the operation of the order for a period not exceeding sixty days, allowing time for such person to demolish or remove such structure.

(4) (a) Where a mandatory order has been made under paragraph (a) of subsection (3) for the removal of a structure of religious significance and where such structure can be safely removed, then subject to the provisions of paragraph (b) of subsection (3) such structure shall be removed and handed over to the organization or institution responsible for erecting such structure.

(b) Where the Executive Engineer is unable to hand over the structure as specified in paragraph (a), the Executive Engineer shall notify the same to the Magistrate and dispose of the structure on the instructions of the Magistrate with due respect and care.

(5) Where a mandatory order has been made under subsection (3) it shall be the duty of the Police to render all necessary assistance to the Executive Engineer in the execution of such order.

(6) The Executive Engineer shall be entitled to recover any reasonable expenses incurred by him in demolishing or removing any structure in pursuance of an order made by the Magistrate under subsection (3).

Determination of compensation in case of lands with buildings on it.

46. Where any addition to a structure which has been built under the authority of a licence under section 42, is situated on any portion of land of which possession for the public use is taken under sections 15 and 18 of this Act, the determination of the compensation payable in such case shall, notwithstanding anything to the contrary in the Land Acquisition Act, (Chapter 460) be subject to the following provisions :—

(a) where the whole of the structure is situated within the building limit, the value assigned to the structure as distinct from the land acquired shall be the value entered in the register under subsection (6) of section 42 or the market value of the structure at the time of the acquisition, whichever is the less and for the purpose aforesaid, such market value shall be the difference between the market value of the structure together with the land, and the market value at that time of the land as distinct from the structure :

(b) where only a part of the structure is situated within the building limit and the value entered in the register under subsection (6) of section 42 is the value of the entire structure in accordance with paragraph (a) of subsection (2) of section 47, the value assigned to that part of the structure, as distinct from the land acquired, shall be the value so entered or the market value of the entire structure at the time of the acquisition, whichever is the less: Market value shall for the aforesaid purpose be the difference between the market value of the entire structure with the land attached thereto at the time of acquisition, and the market value assigned at that time to the land so attached as distinct from the entire structure :

(c) where only a part of the structure is situated within the building limit and the value entered under subsection (6) of section 42 is the value of that part in accordance with paragraph (b) of subsection (2) of section 47 the value assigned to that part of the structure, as distinct from the land acquired, shall be the value so entered in the register or the value of the part of the structure within the building limit at the time of the acquisition, whichever is less, and for the purpose aforesaid such value shall be the aggregate of —

(i) the estimated cost of the severance and removal of that part of the structure at that time : and

(ii) the estimated cost in the case of a building, of adapting at that time the part of the building which will then remain to the purpose for which the building is used at that time, and in the case of a boundary wall or gateway, of completing at that time such additions or repairs as may be necessary :

(d) the value assigned to the land as distinct from the buildings thereon shall be the market value of the land at the time of the acquisition.

47. (1) The value of any structure, for the purpose of subsection (4) of section 42 —

Valuation of buildings &c., within building limits.

(a) shall be fixed by agreement between the Chief Engineer and the owner or owners of the structure ; or

(b) where it is not fixed by agreement, shall be determined by an arbitrator, appointed by the Provincial Director.

(2) In determining the value of any structure or any part thereof for the purposes of subsection (4) of section 42, the following principles shall be followed :—

(a) where any structure or any part thereof the removal of which would render the remaining part useless, is situated within the building limit of any road, public road or national highway, and where, for that reason, the removal of the entire structure will become necessary in the event of the road, public road or national highway being widened or deviated, the value of the entire structure shall be determined ; and such value shall be the difference between the market value of the premises, that is to say, of the structure together with the land attached thereto, at the time of the valuation, and the market value at that time of the land as distinct from the structure ;

(b) where only a part of a structure is situated within the building limit of any road, public road or national highway and after the severance and removal of such part, the remaining part will be capable of adaptation either to the original purpose of the structure or to any other purpose permitted by law, the value of the part within the building limit shall alone be determined and such value shall be the aggregate of —

- (i) the estimated cost of the severance and removal of that part of the structure ; and
- (ii) the estimated cost, in the case of buildings, of adapting the part of the building, which will then remain to the purpose for which the building was used at the time of the valuation, and in the case of a boundary wall, gateway or other structure or any basement or other underground structure or any pond, well or shaft of completing such additions or repairs as may be necessary ;

(c) where at the time of valuation of any structure, the value of such structure, is found to have been increased by any alteration or improvement effected in the structure, then notwithstanding that the alteration or improvement may have been authorized by a licence under subsection (3) of section 42, the amount of the increase shall not be taken into account unless the alteration or improvement was necessary for the maintenance of the structure in a proper state of repair.

(3) Every award or agreement made or entered into as the case may be, under subsection (1) in respect of the value of any structure or part thereof, shall specify the particular paragraph or paragraphs of subsection (2) in accordance with which the value aforesaid was fixed or determined.

48. (1) Where the right of the owner of the land, part of which is situated within the building limit of any road, public road or national highway, to erect a building on the land, is restricted by reason of the provisions of section 42, such owner, may if he desires to erect a building, make application to the Minister requesting that the portion of vacant land at the rear of his land, of sufficient extent to afford him building facilities of the same nature as he would have enjoyed had the provisions of section 45 not been in force, be acquired for him at his expense, and the Minister may, upon the recommendation of the Authority or the Director-General (acting under the delegation of the powers to him by the Authority) and after such inquiry as he may deem necessary, order that a specified extent of the portion of vacant land at the rear of the land of such owner be acquired for him and the provisions of sections 15 and 18 of this Act, shall thereupon apply for the purposes of the acquisition of such extent of land.

(2) All costs, charges and other expenses incurred in the acquisition of any extent of land in pursuance of an order under subsection (1) shall be paid by the owner of the land upon whose application such extent of a land is acquired.

Acquisition of adjacent land for owners affected by building limits.

Application of the provisions of sections 42 to 48.

49. (1) For the purposes of sections 42 to 48 a road, a public road or a national highway shall be deemed to be under the control of the Authority if it is maintained by the Authority from funds provided by the Authority. A certificate under the hand of the Director-General to the effect that any road, public road or national highway is under the control of the Authority shall be admissible in evidence and shall be *prima facie* evidence of that fact.

(2) For the purposes of sections 42 to 48 the expression "boundary wall" includes every structure of whatever material and in whatever manner constructed, and every fence of whatever description, which serves or is intended to serve the purposes of a boundary wall.

Obstruction.

encroachment &c. of a road, a public road or a national highway.

50. (1) The Executive Engineer may, where it appears to him that —

- (a) any road, public road or national highway has been obstructed or encroached ; or
- (b) that the boundary line of any road, public road or national highway has been altered without proper authority ; or
- (c) that any road, public road or national highway has been barricaded without proper authority.

by any person, direct such person by notice in writing to remove the said obstruction encroachment, alteration or barricade within the time as the Executive Engineer has specified in the Notice.

(2) Where any such obstruction, encroachment, barricade or alteration is not removed and the road, public road or national highway is not cleared or the boundary line is not restored within the time specified by the Executive Engineer, the Executive Engineer shall cause such obstruction, encroachment, barricade of alteration to be removed or cleared or restored as the case may be. Any expense incurred by the Executive Engineer in doing so shall be recovered from the offender as a debt due to the State.

(3) Where the Executive Engineer is unable or apprehends that due to any obstruction or resistance as will be or is likely to be offered, he will be unable to remove or clear to restore the road, public road or national highway of the obstruction, encroachment, barricade or alteration as the case may be, the Executive Engineer shall on application made in that behalf to the Magistrate's Court having jurisdiction over the area where the road, public road or national highway which was obstructed, encroached, barricaded or altered is situated, praying for an order of the Court directing the Fiscal to take down and remove or clear or restore such obstruction, encroachment, barricade or alteration as the case may be.

(4) Where an Order under subsection (3) is issued to the Fiscal by a Magistrate, he shall forthwith execute such Order and shall thereafter in writing report to Court such fact along with a narrative of the manner in which it was executed.

51. Any plan or survey made under the authority of the Director-General shall be admissible in evidence and shall be *prima facie* proof of the facts stated therein. Survey to be *prima facie* proof.

52. For the purpose of the application of the provisions of the State Lands (Recovery of Possession) Act, No. 7 of 1979 to any road or public road or national highway to which this Act applies — Application of the provisions of the State Lands (Recovery of Possession) Act.

(a) every written notice issued under any provision of this Act shall be deemed to be a notice served under section 3 of the State Lands (Recovery of Possession) Act, No. 7 of 1979 ;

(b) the expression "competent authority" in the State Lands (Recovery of Possession) Act No. 7 of 1979, shall be deemed to include a reference to the Director-General, Provincial Director, Chief Engineer or Executive Engineer as the case may be of the Authority ;

- (c) the expression "state lands" in the State Lands (Recovery of Possession) Act, No. 7 of 1979, shall be deemed to include a reference to every road or public road or national highway to which this Act applies.

Prescription Ordinance not to apply to lands required for a road, a public road or a national highway.

53. The Provisions of the Prescription Ordinance (Chapter 68) or of any other law relating to the acquisition of rights by virtue of possession or user shall not apply to road or public roads or national highways ; and no person shall be entitled to any exclusive rights of ownership, possession or user over or in respect of, a road or public road or national highway.

Protection of right to use a road, a public road or a national highway.

54. (1) It shall be the duty of the Authority to permit and protect the rights of the public to the use of any road, public road or national highway without any hindrance or inconvenience.

(2) It shall be the duty of the Authority to prevent, as far as possible, the temporary or permanent closure or obstruction of any road, public road or national highway.

Damaging a road, a public road or a national highway to be offence.

55. (1) Every person who, without lawful authority or excuse ---

- (a) digs a drain or excavates on any part of a road, public road or a national highway which consists of a carriageway ; or
- (b) removes the soil or turf from any part of a road, public road or a national highway except for the purpose of improving the road, public road or a national highway without the consent of the Executive Engineer or Chief Engineer ; or
- (c) lights any fire or discharges any material on a road, public road or a national highway, causing damage to the same ; or

- (d) operates a vehicle in such a manner that the materials projecting from the vehicle damages the carriageway of a road, a public road or a national highway,

shall be guilty of an offence under this Act and shall be liable on conviction after summary trial by a Magistrate in the case of a first offence to a fine not exceeding five thousand rupees and in the case of second or subsequent offence, to a fine not exceeding fifty thousand rupees and in the case of continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

(2) Every person who, without lawful authority or excuse damages, pulls down or obliterate a traffic sign, a traffic signal placed on or over a road, a public road or a national highway or a kilometer stone or a lamp post or a direction post or any other similar contrivance or device so placed on a road, a public road or a national highway, shall be guilty of an offence and shall on conviction after summary trial by a Magistrate be liable in the case of first offence to a fine not exceeding five thousand rupees and in the case of second or subsequent offence to a fine not exceeding fifty thousand rupees and in the case of a continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

Painting pictures &c. along a road, a public road or a national highway without lawful excuse an offence.

56. (1) Every person who, without either the prior consent of the Executive Engineer or without reasonable excuse, paints or inscribes or affixes or creates any picture, letter, sign, statue, hoarding or other mark upon the carriageway of a road, a public road or national highway or in a road, public road or national highway or on any road furniture shall be guilty of an offence and shall on conviction after summary trial by a Magistrate be liable in the case of first offence to a fine not exceeding five thousand rupees and in the case of second or subsequent offence to a fine not exceeding fifty thousand rupees and in the case of a continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

the case of a continuing offence to a fine of five thousand rupees for each day in respect of which such offence is continued after conviction.

59. (1) Every person who, without lawful authority or reasonable excuse, in any way willfully obstructs the passage of vehicles or pedestrians along a road, public road or national highway, shall be guilty of an offence and be liable on conviction after summary trial by a Magistrate to a fine not exceeding five thousand rupees and in the case of second or subsequent offence to a fine not exceeding fifty thousand rupees and in the case of the continuing offences to a fine of five thousand rupees for each day after conviction during which the offence is continued.

Obstruction of road, public road or national highway to be an offence.

(2) A police officer may arrest without warrant any person who is committing an offence under this section.

60. Every person who without lawful authority or excuse deposits sand, stone, timber or any other material on a road, public road or national highway, shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate in the case of first offence to a fine not exceeding five thousand rupees and in the case of second or subsequent offence to a fine not exceeding fifty thousand rupees and in the case of a continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

Depositing of sand, timber &c.. on a road, a public road or a national highway to be an offence.

61. (1) It shall be lawful for the Executive Engineer or a police officer to require the owner of the sand, stone, timber, or any other material so deposited within the right of way of the road, public road or national highway to remove or re-deposit the same or cause it to be removed or re-deposited, away from the road, public road or national highway.

Removal of sand, stone, timber &c..

(2) A person required to remove and re-deposit any sand, stone, timber or any other material under subsection (1) shall comply with the requirement within a period of three days.

(2) It shall be lawful for the Executive Engineer to remove any picture, letter, sign, statue, hoarding, notice or other mark referred to in the subsection (1).

57. (1) The Director-General may, having regard to the safety of the users of a road, a public road or a national highway, impose temporary load restrictions on any road, on any public road or on any national highway or section of a road, a public road or a national highway or on any bridge.

Director General to impose temporary load restrictions on a road, a public road or a national highway.

(2) A person who contravenes the provisions of subsection (1) shall be guilty of an offence and shall on conviction after summary trial by a magistrate, be liable, in the case of a first offence to a fine not exceeding ten thousand rupees and in the case of a second or subsequent offence to a fine not exceeding one hundred thousand rupees.

58. (1) Where the foot walk of a road, a public road or a national highway is damaged—

Damage and obstruction to foot walk by excavation &c..

(a) by, or in consequence of any excavation or other work being carried out on the land adjacent to the road, public road or national highway;

(b) by a motor vehicle being driven onto the road, public road or national highway.

the Executive Engineer may forthwith repair the damage and recover the expenses as are reasonably incurred by him in doing so, from the owner of the land or the person responsible for causing the damage.

(2) Where the foot walk of a road, public road or a national highway is obstructed by the parking of a vehicle, the person responsible for such parking shall be guilty of an offence under this Act and be liable on conviction after summary trial before a Magistrate to a fine not exceeding five thousand rupees and in the case of a second or subsequent offence to a fine not exceeding fifty thousand rupees and in

and if he fails to do so, he shall be guilty of an offence and shall be liable on conviction after summary trial by a magistrate in the case of first offence to a fine not exceeding five thousand rupees and in the case of a continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

(3) Where the owner fails to remove sand, stone, timber or any such material in compliance with the requirements set out in subsection (2), it shall be lawful for the Executive Engineer with the assistance of a police officer to cause such material to be removed to a suitable location away from the road, public road or national highway and to charge the costs of removal to the owner.

Restriction of planting trees, shrubs in or near a carriageway.

62. (1) Every person who, without the lawful authority or excuse, plants a tree or shrub in a made up carriageway, traffic island, shoulder or footwalk of a road, public road or national highway shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate in the case of the first offence to a fine not exceeding five thousand rupees and in the case of a continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

(2) It shall be lawful for the Executive Engineer to require the person who planted such tree or shrub to remove it within three days or cause it to be removed.

Executive Engineer may grant permission to plant trees, shrubs, grass, plants &c..

63. (1) The Executive Engineer may permit any person to plant and maintain shrubs, trees, grass and plants within a roundabout or traffic island or along the shoulders of a road, public road or national highway. Such permission shall be granted subject to the requirement that the trees, shrubs and plants shall be grown only to such a height as is specified taking into consideration the movement of traffic and pedestrians safety and the visibility of the road, public road or national highway to drivers or riders.

(2) The Executive Engineer may permit a person or a body of persons to undertake the planting and maintenance of a specified area along a highway. The person or body of persons so responsible shall be permitted to place a name board not exceeding zero point seven five (0.75) metres height from the ground indicating the name of such person or body or persons.

64. Any person who—

Depositing of droppings or things or pitching.

(a) deposits on the carriageway, foot walk or shoulder of a road, public road or national highway, any matter or rubbish; or

(b) pitches a booth, stall or stand on a road, public road or national highway; or

(c) sends waste water or any other liquid waste from a house, building or garden to any part of a road, public road or national highway,

shall be guilty of an offence under this Act.

65. Any person who, without lawful authority or excuse drops earth, sand, stone or any such material or spills water, oil or any such fluid while transporting it in a vehicle, on a road, public road or national highway, shall be guilty of an offence under this Act.

Dropping earth, sand or stones &c.. on a road, a public road or a national highway to be an offence.

66. No person other than a police officer or a member of the Armed Forces shall erect a gate or barrier across a road, public road or national highway without obtaining the prior permission of the Executive Engineer. Any person who so erects a gate or barrier shall be guilty of an offence under this Act.

Erection of barriers &c.. across a road, a public road or a national highway.

Preventing soil being washed onto a road, a public road or a national highway.

67. The Executive Engineer may, by notice in writing to the owner or occupier of a land adjoining a road, public road or national highway, require him, within twenty eight days of the date of service of the notice, to carry out such works thereon as are necessary to prevent soil or refuse from that land being washed or carried on to the road or a public road or national highway or into a gully thereof so as to damage or obstruct the road or public road or national highway or choke the gully. Any person who fails to give effect to such notice within the stipulated time period shall be guilty of an offence.

Power to remove projections &c, across a road, a public road or a national highway.

68. The Executive Engineer may, by notice to the owner or occupier of any building, require him to remove or alter any unauthorised porch, projecting roof, projecting window, step, wall, gate or any such thing and which has been erected or placed in front of a building which causes an obstruction to the safe passage of vehicles and pedestrians along a road, public road or national highway. Any person who fails to give effect to such a notice within a reasonable time, shall be guilty of an offence.

Notice of commission of offence to be given to Executive Engineer.

69. (1) Where an offence is committed under the provisions of sections 64, 65, 66, 67 and 68 the Executive Engineer shall on being informed of such fact, give notice in writing to the person committing the offence, that he shall forthwith take measures to stop or abate the commission of the offence.

(2) If the person on whom notice is served under subsection (1) fails to comply with the requirements therein, such person shall be subject to summary trial by a Magistrate and shall on conviction be liable to a fine not exceeding ten thousand rupees and in the case of a continuing offence be liable to a fine of rupees five thousand for each day after conviction during which the offence is so continued.

(3) Where an offence under sections 64 to 68 is continued the Magistrate may issue a Mandatory Order authorizing the Executive Engineer to demolish or remove the structure or thing which is the subject of the offence. The Executive Engineer shall with the assistance of the Police cause such structure or thing to be removed and recover the cost so incurred from the offender.

70. (1) No person shall put-up any door or gate upon any premises to open outwards on to a national highway except with written consent of the Executive Engineer given in exceptional circumstances with the concurrence of the Chief Engineer.

Doors along a road, a public road or a national highway not to open outwards.

(2) Where a door or gate is put-up in contravention of subsection (1), the Executive Engineer may, by notice to the occupier, require him to alter the door or gate, so as not to open outward on to the national highway.

(3) A notice under subsection (2) may be served on the owner of the premises instead of on the occupier or may be served on both the owner and the occupier of the premises.

(4) Any person aggrieved by the refusal of consent under subsection (1) or by a requirement of a notice under subsection (2) may appeal to the Provincial Director.

(5) Subject to any order made on appeal, if a person on whom notice is served under subsection (2) requiring him to comply with the notice, fails to comply with the requirement of the notice within fourteen days from the date of service of the notice he shall be guilty of an offence and shall on conviction after summary trial by a Magistrate, be liable to a fine not exceeding one thousand rupees.

(6) Where a notice has been served upon any person under subsection (2) and he is guilty of an offence under subsection (5), then whether or not proceedings are instituted

against him in respect of the offence, the Executive Engineer may carry out the work required by the notice and recover the expenses reasonably incurred by him in so doing from the owner or occupier of the premises.

71. (1) Where a tree, shrub or hedge overhangs a road, public road or national highway in such a manner as to obstruct or endanger the passage of vehicles or any user of a road, public road or national highway or interferes with the view of drivers of vehicles or the light from a public lamp, the Executive Engineer may, by notice issued either to the owner or occupier of the land on which the tree, shrub or hedge is located, require him within seven days to top or cut it so as to remove the cause of the danger or interference as the case may be.

Cutting and felling of trees overhanging onto a road, a public road or a national highways.

(2) Any person aggrieved by a notice under subsection (1) may appeal to the Provincial Director.

(3) Subject to any order made on appeal, if a person to whom a notice is served under subsection (1), fails to comply with the requirements of the notice within the specified period, the Executive Engineer may carry out the work required to be made by the notice and recover the expenses reasonably incurred in so doing from such person.

72. (1) If an animal is at any time found straying or lying on or within the reservation of a road, a public road or a national highway, its keeper or owner or both shall be guilty of an offence.

In this section 'keeper' in relation to an animal means the person in whose possession the animal is or should have been.

(2) Any person guilty of an offence under subsection (1), shall be liable on conviction after summary trial by a Magistrate to a fine not exceeding one thousand rupees for the first offence and a fine not exceeding five thousand rupees for every subsequent offence.

(3) Any animal straying or lying on the national highway shall be seized by a cattle seizer authorized by the Executive Engineer and shall be tied in a premises owned or rented by such authorized Cattle Seizer and approved by the Executive Engineer :

Provided that such authorized Cattle Seizer is on contract with the Executive Engineer and every such animal seized by him shall be reported forthwith by the Executive Engineer to the nearest Police Station and to the Magistrate having jurisdiction over such place.

(4) The Executive Engineer shall ensure the safe custody of the animal seized and shall ensure the feeding of such animal.

(5) No such animal seized shall be delivered to the owner unless upon the payment of the fine imposed by the Magistrate.

(6) If no person claims the animal and pays the fine within seven days from the date of imposition of such fine, it shall be lawful for the Executive Engineer, to sell the animal by public auction and pay the proceeds from such sale to the Magistrate having jurisdiction over such place to be credited to the Consolidated Fund after the expenses reasonably incurred by the Executive Engineer in connection with seizing and feeding the animal being recovered.

(7) If a person, without lawful authority or excuse, releases any animal seized for the purpose of being impounded or already impounded or damages any place where the animal is impounded, he shall be guilty of an offence and be liable on conviction after summary trial by a Magistrate in the case of first offence to a fine not exceeding five thousand rupees and in the case of a continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

Executive Engineer may require occupier of premises to do certain acts.

75. (1) The Executive Engineer may, by notice to the occupier of a premises adjoining a road, a public road or a national highway, require him within twenty eight days from the date of service of the notice to construct or erect and thereafter maintain such gutters as may be necessary to prevent water from the roof or any other part of the premises falling upon the road, public road or the national highway.

(2) A person aggrieved by a requirement of a notice made under this section may appeal to the Divisional Secretary of the area.

(3) Subject to any order made on appeal, if a person to whom notice is served under this section fails to comply with the requirements of the notice within the period of time specified in subsection (1), he shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate to a fine not exceeding one thousand rupees and if the offence is continued after conviction, he shall be guilty of a further offence and be liable to a fine not exceeding one hundred rupees for each day on which the offence is so continued.

License to be obtained for the erection of scaffoldings &c. on road, a public road or a national highway.

76. (1) No person shall, in connection with any building or demolition or alteration, repair, maintenance or cleaning of any building, erect or retain, on or over a road, public road or national highway any scaffolding or other structure which obstructs the road or public road or national highway, unless he is authorized to do so by a licence issued by the Executive Engineer and complies with the terms and conditions of the licence.

(2) If a person applies to the Executive Engineer for a licence in respect of any structure referred to in subsection (1) and furnishes the Executive Engineer with such particulars relating to the structure as the Executive Engineer

73. (1) If a person without lawful authority or excuse deposits or throws anything whatsoever on or onto a road, public road or national highway as a result of which a user of a road, public road or national highway is injured or likely to be injured or endangered, he shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate in the case of first offence to a fine not exceeding five thousand rupees and in the case of a continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

Depositing or throwing anything onto a road, a public road or a national highway to be an offence.

(2) If a person without lawful authority or excuse, lights any fire or discharges any fire work so as to injure or endanger a user of a road, public road or national highway, he shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate in the case of first offence to a fine not exceeding five thousand rupees and in the case of a continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

(3) If a person without lawful authority or excuse, allows any dirt, filth or offensive matter or thing to run or flow unto a road, public road or national highway from any premises, he shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate to a fine not exceeding five thousand rupees and in the case of a continuing offence to a fine of five thousand rupees for each day after conviction during which the offence is continued.

Placing ropes across a road, a public road or a national highway to be an offence.

74. A person who places a rope or any apparatus across a road or public road or national highway, for any purpose in such a manner so as to cause danger to users of a road or a public road or a national highway shall, unless he proves that adequate warning of the danger was given by him to such users, be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate to a fine not exceeding two thousand rupees.

may reasonably demand, it shall be the duty of the Executive Engineer to issue a licence unless he considers—

- (a) that the structure would cause an obstruction to a road, public road or national highway ; and
- (b) that a structure erected otherwise than as proposed by the applicant would cause less obstruction to the road, public road or national highway than the proposed structure.

(3) If on an application for a licence under subsection (2), the Executive Engineer refuses to issue a licence or issues a licence containing terms to which the applicant objects, the applicant may appeal to the Provincial Director against the refusal or the terms of the licence and on such appeal the provincial Director may—

- (a) in the case of an appeal against a refusal, direct the Executive Engineer to issue a licence in respect of the application ; or
- (b) in the case of an appeal against the terms of the licence, alter or vary the terms.

(4) It shall be the duty of a person to whom a licence is issued by the Executive Engineer in respect of a structure—

- (a) to ensure that the structure is adequately lit during the hours of darkness; and
- (b) to comply with any directions given to him in writing by the Executive Engineer with respect to the erection and maintenance of any traffic control devices.

(5) A person who contravenes the provisions of subsection (1) or who fails without reasonable excuse to comply with the terms of a licence issued under subsection (1) or to

perform a duty imposed on him under subsection (4), shall be guilty of an offence and shall on conviction after summary trial by a Magistrate be liable to a fine not exceeding five thousand rupees.

77. (1) A person may, with the consent of the Executive Engineer, temporarily deposit building materials or other things on a road, public road or national highway or make temporary excavations in it.

Depositing of building materials &c.. along a road, a public road or a national highway to be done with consent of the Executive Engineer.

(2) The Executive Engineer may give his consent under subsection (1), subject to such conditions as he thinks fit, including in particular, conditions for preventing damage or ensuring access, to utility services.

(3) Any person aggrieved by the refusal of consent under subsection (1) or any person to whom such a consent is given, subject to conditions, may appeal to the Provincial Director, against the refusal or the conditions, as the case may be.

(4) It shall be the duty of the person who makes such a deposit or excavation under subsection (1), to comply with any directions given to him in writing by the Executive engineer with respect to the erection and maintenance of traffic signs in connection with such deposit or excavation.

(5) Where a person places any building materials or any other thing on, or makes an excavation in a road, public road or national highway he shall not allow the obstruction or excavation to remain in the road, public road or national highway any longer than the period allowed by the Executive Engineer and in addition he shall—

- (a) ensure that the obstruction or excavation to be properly fenced and to be properly lit during the hours of darkness; and
- (b) if required by the Executive Engineer, remove the obstruction or fill in the excavation.

- (6) any person who—
- (a) without reasonable cause or excuse fails to comply with any condition subject to which a consent is given under subsection (1); or
- (b) without reasonable cause or excuse fails to perform the duty imposed on him under subsection (4); or
- (c) fails to perform a duty imposed on him under subsection (5),

shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate to a fine not exceeding five thousand rupees in respect of each day on which such contravention or failure occurs.

Precautions to be taken when carrying out road works.

78. (1) A person or contractor who is responsible for executing works on a road or public road or national highway shall—

- (a) erect such barriers and traffic signs as are required by the Executive Engineer for preventing danger to traffic, for regulating traffic and warning traffic of danger, until the work is completed and shall remove them as soon as the work is completed; and
- (b) ensure that the works to be properly guarded and lit during the hours of darkness.

(2) If any person or contractor fails to comply with requirements of subsection (1), he shall be guilty of an offence and, shall on conviction after summary trial by a Magistrate be liable to a fine not exceeding five hundred rupees in respect of each day on which failure continues.

(3) Any person who, without lawful authority or excuse—

- (a) takes down, removes or alters any barrier, traffic sign, or light erected or placed in pursuance of

subsection (1), for the purpose of warning the users of a road, public road or national highway of any obstruction or for the purpose of protecting the users of the road, public road or national highway from danger arising out of an obstruction; and

- (b) extinguishes a light so placed.

shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate to a fine not exceeding four thousand rupees.

PART VIII

USE OF EXPRESSWAYS AND RESTRICTED ACCESS HIGHWAYS

79. (1) A person shall not walk on an expressway or a restricted access highway. Prohibited users.

(2) On an expressway or a restricted access highway, a person shall not —

- (a) ride or take an animal other than an animal being conveyed in a motor vehicle or the trailer of a motor vehicle; or
- (b) drive a three wheeler, hand tractor or ride or take a bicycle; or
- (c) drive a vehicle other than —
- (i) a motor vehicle; or
- (ii) the trailer of a motor vehicle; or
- (d) drive a vehicle or combination of vehicles that is or are not capable of attaining and maintaining on a level road such speed as is prescribed; or

- (e) drive a vehicle of a prescribed type.
- (3) The driver of a vehicle on an expressway or restricted access highway shall not make a "U" turn except at a place indicated by a sign permitting "U" turns.
- (4) For the purpose of subsection (3) a "U" turn occurs when a vehicle turns to travel in the opposite direction along the same or a parallel carriageway.
- (5) The provisions of this section shall not apply to any person engaged in maintenance or construction work on an expressway or a restricted access highway.
- (6) A person who fails to comply with requirements of this section shall be guilty of an offence and be liable on conviction after summary trial by a Magistrate in the case of first offence to a fine not exceeding five thousand rupees and in the case of a second or subsequent offence, to a fine not exceeding fifty thousand rupees.

PART IX

OPERATION AND MAINTENANCE OF ROADS BY THE USER COMMUNITY

- Maintenance of roads by community based organizations.
80. (1) The Minister may, whenever it appears necessary so to do for ensuring the participation of all persons living in the area or in the human settlement within any Divisional Secretariat Division by Order, published in the *Gazette*, handover the operation and maintenance of any road or public road other than a national highway to a community based organization formed by such persons.
- (2) An Order referred to in subsection (1) shall specify the length and width of such road and road reservations if any.
- (3) Before an Order under subsection (1) is published in the *Gazette* the Executive Engineer shall sign an agreement with the relevant community based organization.

- (4) The terms and conditions of the agreement referred to in subsection (3) shall *inter alia* include —
- (a) the provision of technical or financial assistance to the community based organization by the Authority or the relevant Divisional Secretary or the relevant Local Authority ;
- (b) directions for the receiving of donations and contributions by the community based organization;
- (c) the administration and auditing of the accounts of the community based organization ;
- (d) the duties and obligations of the community based organization, the user community the Authority, the relevant Divisional Secretary and the relevant Local Authority towards the operation and maintenance of such road.

PART X

MISCELLANEOUS

81. (1) Every notice required to be served under this Act shall be in the Sinhala, Tamil and English Languages. Language of notices.
- (2) Every notice addressed to any person may be sent by registered post or served personally upon such person or such notice may be left with some member of his household or it may be affixed to some conspicuous part of his house and a notice served in any of foregoing methods shall be deemed to be personal service.
82. (1) The driver of a vehicle entering an expressway or restricted access highway shall — Entering and leaving an expressway.
- (a) if there is no acceleration lane, give way to vehicle traveling on the expressway or restricted access highway ;

(b) if there is an acceleration lane, use it and when merging into the traffic on the expressway or restricted access highway, show due diligence not to endanger other road users.

(2) The driver of a vehicle leaving an expressway or restricted access highway shall —

(a) move into the traffic lane appropriate to the expressway or restricted access highway exit in proper time ; and

(b) enter the deceleration lane, if there is one, as soon as is practicable.

(3) The driver of a vehicle shall not enter an expressway or a restricted access highway at a place other than at the authorized access point.

(4) A person who fails to comply with requirements of this section shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate in the case of first offence to a fine not exceeding five thousand rupees and in the case of a second or subsequent offence to a fine not exceeding fifty thousand rupees.

Stopping of vehicles.

83. (1) A driver of a vehicle on an expressway or restricted access highway shall not stop the vehicle except —

(a) at a marked parking site in accordance with any restrictions applying to the use of that site ;

(b) where necessary to avoid injury to a person or damage to property ;

(c) in obedience to a signal or other instruction which the person is required by law to obey ;

(d) where necessary for the purpose of facilitating the carrying out of maintenance or construction on the expressway or restricted access highway authorized by the Authority ;

(e) where the vehicle is so disabled that it is impossible to avoid stopping ;

(f) where the vehicle is stopping in compliance with a request to render assistance to a disabled vehicle ;

(g) where the person is reporting a traffic accident or other situation or incident to the police, the Authority or other traffic authority, either directly or by means of an emergency telephone or similar device ; or

(h) where the vehicle is being operated in accordance with an agreement with the Authority to remove impediments to traffic.

(2) A driver of a vehicle which is stopped on an expressway or restricted access highway shall move the vehicle off the carriageway.

(3) A person who is unable to move a stopped vehicle off the carriageway and roadside of an expressway or restricted access highway as required by subsection (2) shall signal the presence of the vehicle by means of a triangle warning device at a distance, sufficient to provide adequate warning to the drivers of approaching vehicles.

(4) A person who fails to comply with requirements of this section shall be guilty of an offence and be liable on conviction after summary trial by a Magistrate in the case of first offence to a fine not exceeding five thousand rupees and in the case of a second or subsequent offence to a fine not exceeding fifty thousand rupees.

Restriction on
placing beams
&c..

84. (1) No person shall place or fix any traffic sign, overhead beam, pipe, cable, wire, gantries hoardings or rail or other similar apparatus over, along or across a road, a public road or a national highway without the consent of the Executive Engineer. The Executive Engineer may when giving his consent attach such reasonable terms and conditions thereto as he thinks fit.

(2) Subject to subsection (3) a person aggrieved by the refusal of a consent under subsection (1), or by the terms and conditions attached to such a consent, may appeal to the Provincial Director.

(3) No appeal lies under subsection (2) against any term or condition attached by the Executive Engineer to a consent given by him under this section, if he declares the terms or condition to be necessary for the purpose of ensuring the safety of persons using a road, public road or national highway to which the consent relates or for preventing interference with traffic thereon.

(4) A person who contravenes the provisions of subsection (1), or the terms or conditions of any consent given thereunder shall be guilty of an offence and be liable on conviction after summary trial by a Magistrate to a fine not exceeding five hundred rupees for each day on which the offence is so continued.

Control of
constructions
&c..

85. (1) No person shall construct a vault, mine, pit or any such thing under any road, public road or national highway without the consent of the Executive Engineer, and Executive Engineer may, by notice served on a person who has constructed a vault, mine, pit or any such thing in contravention of the provisions of this section require him to remove it or to alter or modify it, as specified in the notice.

(2) No person shall carry out any excavation exceeding three meters in depth, within a distance of fifty meters from the centre of a road, public road or national highway without the consent of the Executive Engineer.

(3) No person shall carry out any sand mining at or near any bridge, causeway or any structure within a distance of one hundred and fifty meters from the extreme edge of the bridge, causeway or structure, or at or near any road, public road or national highway within a distance of one hundred meters from the extreme edge of the roadway without the consent of the Executive Engineer.

(4) A person aggrieved by a refusal of consent or by a requirement of a notice under subsection (1), may appeal to the Divisional Secretary.

(5) Any person who contravenes the provisions of subsection (1), (2), or (3) shall be guilty of an offence and shall be liable on conviction after summary trial by a Magistrate to a fine not exceeding two thousand rupees.

(6) Subject to an order made on appeal, if a person fails to comply with a requirement of a notice served on him under subsection (1), or with the provisions of subsection (2) or (3), he shall be guilty of a further offence and shall be liable on conviction after summary trial by a Magistrate to a fine not exceeding five hundred rupees for each day during which the failure continues.

(7) It shall be lawful for the Executive Engineer to close any vault, mine, pit or any such thing constructed in contravention of the provisions of subsection (1), (2) or (3) and to recover expenses reasonably incurred by him in so doing from the offender.

86. (1) The Minister may, for reason to be stated, by Order published in the Gazette, prohibit or restrict access by the public to or from any public road or national highway or any part of such public road or national highway.

Power to restrict
access to a road,
a public road or
a national
highway.

(2) Upon the making of an Order under subsection (1) no person shall connect any access way to that public road or national highway, without the approval in writing of the Executive Engineer given in concurrence with the Chief Engineer of the relevant District.

(3) Any person who contravenes the provisions of subsection (2) shall be guilty of an offence and shall on conviction after summary trial before a Magistrate be liable to a fine not exceeding twenty five thousand rupees. He shall also be liable to pay to the Executive Engineer the cost incurred by the Engineer in restoring the public road or national highway to its original state by removing the connection made by such person.

(4) The Executive Engineer may, where he deems it expedient in the circumstances in lieu of instituting action under subsection (3) —

- (a) require the offender to forthwith remove the connection made by him and restore the public road or national highway to its original state ; or
- (b) if the offender fails to remove the connection made by him, proceed to remove such connection and take steps to restore the public road or national highway to its original state and recover the cost incurred by him in doing so, from the offender.

87. Notwithstanding anything to the contrary in any other written law, it shall be the duty of any individual, authority or institution, granting licences for carrying on any business abutting any road, public road or national highway, to obtain the consent of the Executive Engineer of the area before issuing such licence.

Clearance of Executive Engineer essential.

88. It shall be the duty of all police officers and all Grama Niladharis to aid and assist in the prevention of any offence as may be committed in contravention of the provisions of this Act within their respective jurisdictions.

Duty of Police officers and Grama Niladharis.

89. (1) The Minister may make regulations for the purpose of carrying out or giving effect to any matter which is prescribed under this Act, or in respect of which regulations are required to be made.

Regulations.

(2) In particular and without prejudice to the generality of the powers conferred on him by subsection (1), the Minister may make regulations in respect of all or any of the following matters, namely :—

- (a) the speed which a motor vehicle must be capable of attaining in order to use a expressway or restricted access highway ;
- (b) the types of vehicle which may be used on a road, a public road, national highway or expressway or restricted access highway ;
- (c) the collection and payment of fees in respect of user fee national highways ;
- (d) the form to be used in giving notice of infringement of the provisions of this Act ;
- (e) restrictions on the use of national highways or expressways or restricted access highways including the time at which prescribed vehicles may not be used on national highways or expressways or restricted access highways ;
- (f) the prevention of ribbon development along the roads, public roads or national highways or expressways or restricted access highways ;
- (g) duties and obligations of the Authority under the agreements it may enter in pursuant to section 12 of this Act.

(3) Every regulation made by the Minister shall be published in the *Gazette* and shall come into operation on the date of such publication or on such later date as may be specified therein.

(4) Every regulation shall, as soon as convenient after publication in the *Gazette* be brought before Parliament for approval. Any regulation which is not so approved shall be deemed to be rescinded as from the date of the disapproval, but without prejudice to anything previously done thereunder.

(5) Notification of the date on which any regulation made by the Minister is so deemed to be rescinded, shall be published in the *Gazette*.

90. (1) Thoroughfares Ordinance (Chapter 193) shall be repealed with effect from appointed date.

Repeal of
Thoroughfares
Ordinance and
Transitional
Provisions.

(2) Notwithstanding the repeal of the Thoroughfares Ordinance (Chapter 193) —

(a) all contracts and agreements entered into under the Thoroughfares Ordinance (hereinafter referred to as the "repealed Ordinance") and subsisting on the day preceding the appointed date shall be deemed, with effect from the appointed date to be contracts and agreements entered into by the Authority and may be enforced accordingly ;

(b) all actions, matters, proceedings or things instituted under the repealed Ordinance and pending on the day preceding the appointed date shall be deemed, with effect from the appointed date to be proceedings instituted by or against the Authority and may be enforced accordingly ;

(c) all decrees or orders entered by any court or tribunal under the repealed Ordinance shall be deemed with effect from the appointed date to be decrees or orders entered by or against the Authority and may be enforced accordingly ;

(d) all declarations, notifications, licences and orders made or issued under the repealed Ordinance and subsisting on the day immediately preceding the appointed date, shall be deemed with effect from the appointed date to be declarations, notifications, licences and orders made or issued under the provisions of this Act and shall be construed accordingly.

91. In the event of any inconsistency between the Sinhala and Tamil texts of this Act, the Sinhala text shall prevail.

Sinhala text to
prevail in case
of inconsistency.

92. In this Act, unless the context otherwise requires — Interpretation.

"carriageway" means the travel way of a road, a public road or a national highway designed for use by vehicular traffic and does not include the shoulder and verge ;

"centre of the national highway for a single carriageway" means the centre of the carriageway as determined in the survey plan or as determined by the Executive Engineer at the site ;

"centre of the national highway for a dual carriageway" means the centre of the centre median of the national highway ;

"Chief Engineer" means the Chief Engineer of the Road Development Authority designated under the Road Development Authority (Special Provisions) Act, No. 5 of 1988 ;

"Director-General" means the Director-General of the Road Development Authority appointed under section 12 of the Road Development Authority Act, No 73 of 1981 ;

"Executive Engineer" means the Executive Engineer of the Road Development Authority for any division designated under the Road Development Authority (Special Provisions) Act, No. 5 of 1988 ;

"inter changes" means the points along an expressway or a restricted access highway at which access may be gained by motor vehicles to or from other public roads ;

"prescribed" means prescribed by regulation made by the Minister in charge of the subject ;

"Provincial Director" means the Provincial Director of the Road Development Authority for any Province ;

"public road" means any road intended for normal motor vehicular traffic including national highways, except the streets within a Town Plan area or Municipality Plan area ;

"reservation" in relation to a road, a public road or national highways means all land adjoining and beyond the drains or the verge of a public road or highway or national highway which has been reserved for its safety, protection and benefit and for the future development of the road, public road or national highway ;

"right of way" includes the carriageway, shoulders, verge drains and the reservations of a road or public road or national highway ;

"road" includes —

- (a) all public carriageways, fly overs, viaducts, interchanges, cart ways and pathways, as well as all bridges, drains and embankments, causeways and ditches belonging or appertaining to a road ;

(b) all land adjoining any road, which has been reserved for its protection or benefit ;

(c) all land which has been marked off and reserved for the construction of any road ; and

(d) all waste land which, not being private property, lies within a distance of ten metres of the centre of public carriageways and cart ways and three metres of the centre of public pathways. (The burden of proving that such waste land is private property lying on the person asserting the same ;)

"Road Development Authority" means Road Development Authority established under the Road Development Authority Act, No. 73 of 1981 and shall be deemed to include any Authority or other body which may be established by or under any written law, in place of the Road Development Authority, or to which the powers in relation to "roads" or any part thereof presently exercised by the Road Development Authority may be transferred ;

"user-fee national highway" means, an expressway, in respect of which a fee is chargeable from the users thereof or part thereof ;

"vehicle" means a conveyance that is designed to be propelled or drawn by any means whether or not it is capable of being so propelled or drawn and includes —

(a) a bicycle or other pedal powered vehicle ; and

(b) a trailer ;

"works" means all road works and shall include ---

- (a) works associated with the erection or creation of a structure ;
- (b) creation, modification or felling of a trench ;
- (c) earthwork ;
- (d) interference with land or a structure.

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.

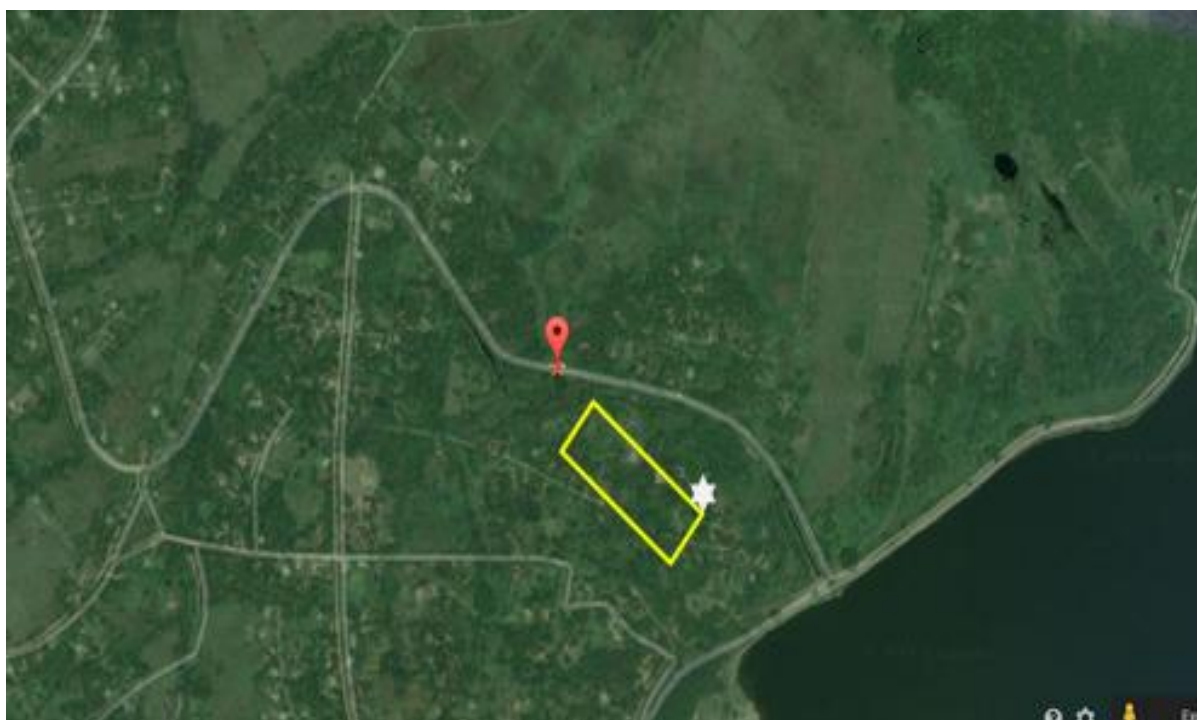


FIGURE 1 GOOGLE MAP OF PROPOSED WATER INTAKE AND THE WTP

The Estimated requirement for distribution under the first phase of the project is 9,900m³ per day and this will rise to about 19,000m³ 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.

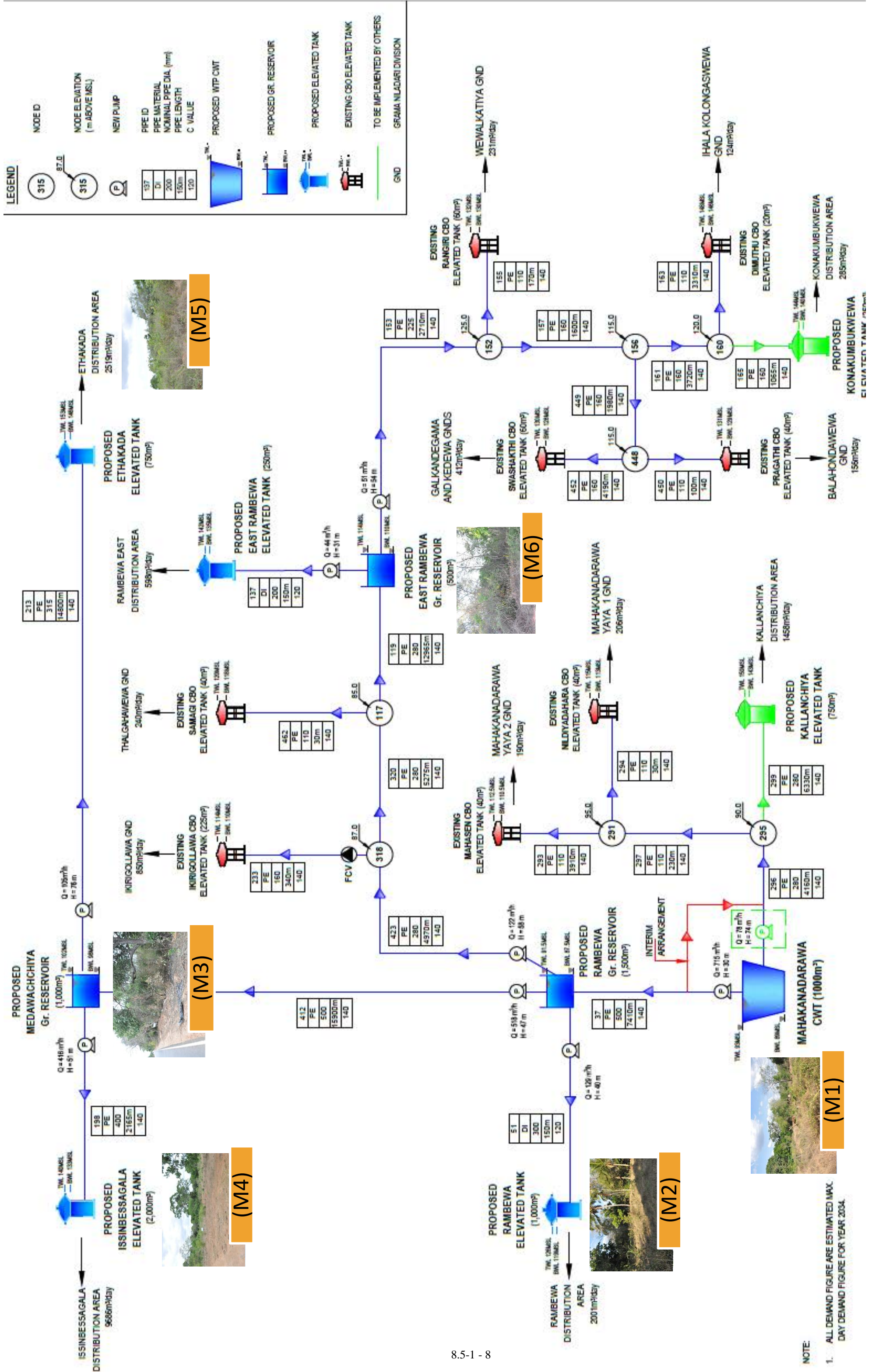


FIGURE 2. PROPOSED SCHEMATIC DIAGRAM FOR THE "TREATED WATER TRANSMISSION SYSTEM" AND THE EXISTING ENVIRONMENT OF THE SITE LOCATIONS

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.

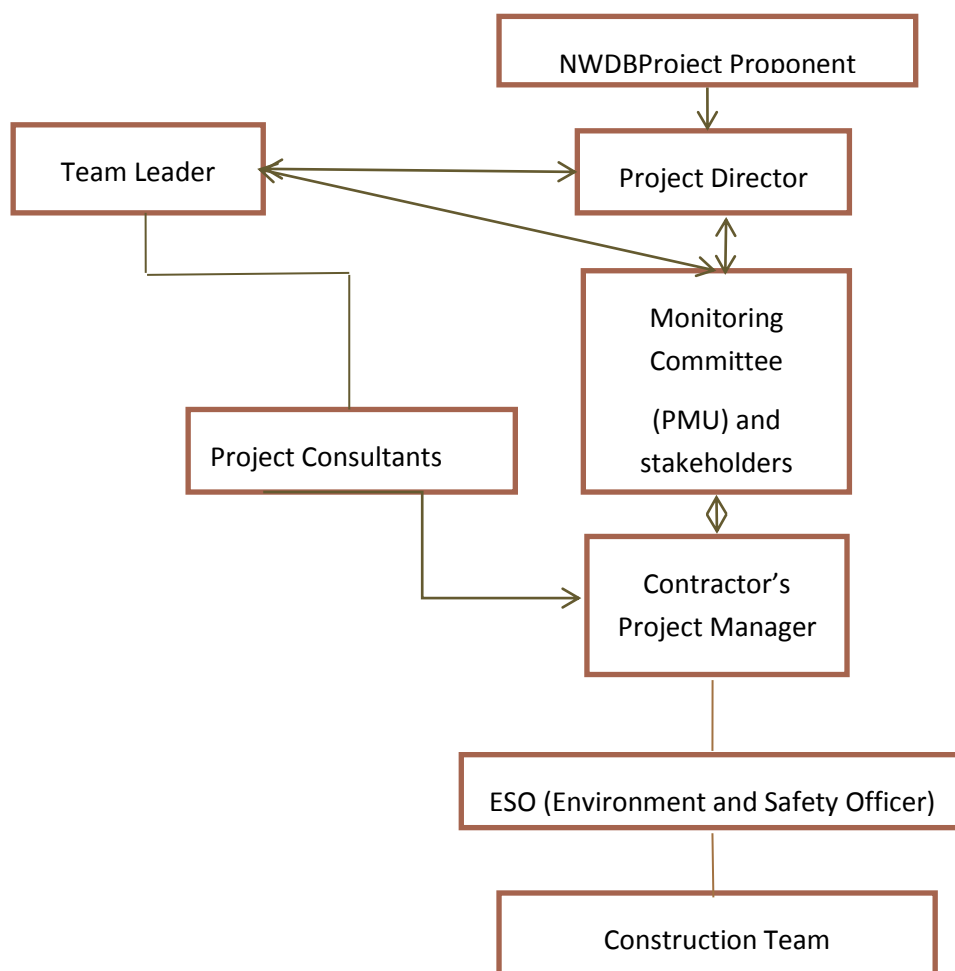


FIGURE 3 PROPOSED ORGANIZATIONAL ARRANGEMENT FOR THE IMPLEMENTATION OF THE EMP

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 all 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 ACTIVITIES

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	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. 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	General ecos system and environmental practices as recommended in code of conduct	Where clearance of land is needed	Wildlife department, CEA	PMU, Wildlife department, CEA	No additional Payment		
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 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		NWSDDB, PCEA, RDC,	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		NWSDDB, HO		No additional Payment
		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		Where pre construction activities are taking place		ESO/Contractor	PMU	No additional Payment
	Contaminants	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	Vehicle maintenance procedure and road worthiness inspections		During the usage of vehicles			No additional Payment
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	NWSDDB,	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)							
A. Effect on physical environment										
Construction phase	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. 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	Inspection of vehicles road worthiness certificate Dust levels to be monitored visually during dry period extending for	At the project contractors office Where there is sensitive public buildings or activities	Whenever new vehicle is enlisted Every week during the dry weather and windy conditions	ESO Contractor	PMU	No additional Payment
		Emission of dust from the site during construction will cause air pollution.	Minor (common)							

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					
				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					No additional Payment
				To sprinkle water to prevent the dust during dry periods.	Transport routes and excavated areas				PMU	
				Guidance of proper installation must be followed						
			Minor (rare)	Safety training on this matter should be given to laborers						
		Leakage of Chlorine gas can cause adverse effects during construction		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					No additional Payment
			Minor and temporary (common)	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		Work sites	At the time of vehicle enlisting or replacement	ESO/Contractor	PMU	No additional Payment
	Leakage of Chlorine gas									
	Vehicles and machinery	Heavy equipment and trucks for construction will increase noise and vibration								

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
				<p>guidelines, to keep noise from these at a minimum level.</p> <p>Unnecessary idling must not be allowed</p> <p>Route of transportation must be properly and regularly examined to prevent noise or other effect on vicinity.</p>						
	Construction Work	Construction activities will generate noise and vibration	Minor (temporary)	<p>Actions should be taken to avoid noise and vibration generating activities at nighttime and during festival times.</p> <p>If generators are to be used for construction work use sound proof or minimizing devices</p>	<p>Measure Noise levels during construction from the boundary of the sites</p>	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	<p>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.</p>	Medium (common)	<p>Proper guidelines must be given to contractors and the ESO for protecting water bodies from being polluted</p> <p>Avoid/ minimize construction works near/ at such drainage or water bodies during heavy rain seasons</p>	<p>Water bodies near the construction sites to be inspected on monthly basis.</p> <p>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.</p>	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)	<p>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</p> <p>Turbid water generated by earthwork can be leached to water bodies</p>	<p>General practices along the excavation sites and construction sites to be monitored for signs of erosions</p>	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 Contamination of water can occur due to fuel and lubricants emitted during construction and also from transportation vehicles	Minor (remote)	Oil and grease should be collected separately in a container. 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. 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)	Vehicle service records from the hired vehicles to be made mandatory for hiring	Work sites Work sites	Monthly Monthly	Contractor Contractor	PMU PMU	No additional Payment No additional Payment
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 The temporarily 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	Waste generation	Work sites	Monthly	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
				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 will be generated by the laborer's activities	Minor (common)	Domestic waste is placed at the temporarily 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, 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 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 activities 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		<p>Pipe laying work on the road is planned carefully to prevent inconvenience as much as possible without hindering accessibility</p> <p>Refraining from working during peak hours should be done to prevent road traffic blocks</p> <p>It would be useful if a public notice is given prior to construction</p> <p>The maintenance and rehabilitation of any irrigation canal during construction should not cause inconvenience to the livelihood</p> <p>The maintenance and rehabilitation of any access roads during construction should not cause inconvenience to the livelihood</p>	<p>Review Construction process</p> <p>Review Traffic control</p>	<p>Road sides</p> <p>Road sides</p>	<p>When traffic is to be blocked to lay pipelines</p>			
<p>F. Effect on the working condition for the workers</p>										
		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
	Occupational Safety	Workers can be affected by poor sanitary facilities and vector control in workers camps	Minor (common)	<p>Locating, sanitation and waste disposal in construction camps</p> <p>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</p>	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
				<p>satisfaction of the relevant norms. Compliance with the relevant regulations and guidelines issued by the CEA/LA shall be strictly adhered to.</p> <p>Training and awareness program for laborer should be done</p> <p>Necessary measures shall be taken to prevent breeding of vectors at work sites</p> <p>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.</p> <p>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.</p> <p>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</p>	<p>No of training programs and number of workers participated</p> <p>General sanitary conditions</p>	<p>Work place</p>	<p>When new contract is signed</p>			

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
<p>G. Traffic Control during construction phase</p>										
	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. 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.	Traffic flow during construction times and adequacy of warning signage	All affected road sides	When needed	NWSDB	NA	No additional Payment
					No monitoring task	Road sides	Before road work begins at the planning time			
<p>A. Impact on physical environment (air, water and land)</p>										
Operational phase	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 Safety training should be given to the laborer	Conditions of the gas storage and its monitoring devises	Storage rooms	During storage	NWSDB, RSC	NWSDB HO	No additional Payment
	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). Measures should be taken to minimize dust during handling of material during operational phase				NWSDB, RSC	NWSDB HO	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
				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. Low noise/ vibration pump and generator must be used as specified in tender document.				NWSDB RSC	NWSDB HO	No additional Payment
	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 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.	Water quality standards as specified in CEA regulations	Discharged point of WTP	Weekly	NWSDB RSC	NWSDB HO	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
				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 Garbage bins must be provided in the work sites and regularly emptied and the garbage disposed off in a hygienic manner.	Domestic garbage disposal	Work sites	Regularly Regularly	NWSDB RSC	NWSDB HO	No additional Payment
	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 Dried sludge should be dumped by the contract with the approval of land owner	Sludge produced	Sludge beds in WTP	Regularly	NWSDB RSC	NWSDB HO	No additional Payment
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 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.				NWSDB RSC	NWSDB HO	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
	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. In every workplace and labour camps portable water shall be available throughout the day in sufficient quantities.				NWSDB RSC	NWSDB HO	No additional Payment

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	-

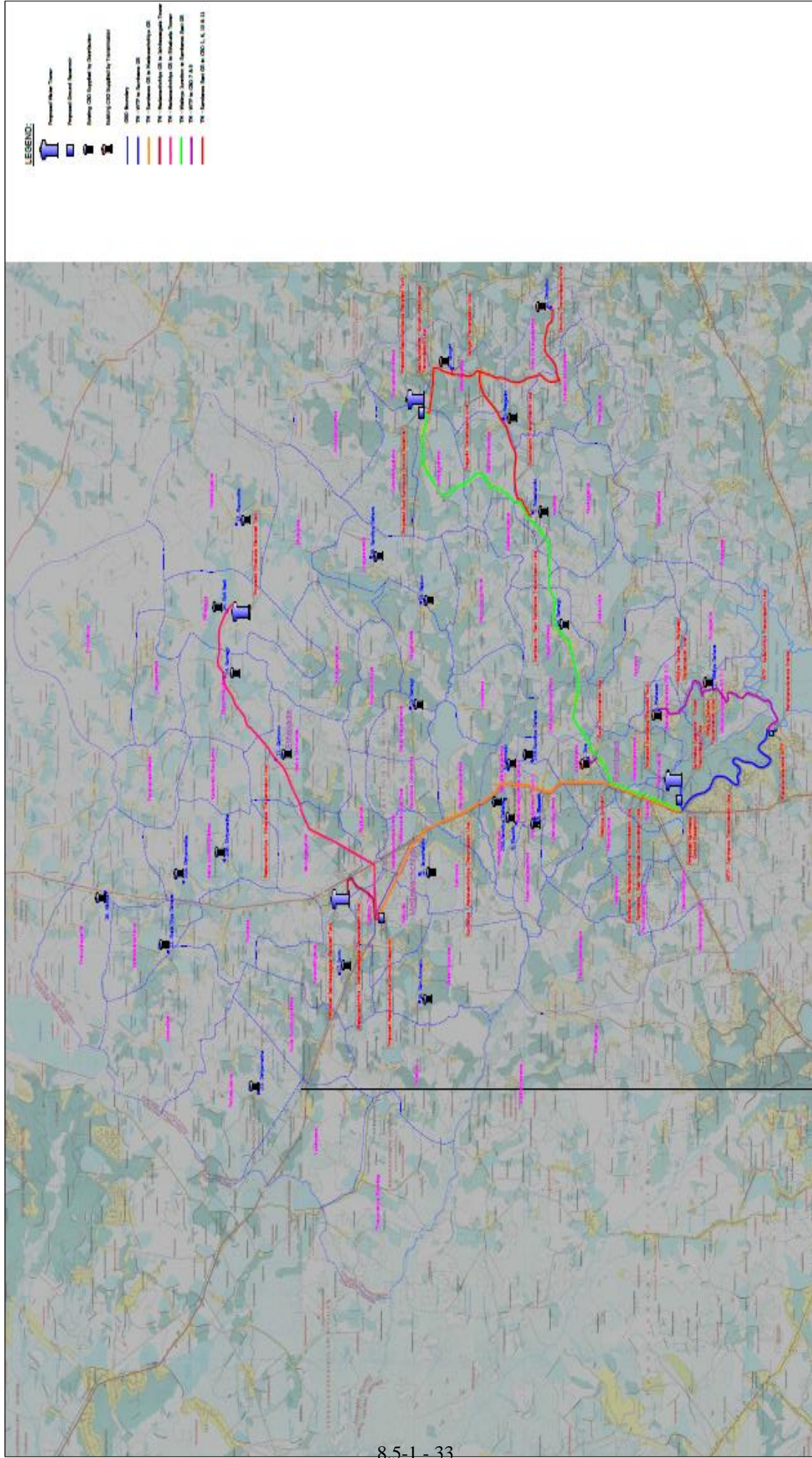
Following items are to be established in the site locations according to the “Lot A” contract package.

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
		9,400 m ³ /day production capacity WTP and all incorporated facilities
	Mahakanadarawa WTP	Construction of 1,000 m ³ Clear Water Reservoir
		High Lift Pump House and treated water transmission pumps
		Construction of 1,500 m ³ ground reservoir
	Rambewa	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
		Construction of 1,000 m ³ ground reservoir
	Medawachchiya	Construction of building facilities including pump house
		Supply and installation of transmission pumps
		Supply and installation of Chlorination facilities
		Construction of 500 m ³ ground reservoir
	Rambewa East	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
Construction of 2,000 m ³ elevated water tank		
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	
	"Lot C2 " Contract Package (Supply Only)	PVC	63	234,920
			90	109,895
			Total	
	"Lot C3" Contract Package (Laying Only)	PVC	90	109,895
			Total	
	Total of "Lot C" Contract Package (supply)			375,770

ANNEX 2 TRANSMISSION KEY MAP



ANNEX 3 IMPORTANT ENVIRONMENTAL LEGISLATIVE INSTRUMENTSNational 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 conflict.

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 plants of capacity exceeding 1/2 million cubic meters

2. By location (e.g. if projects are located wholly or 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 Environmental (Noise Control) Regulations 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 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 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 than 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 ($\text{PM}_{2.5}$)	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 Dioxide (SO_2)	24 hrs.	80	0.03	Pararosanilene 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 Spectroscopy"
		1 hr	30,000	26	
		Anytime	58,000	50	

Table Occupational Safety and Health Guideline for Chlorine

	ppm	mg/m ³	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/l, 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°C or BOD_3 3 days at 27°C)	mg/l, max.	30
5	Temperature of discharge	$^\circ\text{C}$, max.	Shall no exceed 40°C in any section of the stream within 15 m down stream from the effluent outlet.
6	Oils and greases	mg/l, max.	10
7	Phenolic compounds (as $\text{C}_6\text{H}_5\text{OH}$)	mg/l, max.	1
8	Chemical oxygen demand (COD)	mg/l, 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	micro curie/ml, max	10^{-8}
	(b) beta emitters	micro curie/ml, max	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 8.5-2 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Discussion and making agreement about construction schedule, procedure, and impact 	Minor	NWSDB RSC	PMU DS
	Public relation activities for local residents	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> To ensure the use of vehicles and machineries officially registered, and properly maintained. 	Minor	ESO/ Contractor	PMU
	Dust	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Guidance of proper installation Safety training to laborer 	Minor	ESO/ Contractor	PMU
Noise	Vehicles and machinery	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Making water resource protection plan with the commitment of relevant authority 	Minor	PMU	PD
	Discharge water	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Effluent is treated by the soak pit. 	Minor	ESO/ Contractor	PMU
	Oil and grease	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 to the recycling manufacturer. Waste which is not recyclable is disposed to follow the fixed rule of 	Minor	ESO/ Contractor	PMU

Impact		Mitigation measures	Impact	In charge or implemented by	Supervising
		relevant DS.			
	Domestic waste generated by laborer	<ul style="list-style-type: none"> Domestic waste is placed at the temporarily dumping yard, and transferred to the officially operated disposal field. 	Minor	ESO/ Contractor	PMU
Ecological environment	Violation to ecosystem	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Clearing land is minimized and the large tree is remained as far as possible, or transplanted. 	Minor	ESO/ Contractor	PMU
	Rare species	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Training and awareness program for laborer are planned and done. Security guard is appointed. 	Minor	ESO/ Contractor	PMU
	Inconvenience of livelihood	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Chlorine gas concentration is monitored by appropriate device. Safety training to laborer 	Minor	NWSDB RSC	NWSDB HO
Noise	Noise generation facility (pump etc)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Under drain water from sludge drying bed should be managed to satisfy the request of Irrigation dept. 	Minor	NWSDB RSC	NWSDB HO
	Domestic effluent	<ul style="list-style-type: none"> Effluent is treated by the soak pit. 	Minor	NWSDB RSC	NWSDB HO
	Oil and grease	<ul style="list-style-type: none"> Oil and grease are kept separately in the container and discarded in proper way. 	Minor	NWSDB RSC	NWSDB HO
Waste	Domestic waste	<ul style="list-style-type: none"> Domestic waste is placed at the temporally collection place, and transferred to the officially operated disposal field 	Minor	NWSDB RSC	NWSDB HO
	Sludge	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 8.6-1 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
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 Regional Support Center

PMU: Project Management Unit

ESO: Environment and safety officer

Appendix 8.6-2 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,
Total Suspended Solid (TSS)	mg/l			50	200	Monthly in construction stage, every three months in operation stage.
Oil and grease	mg/l			10	5 (as mineral oil) 30 (as oil extracted from animals and plants)	In case of abnormal result, the full examination of discharge water standard items should be done.
COD	mg/l			250	160	
Iron	mg/l			3	10	
Faecal Coliform	MPN/100ml, max.			40	3,000/ml as Total Coliform	

Sri Lanka discharge standard is attached as Appendix 8.6-3.

- 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 International 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	

SCHEDULE I

TOLERANCE LIMITS FOR THE DISCHARGE OF INDUSTRIAL WASTE IN TO INLAND SURFACE WATERS

No.	Parameter	Unit type of limit	Tolerance Limit values
01.	Total suspended solids	mg/l, max.	50
02.	Particle size of the total suspended solids	µm, less than	850
03.	pH at ambient temperature	-	6.0 - 8.5
04.	Biochemical oxygen demand (BOD ₅ in five days at 20°C or BOD ₃ in three days at 27°C)	mg/l, max.	30
05.	Temperature of discharge	°C, max.	Shall not exceed 40°C in any section of the stream within 15 m down stream from the effluent outlet.
06.	Oils and greases	mg/l, max.	10
07.	Phenolic compounds (as C ₆ H ₅ OH)	mg/l, max.	1
08.	Chemical oxygen demand (COD)	mg/l, max.	250
09.	Colour	Wavelength Range	Maximum spectral absorption coefficient
		436 nm (Yellow range)	7m ⁻¹
		525 nm (Red range)	5m ⁻¹
		620 nm (Blue range)	3m ⁻¹
10.	Dissolved phosphates (as P)	mg/l, max.	5
11.	Total Kjeldahl nitrogen (as N)	mg/l, max.	150
12.	Ammoniacal nitrogen (as N)	mg/l, max.	50
13.	Cyanide (as CN)	mg/l, max.	0.2
14.	Total residual chlorine	mg/l, max.	1.0
15.	Fluorides (as F)	mg/l, max.	2.0
16.	Sulphide (as S)	mg/l, max.	2.0
17.	Arsenic (as As)	mg/l, max.	0.2
18.	Cadmium (as Cd)	mg/l, max.	0.1
19.	Chromium, total (as Cr)	mg/l, max.	0.5
20.	Chromium, Hexavalent (as Cr ⁶⁺)	mg/l, max.	0.1
21.	Copper (as Cu)	mg/l, max.	3.0
22.	Iron (as Fe)	mg/l, max.	3.0
23.	Lead (as Pb)	mg/l, max.	0.1
24.	Mercury (as Hg)	mg/l, max.	0.0005
25.	Nickel (as Ni)	mg/l, max.	3.0
26.	Selenium (as Se)	mg/l, max.	0.05

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SCHEDULE I (Contd.)

TOLERANCE LIMITS FOR THE DISCHARGE OF INDUSTRIAL WASTE IN TO INLAND SURFACE WATERS

No.	Parameter	Unit type of limit	Tolerance Limit values
27.	Zinc (as Zn)	mg/1, max.	2.0
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	micro curie/ml, max	10 ⁻⁸
	(b) Beta emitters	micro curie/ml, max	10 ⁻⁷

Note 1 : All efforts should be made to remove unpleasant odour as far as possible.

Note 2 : These values are based on dilution of effluents by at least 8 volumes of clean receiving water. If the dilution is below 8 times, the permissible limits are multiplied by the 1/8 of the actual dilution.

Note 3 : The above mentioned general standards shall cease to apply with regard to a particular industry when industry specific standards are notified for that industry.

Note 4 : Pesticides as per World Health Organization (WHO) and Food and Agriculture Organization (FAO) requirements.

LIST II

TOLERANCE LIMITS FOR INDUSTRIAL WASTE DISCHARGED ON LAND FOR IRRIGATION PURPOSE

No.	Parameter	Unit type of limit	Tolerance Limit value
1.	Total dissolved solids	mg/1, max.	2100
2.	pH at ambient temperature	-	5.5 - 9.0
3.	Biochemical oxygen demand (BOD ₅ in five days at 20 ⁰ C or BOD ₃ in three days at 27 ⁰ c)	mg/1, max.	250 30
4.	Oils and greases	mg/1, max.	10
5.	Chemical Oxygen Demand (COD)	mg/1, max.	400
6.	Chlorides (as Cl)	mg/1, max.	600
7.	Sulphates (as SO ₄)	mg/1, max.	1000
8.	Boron (as B)	mg/1, max.	2.0
9.	Arsenic (as As)	mg/1, max.	0.2
10.	Cadmium (as Cd)	mg/1, max.	2.0
11.	Chromium , total (as Cr)	mg/1, max.	1.0
12.	Lead (as Pb)	mg/1, max.	1.0
13.	Mercury (as Hg)	mg/1, max.	0.01
14.	Sodium adsorption ratio (SAR)	-	10 - 15
15.	Residual sodium carbonate (RSC)	mol/1, max.	2.5

LIST II (Contd),

TOLERANCE LIMITS FOR INDUSTRIAL WASTE DISCHARGED ON LAND FOR IRRIGATION PURPOSE

No.	Parameter	Unit Type of limit	Tolerance Limit Values
16.	Electrical conductivity	μS/cm. max.	2250
17.	Faecal coliform	MPN/100ml, max.	40
18.	Copper (as Cu)	mg/l, max.	1.0
19.	Cyanide (as CN)	mg/l, max.	0.2
20.	Radio Active Material :		
	(a) Alpha emitters	Micro curie./m1, max.	10 ⁻⁹
	(b) Beta emitters	Micro curie/m1, max.	10 ⁻⁸

Hydraulic Loading Applicable for Different Soils :

Soil Texture Class	Recommended dosage of settled Industrial Effluents (m ³ /hectare, day)
1. Sandy	225 - 280
2. Sandy laom	170 - 225
3. loam	110 - 170
4. Clay loam	55 - 110
5. Clay	35 - 55

LIST III

TOLERANCE LIMITS FOR INDUSTRIAL AND DOMESTIC WASTE DISCHARGED INTO MARINE COASTAL AREAS

No.	Parameter	Unit Type of limit	Tolerance Limit Values
1.	Total suspended solids	mg/l, max.	150
2.	Particle size of -		
	(a) Floatable solids	mm, max.	3
	(b) Settlabe solids	μm, max	850
3.	pH at ambient temperature	-	5.5 - 9.0
4.	Biochemical oxygen demand (BOD ₅ in five days at 20 °C or BOD ₃ in three days at 27 °C)	mg/l, max.	100
5.	Temperature	°C, max	45°C at the point of discharge
6.	Oils and greases	mg/l, max.	20

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LIST III (Contd.,)

TOLERANCE LIMITS FOR INDUSTRIAL AND DOMESTIC WASTE DISCHARGED INTO MARINE COASTAL AREAS

No.	Parameter	Unit Type of limit	Tolerance Limit Values
7.	Phenolic compounds (as Phenolic OH)	mg/1, max.	5
8.	Chemical oxygen demand (COD)	mg/1, max.	250
9.	Total residual chlorine	mg/1, max.	1.0
10.	Ammoniacal Nitrogen (as N)	mg/1, max.	50
11.	Cyanide (as CN)	mg/1, max.	0.2
12.	Sulphides (as S)	mg/1, max.	5.0
13.	Fluorides (as F)	mg/1, max.	15
14.	Arsenic (as As)	mg/1, max.	0.2
15.	Cadmium (as Cd)	mg/1, max.	2.0
16.	Chromium, total (as Cr)	mg/1, max.	2.0
17.	Chromium, Hexavalent (as Cr ⁶⁺)	mg/1, max.	1.0
18.	Copper (as Cu)	mg/1, max.	3.0
19.	Lead (as Pb)	mg/1, max.	1.0
20.	Mercury (as Hg)	mg/1, max.	0.01
21.	Nickel (as Ni)	mg/1, max.	5.0
22.	Selenium (as Se)	mg/1, max.	0.1
23.	Zinc (as Zn)	mg/1, max.	5.0
24.	Pesticides	mg/1, max.	0.005
25.	Organo-Phosphorus compounds	mg/1, max.	1.0
26.	Chlorinated hydrocarbons (as C1)	mg/1, max.	0.02
27.	Faecal coliform	MPN/100m1, max.	60
28.	Radio Active Material :		
	(c) Alpha emitters	micro curie/m1, max	10 ⁻⁸
	(d) Beta emitters	micro curie/m1, max	10 ⁻⁷

Note 1 : All efforts should be made to remove unpleasant odour and colour as far as practicable.

Note 2 : These values are based on dilution of effluents by at least 8 volumes of clean receiving water. if the dilution is below 8 times, the permissible limits are multiplied by the 1/8 of the actual dilution.



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நீர்ப்பாசனத் திணைக்களம்
IRRIGATION DEPARTMENT



230, බෞද්ධලෝක මාවත,
කොළඹ 07

230, බෞද්ධලෝක මාවත,
කොළඹ 07.

230, Buddhaloka Mawatha,
Colombo 07
SRI LANKA

ක. ම. 1138
P.O. Box

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பணிப்பாளர் நாயகம்
Director-General
දුරකථන
தொலைபேசி - 2584984
Telephone

ෆැක්ස්
தொலைநகல் 2505890
Fax

E-mail dir_gen@irrigation.slt.lk, dgiirrig@sltnet.lk

මගේ අංකය
எனது இலக்கம் 70 000 673/WS
My No

ඔබේ අංකය
உமது இலக்கம்
Your No.

දිනය
திகதி 13 -08-2012.
Date

General Manager
National Water Supply & Drainage Board

Sub: MOU for extracting water from Mahakanadarawa wewa and Wahalkada wewa for the Anuradhapura North Water Supply Scheme

Original copy of signed MOU for extracting water from Mahakanadarawa wewa and Wahalkada wewa for the Anuradhapura North Water Supply Scheme is sent herewith please.

Eng. Y. Abdul Majeed
Director (Irrigation & Water Management)
For Director General of Irrigation

Directors

Planning & Designs	2588879	Assets Management	2588625	Regional Development & Construction	2586839
Specialized Services & Training	2584485	Irrigation & Water Management	2586311	Plan Implementation	2588127

**Memorandum of Understanding between the
Irrigation Department of Sri Lanka and
National Water Supply & Drainage Board
for extracting water from Mahakanadarawa wewa and Wahalkada wewa for the
Anuradhapura North Water Supply Scheme.**

This memorandum of understanding is made and entered into by and between the National Water Supply & Drainage Board, a body corporate established under law No. 2 of 1974 and having its office at Galle Road, Ratmalana (hereinafter called and referred to as the NWSDB) on one part

AND

The Irrigation Department of Sri Lanka, having its office at No.230, Bauddhaloka Mawatha, Colombo 07 (hereinafter called and referred as the ID) which term of expression as herein used shall as and where the context so requires or admits and include the aforesaid and his successors in the said office for the time being, and the officers who for the time being are acting in the office of or are performing the functions now exercised by the Director General of Irrigation acting herein for and on behalf of the Democratic Socialist Republic of Sri Lanka of the other part.

WHEREAS

- (A) Implementation of the Anuradhapura North Water Supply Scheme proposed under JICA Loan funding is to be executed by the NWSDB.
- (B) It has become necessary to form a Memorandum of Understanding for extraction of water from the Mahakanadarawa wewa and Wahalkada wewa for Anuradhapura North Water Supply Scheme.

It is hereby mutually agreed by and between the parties as follows:

1. The Mahakanadarawa wewa and Wahalkada wewa will be used as the Prime Water Source for the Anuradhapura North Water Supply Project.
2. Mahagalkadawala wewa will be developed as a supplementary source to Mahakanadarawa wewa to ensure continuous extraction. Mahagalkadawala wewa will be developed utilizing GOSL fund.

3. ID agrees to the NWSDB to extract the short term (2016) requirement of 6,700 m³/d water from Mahakandarawa wewa after the completion of Mahakandarawa water treatment plant , the long term (2034) requirement of 18,800 m³/d after the completion of Upper Elahara Canal project and short term (2016) requirement of 10,500 m³/d and the long term requirement (2034) of 28,800 m³/d water from Wahalakada wewa and that NWSDB undertakes to facilitate such process and to not take any steps to hinder such extraction other than as provided in this agreement.
4. Staff of the NWSDB attached to the intake facilities shall be responsible for and shall have free access for the operation and maintenance of the intake facilities and shall be allowed to be stationed at the intake facilities.
5. NWSDB shall request the Secretary in charge of subject of Irrigation to appoint a representative of NWSDB as member of the Project Management Committee of affected Irrigation schemes established under the Irrigation Ordinance and any amendment there to.
6. The NWS&DB should obtain approval from ID for design and construction of control gate structure, flow measuring devices and any other connected infrastructure for the above water supply project.
7. The NWSDB must permit ID to inspect the operation of its Intake, and to scrutinize and copy any records it has kept about its operations and shall submit any calibration reports if the ID were to request calibration of its intake facilities where necessary.
8. It shall be obligatory on the NWSDB to allow the ID to inspect and observe any water supply structure under the Project or part of it at any time.
9. During the periods of exceptional water scarcity, priority of water allocation between the irrigation and drinking water will be decided at a meeting of officers from ID, Irrigation Management Division and NWSDB. Divisional Secretary and Members of Project Management Committee established under the Irrigation ordinance and chaired by the District Secretary, and if NWS&DB has to reduce the extraction then the NWSDB shall work out the figures pertaining to this essential survival level supply and shall keep to that level of extraction.

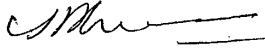
10. The ID shall arrange a meeting at least one for each cultivation season during the year or when changes of extraction is required, with the representatives of ID, IMD, NWSDB, Project Management Committees of the Irrigation Schemes and other sharing Stake holders and decide on the water that would be extracted under this project and the NWSDB shall comply with such decisions. These meetings will be chaired by the District Secretary.
11. If the NWSDB wishes to upgrade, modernize or replace any of the installed facilities of the intake to increase efficiency, to improve performance or to make operation more economical, It has to obtain prior approval of the ID of the intended changes. However, such changes shall not be constructed as an implicit approval for the NWSDB to increase its daily extraction rates.
12. Any increase in the rate or any change in the scope of project in the future shall be the subject of a future agreement similar to this. Without such agreement, the daily extraction rate shall not be increased by the NWSDB under any circumstances.
13. Any conflicts arising in implementation of this agreement shall be referred to the Secretaries of the Ministries of the first and second part.
14. This MOU is subjected to NWS&DB to obtain all other necessary clearances including environmental clearance for the implementation of the Project.
15. NWS&DB shall make arrangements for the provision of funds amounting to Rs. 500 million from the GOSL fund to the ID for the following improvements to the Irrigation system in Mahakanadarawa wewa and Wahalkada wewa.


	Scheme	Cost (Rs. Million)
1	Mahakanadarawa wewa main and sub system rehabilitation	300
2	Wahalkada wewa main and sub system rehabilitation	200
	Total	500

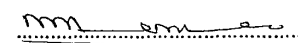
The ID and NWSDB shall plan and implement public awareness campaign to make stake holders understand the importance of water supply scheme and accept the scheme implementation.

IN WITNESSED WHERE OF of the parties hereto have unto set their respective hands and seals on the day and year first before written.


Signed for and on behalf of **National Water Supply and Drainage Board**, Eng. Karunasena Hettiarachchi, Chairman on the 07th day of August Two Thousand Twelve at Colombo, in the presence of following witnesses.

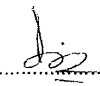

 Chairman
NATIONAL WATER SUPPLY & DRAINAGE BOARD

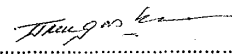
WITNESS(1)
 Signature 
 Address N.W.S. & D.B. Galle Road
Rajmalana
 Occupation Secretary
 Signed by K.K. Chandrasiri

WITNESS(2)
 Signature 
 Address JAPAN EJE PROJECT UNIT
NWSOB, GALLE ROAD, RAJMALA
 Occupation ASSISTANT GENERAL MANAGER
 Signed by M M UMAR LEBES

Signed for and on behalf of **Irrigation Department of Sri Lanka**, Eng Badra Kamaladasa Director General of Irrigation on the 13 day of August Two Thousand Twelve at Colombo in the presence of the following witnesses.


 Director General of Irrigation
 Irrigation Department of Sri Lanka
 Eng. Badra Kamaladasa
 Director General of Irrigation

WITNESS(1)
 Signature 
 Address **Eng. Y. Abdul Majeed**
 Director of Irrigation (Irrigation & Water Management)
 Irrigation Department
 230, Bauddhaloka Mawatha,
 Colombo 07.
 Occupation
 Signed by

WITNESS(2)
 Signature 
 Address **Eng. (Ms) T.J. Meegastenna**
 Deputy Director (Water Management)
 Irrigation Department
 230 Bauddhaloka Mawatha,
 Colombo 07.
 Occupation
 Signed by

Appendix 8.7-2 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.

<p>2 Pollution Control</p>	<p>(1) Air Quality</p>	<p>(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?</p>	<p>(a) N (b) N</p>	<p>(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.</p> <p style="text-align: center;">Occupational Safety and Health Guideline for Chlorine</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>ppm</th> <th>mg/m3</th> <th></th> </tr> </thead> <tbody> <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> </tbody> </table> <p style="text-align: center;">Ambient Air Quality</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2"></th> <th rowspan="2">Pollutant</th> <th rowspan="2">Averaging Time*</th> <th colspan="2">Maximum</th> <th rowspan="2">Method of measurement</th> </tr> <tr> <th>µgm-3</th> <th>ppm</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1</td> <td rowspan="2">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 Gravimetric or Beta Attenuation</td> </tr> <tr> <td>24 hrs.</td> <td>100</td> <td>—</td> </tr> <tr> <td rowspan="2">2</td> <td rowspan="2">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 Gravimetric or Beta Attenuation</td> </tr> <tr> <td>24 hrs.</td> <td>50</td> <td>—</td> </tr> <tr> <td rowspan="3">3</td> <td rowspan="3">Nitrogen Dioxide (NO₂)</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>8 hrs.</td> <td>150</td> <td>0.08</td> </tr> <tr> <td>1hr.</td> <td>250</td> <td>0.13</td> </tr> <tr> <td rowspan="3">4</td> <td rowspan="3">Sulphur Dioxide (SO₂)</td> <td>24 hrs.</td> <td>80</td> <td>0.03</td> <td rowspan="3">Pararosanilene Method or equivalent Pulse Fluorescent</td> </tr> <tr> <td>8 hrs.</td> <td>120</td> <td>0.05</td> </tr> <tr> <td>1hrs.</td> <td>200</td> <td>0.08</td> </tr> <tr> <td>5</td> <td>Ozone (O₃)</td> <td>1 hr.</td> <td>200</td> <td>0.1</td> <td>Chemiluminescence Method or equivalent Ultraviolet</td> </tr> <tr> <td rowspan="3">6</td> <td rowspan="3">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>1 hr.</td> <td>30,000</td> <td>26</td> </tr> <tr> <td>Any time</td> <td>58,000</td> <td>50</td> </tr> </tbody> </table>		ppm	mg/m3		Permissible exposure limit	1	3	US dept of Labor	Advisable limit	0.5	1.5	NIOSH	Evaluation standard	0.5	1.5	Japan		Pollutant	Averaging Time*	Maximum		Method of measurement	µgm-3	ppm	1	Particulate Matter - Aerodynamic diameter is less than 10 µm in	Annual	50	—	Hi-volume sampling and Gravimetric or Beta Attenuation	24 hrs.	100	—	2	Particulate Matter - Aerodynamic diameter is less than 2.5 µm in	Annual	25	—	Hi-volume sampling and Gravimetric or Beta Attenuation	24 hrs.	50	—	3	Nitrogen Dioxide (NO ₂)	24 hrs.	100	0.05	Colorimetric using saltzman Method or equivalent Gas phase	8 hrs.	150	0.08	1hr.	250	0.13	4	Sulphur Dioxide (SO ₂)	24 hrs.	80	0.03	Pararosanilene Method or equivalent Pulse Fluorescent	8 hrs.	120	0.05	1hrs.	200	0.08	5	Ozone (O ₃)	1 hr.	200	0.1	Chemiluminescence Method or equivalent Ultraviolet	6	Carbon Monoxide (CO)	8 hrs.	10,000	9	Non-Dispersive Infrared Spectroscopy"	1 hr.	30,000	26	Any time	58,000	50
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	(2) Water Quality	<p>(a) Do pollutants, such as SS, BOD, COD contained in effluents discharged by the facility operations comply with the country's effluent standards?</p>	(a) Y	<p>(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.</p> <p style="text-align: center;">Tolerable limit of discharge to inland surface water</p> <table border="1"> <thead> <tr> <th>No</th> <th>Parameter</th> <th>Unit type of limit</th> <th>Tolerance Limit values</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Total suspended solids</td> <td>mg/l, 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 (BOD₅ 5 days at 20°C or BOD₃ days at 27°C)</td> <td>mg/l, max.</td> <td>30</td> </tr> <tr> <td>5</td> <td>Temperature of discharge</td> <td>°C, max.</td> <td>Shall no exceed 400°C 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/l, max.</td> <td>10</td> </tr> <tr> <td>7</td> <td>Phenolic compounds (as C₆H₅OH)</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/l, max.</td> <td>5</td> </tr> <tr> <td>11</td> <td>Total Kjeldahl nitrogen (as N)</td> <td>mg/l, max.</td> <td>150</td> </tr> <tr> <td>12</td> <td>Ammoniacal nitrogen (as N)</td> <td>mg/l, max.</td> <td>50</td> </tr> <tr> <td>13</td> <td>Cyanide (as CN)</td> <td>mg/l, max.</td> <td>0.2</td> </tr> <tr> <td>14</td> <td>Total residual chlorine</td> <td>mg/l, max.</td> <td>1</td> </tr> <tr> <td>15</td> <td>Flourides (as F)</td> <td>mg/l, max.</td> <td>2</td> </tr> <tr> <td>16</td> <td>Sulphide (as S)</td> <td>mg/l, max.</td> <td>2</td> </tr> <tr> <td>17</td> <td>Arsenic (as As)</td> <td>mg/l, max.</td> <td>0.2</td> </tr> <tr> <td>18</td> <td>Cadmium (as Cd)</td> <td>mg/l, max.</td> <td>0.1</td> </tr> <tr> <td>19</td> <td>Chromium, total (as Cr)</td> <td>mg/l, max.</td> <td>0.5</td> </tr> <tr> <td>20</td> <td>Chromium, Hexavalent (as Cr6+)</td> <td>mg/l, max.</td> <td>0.1</td> </tr> <tr> <td>21</td> <td>Copper (as Cu)</td> <td>mg/l, max.</td> <td>3</td> </tr> <tr> <td>22</td> <td>Iron (as Fe)</td> <td>mg/l, max.</td> <td>3</td> </tr> <tr> <td>23</td> <td>Lead (as Pb)</td> <td>mg/l, max.</td> <td>0.1</td> </tr> <tr> <td>24</td> <td>Mercury (as Hg)</td> <td>mg/l, max.</td> <td>0.0005</td> </tr> <tr> <td>25</td> <td>Nickel (as Ni)</td> <td>mg/l, max.</td> <td>3</td> </tr> <tr> <td>26</td> <td>Selenium (as Se)</td> <td>mg/l, max.</td> <td>0.05</td> </tr> <tr> <td>27</td> <td>Zinc (as Zn)</td> <td>mg/l, max.</td> <td>2</td> </tr> <tr> <td>28</td> <td>Pesticides</td> <td>mg/l, max.</td> <td>0.005</td> </tr> <tr> <td>29</td> <td>Detergents/surfactants</td> <td>mg/l, 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 :</td> <td></td> <td></td> </tr> <tr> <td></td> <td>(a) Alpha emitters</td> <td>micro curie/ml, max</td> <td>10⁻⁸</td> </tr> <tr> <td></td> <td>(b) beta emitters</td> <td>micro curie/ml, max</td> <td>10⁻⁷</td> </tr> </tbody> </table>	No	Parameter	Unit type of limit	Tolerance Limit values	1	Total suspended solids	mg/l, 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°C or BOD ₃ days at 27°C)	mg/l, max.	30	5	Temperature of discharge	°C, max.	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	(3) Wastes	<p>(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed in accordance with the country's regulations?</p>	(a) Studying	<p>(a) The sludge treatment system is designed.</p>																																																																																																																																								

	<p>(4) Noise and Vibration</p>	<p>(a) Do noise and vibrations generated from the facilities, such as pumping stations comply with the country's standards?</p>	<p>(a) Y</p>	<p>(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.</p> <p>Maximum permissible Noise Levels at Boundaries of the land in which the source of noise is located in Laeq', T,</p> <table border="1"> <thead> <tr> <th></th> <th>Laeq', T</th> </tr> </thead> <tbody> <tr> <td>Day time</td> <td>75</td> </tr> <tr> <td>Night time</td> <td>50</td> </tr> </tbody> </table> <p>Maximum permissible Noise Levels at Boundaries in LAeq, T, for industrial activities</p> <table border="1"> <thead> <tr> <th>Area</th> <th>Daytime</th> <th>Night time</th> </tr> </thead> <tbody> <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> </tbody> </table>		Laeq', T	Day time	75	Night time	50	Area	Daytime	Night time	Rural Residential Area	50	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
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	(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	<p>(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?</p> <p>(b) What are the items, methods and frequencies of the monitoring program?</p> <p>(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?</p> <p>(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?</p>	<p>(a) ongoing</p> <p>(b) ongoing</p> <p>(c) ongoing</p> <p>(d) Y</p>	<p>(a)(b)(c)The project is preparing the monitoring plan</p> <p>(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.</p>
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.