Initial Environmental Examination

Project Number: 49216-002
Loan Number: 3409
April 2020

SRI: Supporting Electricity Supply Reliability Improvement Project
Addendum - 4

Prepared by Ceylon Electricity Board for the Asian Development Bank.

Supplementary Initial Environmental Examination Report for Monaragala Grid Substation to Wellawaya Gantry 33kV Line

April 2020

ADB Loan No. 3409 - SRI
Supporting Electricity Supply Reliability Improvement Project
Package 4

Prepared by Project Management Unit of Supporting Electricity Supply Reliability Improvement Project for Package 4 in Ceylon Electricity Board for the Asian Development Bank

CURRENCY EQUIVALENTS

(as of 12 May 2020)

Currency unit – US Doller to Sri Lankan rupee

$1.00 = SLR 191.60

List of abbreviations

2SSBB	2 section single bas bar
ADB	Asian Development Bank
AP	project affected persons
CEA	central environmental authority
CEB	Ceylon electricity board
DS	divisional secretary
EA	project executing agency
EED	energy and environment division
EMP	environmental management plan
EO	environmental officer
GN	grama niladhari
GRC	grievance redress committee
GRM	grievance redress mechanism
IA	project implementing agency
IEE	initial environmental examination
MPRE	ministry of power and renewable energy
MSW	municipal solid waste
MV	medium voltage
NBRO	national building research organization
NEA	national environmental act
GoSL	government of Sri Lanka
PAUSL	public utilities commission of Sri Lanka
PCB	poly-chlorinated biphenyl
PIU	project implementing unit
PMU	project management unit
PPE	personnel protective equipment
SESRIP	supporting electricity supply reliability improvement project
UP	Uva province
SPS	ADB, safeguard policy statement (2009)
W notice	wayleave notice

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1. Introduction

1. Supporting electricity supply reliability improvement project (SESRIP) was approved by ADB's board of directors in July 2016. This project is in line with ADB policy to assist the government of Sri Lanka (GoSL) in its aims to ensure sustainable development of energy resources. This project is financed by (i) Loan 3409-SRI for US$ 115 million from ADB ordinary capital resources, an investment Grant 0486 of US$ 1.8 million from the clean energy fund under the clean energy financing partnership facility and an investment grant of US$ 2 million provided by the Japan fund for poverty reduction. The loan became effective in June 2017 and is proposed to be completed in September 2021. Expected outputs of the project are: Renewable (1) energy systems established, (2) Reliability of the medium voltage network improved, (3) Rural electrification network extended and distribution performance monitoring improved, and (4) Reactive power management in the transmission system improved.

2. The Ceylon electricity board (CEB) is the project executing and implementing agency. The SESRIP consists of four components to deliver above outputs as,

Component 1: Renewable energy development
Component 2: Reliability improvement of the medium voltage network
Component 3: Rural electrification and distribution performance monitoring
Component 4: Reactive Power Management in the Transmission System

3. The overall project shall be executed through seven major packages, and package 4, 5 and 6 is executes by a separate project management unit (PMU). This PMU is officially termed as the PMU of SESRIP. Of these three packages, package 4 includes construction of 16 Nos. of 33kV tower lines with a total line length of approximately 280 km and 13 Nos. of 33 kV switching gantries.

4. The project does not fall within the "prescribed projects" list as stipulated in the national environmental act (NEA). As per the guidelines of ADB, safeguard policy statement 2009 (SPS), the overall project is categorized as environmental category B. An initial environmental examination (IEE) report was developed for the overall project in March 2016 and disclosed. This IEE report included basic information with respect to construction of 33 kV tower line route from Monaragala to Wellawaya including the switching gantry at Wellawaya.

1.1. Need of updating the IEE

5. The IEE report developed and disclosed in 2016 was based on several assumptions and preliminary engineering designs. As per the guidelines given in this IEER, each sub project should develop a supplementary IEE report once detail designs are available.

6. The detail designs and line route from Monaragala to Wellawaya and the switching gantry at Wellawaya have been now completed. Therefore, this supplementary IEE developed based on field visits and detail designs, provides more specific and updated details of the sub project including impacts and mitigation measures. This report shall be disclosed before awarding civil works contract for the sub project.

2. Description of the sub project

2.1. Scope and justification for the sub project

7. This sub project is included under package 4 of SESRIP. The scope of work shall include; (i) construction of a 36.011 km long 33 kV double circuit tower line (with Lynx conductors drawn on lattice steel structures) from Monaragala GS to new switching gantry at Wellawaya, the line has 68 angle towers and approximately 69 suspension lattice towers, (ii) construction of a new 2 section single bas bar (2SSBB) gantry at Wellawaya.

8. The proposed line is to strengthen the existing medium voltage (MV) distribution system at Wellawaya and Monaragala suburbs in the Uva province (UP) of Sri Lanka. The electrification level of UP as at the end of 2019 was 98%. In UP, demands of electricity for domestic and industrial sectors are increasing at the annual growth rates of 8.2% and 3.0% respectively over the ten-years planning horizon from 2015 to 2024. At present Wellawaya area experiences low voltages. The energy loss in the existing MV system is 2.6%. Construction of this express line is an additional power injection source to the power distribution system in Wellawaya area. This line will enhance the power distribution capacity of CEB distribution network and improve the system voltages. Additionally, this new line will increase system reliability and reduce MV system losses. The proposed 33 kV 2SSBB switching gantry at Wellawaya is required to connect the above mentioned 33 kV backbone line with the existing MV systems in Wellawaya area to improve the operational flexibility of the MV system in UP.

2.2. Details on sub project location

9. The double circuit tower line and new 2SSBB gantry site are located within Wellawaya, Monaragala and Buttala divisional secretary (DS) divisions in Monaragala district of UP. Table 1 below presents the grama niladhari (GN) divisions through which the tower line shall be located. Table 2 presents the GN divisions which the gantry site shall be located. Figure 1 presents the location map of the sub project.

Table 1. List of affected grama niladhari divisions for line route

Province/ District	DS division	GN division	Local authority
Uva/ Monaragala	Monaragala	Horombuwa, Madurakatiya, Kumbukkana	Monaragala Pradeshiya Sabha
Uva/ Monaragala	Buttala	Mahagodayaya, Medagama, Pettagamwala, Yatiyallathota, Pelwatta, Mahasenpura, Weheragala, Puhulkotuwa, Kumarapura	Buttala Pradeshiya Sabha
Uva/Monaragala	Wellawaya	Sudupanawala, Anapallama, Galbokka	Wellawaya Pradeshiya Sabha

Table 2. List of affected grama niladhari divisions for gantry site

Province/ District	DS division	GN division	Local authority
Uva/Monaragala	Wellawaya	Galbokka	Wellawaya Pradeshiya Sabha

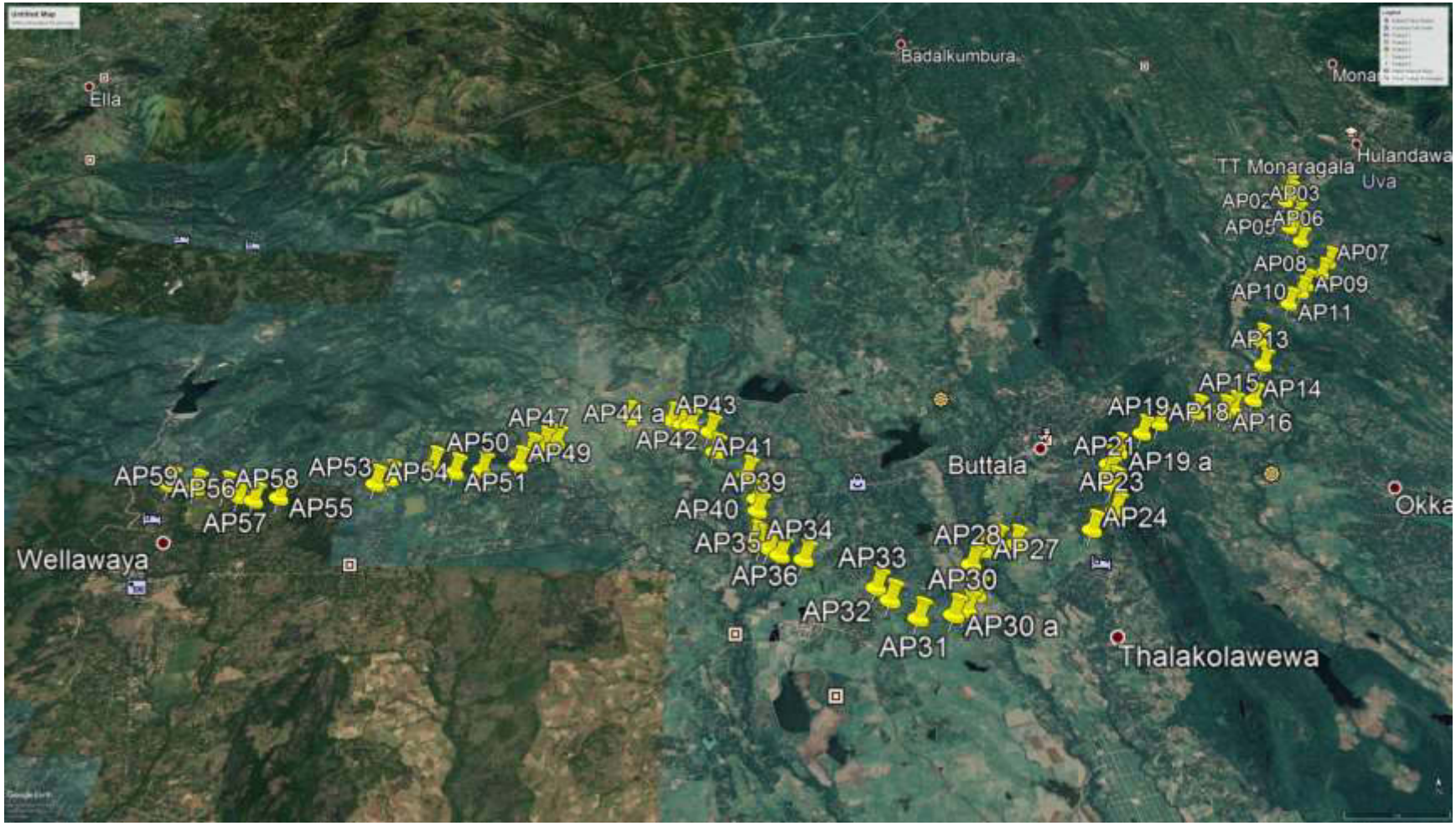


Figure1. Sub project location map with finalized route from *Monaragala Grid Substation to Wellawaya Proposed Gantry*

2.3. Present progress with respect to the sub project

10. Present status of activities carried out with respect to this sub project is summarized below.

Table 3. Updated status of activities on Monaragala – Wellawaya line route

Sub Project	Description	Status
Package 4	**Construction of 36.011km long 33kV tower lines from Monaragala to Wellawaya**	(i)Line route surveying 100% completed.
		(ii) W notice[1] issuing 100% completed.
		(iii) Public concerns are being resolved and informed to District Secretariat for conducting inquiries
		(iv) Line route adjustments as instructed by DSs at public inquiries are done (100%) and resurveying of the adjusted sections is being conducted.
		(v) Identification of trees that needs to be removed completed for the total length of the line and listed out for payment of compensation.
		(vi) Soil testing completed
		(vii) Profile design in progress

2.4. Proposed Schedule for Implementation

11. Activities completed, being implemented and to be implemented are summarized in table4.

Table 4. Proposed schedule of activities for the line route from Monaragala to Wellawaya

Sub Project Activities	2019				2020				2021		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Selection of line corridor	√	√									
Preliminary Survey		√	√	√							
Arranging route approval			√	√							
Profile Survey	—	—	—	√							
Soil Investigation	—	—	—	—	√						
Route clearance					P	P	P	P	P		
Design	—	—	—	—		P	P				
Excavation for construction of tower foundations	—	—	—					P	P		
Construction of tower foundations	—	—	—					P	P		
Tower erection	—	—	—	—				P	P	P	
Conductor Stringing	—	—	—	—	—			P	P	P	
Testing & Commissioning	—	—	—	—	—	—	—				P

Q: Quarters √: Activity Done P: Activity Planned —: No Activity

[1] W-notice or "wayleave notice" is a notice developed as per the terms of Item 3 of Schedule I of the Sri Lanka Electricity Act, No. 20 of 2009 (as amended). This notice is submitted to the landowner/ occupier by CEB requesting a wayleave with any terms and conditions as indicted by landowner/ occupier.

2.5. National legislations which would have a bearing on the sub project

Table 5. A list of applicable national laws and policies for the sub project

Act/ Policy	Scope and objective	Key areas	Operational agencies/ Key players
Agrarian Services Act (No. 58 of 1979) Agrarian Development Act Nº 46 of 2000	To provide secure background to farmers and their agricultural premises	Regulates the acquisition of land that belongs to paddy and other activities, which are related to agricultural areas	The Ministry of Agriculture Development and Agrarian Services
Ceylon Electricity Board Act 1969	To provide for the establishment of an electricity board for the development and co - ordination of generation	Enters with joint schemes by such board with any government department or approved body for the generation of electrical energy, the irrigation lands, control of floods or other like objects, and to make provision for all matters connected there with or incidental thereto.	Ceylon Electricity Board
Electricity Act 2009	To provide reliable and cheap electrical energy	Regulates the generation, transmission, transformation, distribution, supply and use of electrical energy	Ceylon Electricity Board
Public Utilities Commission of Sri Lanka Act No. 35 of 2002	Create an environment for all inhabitants of Sri Lanka and the contributors to its development, to have access to essential infrastructure and utility services in the most economical manner within the boundaries of the sustainable development agenda	Regulate all the utilities within the purview of the Public Utilities Commission of Sri Lanka, to ensure safe, reliable and reasonably priced infrastructure services for existing as well as future consumers in the most equitable and sustainable manner.	The Public Utilities Commission of Sri Lanka
Sri Lanka Sustainable Energy Authority Act, No. 35 of 2007	To develop renewable energy resources; to declare energy development areas; to implement energy efficiency measures and conservation programs; to promote energy security	Reliability and cost effectiveness in energy delivery and information management, function as a National Technical Service Agency of Clean Development Mechanism (CDM) in Sri Lanka that provides technical assistance to the Designated National Agency for Clean Development Mechanism and project developers, on energy sector clean development project activities	Sri Lanka Sustainable Energy Authority
Felling of Trees (Amendment Act No. 01 of 2000 and Act to Amend felling of trees control)	The control removal of trees	Regulates the removal of trees relevant to type and the compensation	Department of Forest
Irrigation Clauses Act	To provide regulations for the	Regulates the construction of	Department of Irrigation

Act/ Policy	Scope and objective	Key areas	Operational agencies/ Key players
1973	construction of structures across the irrigation canals and water resources.	structures across the irrigation canals and water resources.	
Land Acquisition (Amendment) Act, No. 13 of 1986	Establishes the procedure to be followed by the competent authorities for the acquisition of land for public purpose.	It includes, among other matters: investigations for selecting land to be carried out by a district officer appointed by the Minister; issue of notice of intended acquisition indicating the compensation to be paid for any damage caused during investigations; issue of notice of acquisition of land or servitude for a public purpose.	Ministry responsible for power and energy, Ministry of land, Department of Valuation
National Involuntary Resettlement Policy	Land Acquisition Act does not deal with the broader social and economic impacts of the project. Thus, this policy was established to overcome these impacts.	To monitor land replacement, income restoration, relocation assistance and allowances, consultation and grievance redress, assistance to vulnerable groups and provision of resettlement sites and services	Ministry responsible for land and land development, CEA
Monuments and Archaeological Sites and remains Act, 1958. Act No. 24 of 1958 Antiques Ordinance, 1960	An Act to provide for the preservation of ancient and historical monuments and archaeological sites and remains of national importance	For the regulation of archaeological excavations and for the protection of sculptures, carvings and other like objects etc.	Department of Archaeology
Motor Traffic Act No. 60 of 1979	To provide sustainable approach for vehicle traffic	Regulates vehicle traffic during transportation of construction materials and the construction activities	Traffic police
National Environmental Act No. 47 of 1980, amendment Nº 56 of 1988, and other amendments	Provide protection, management, enhancement of the environment with prevention and control of pollution	Regulates sustainable utilization of almost all natural resources such as water, soil and air	Central Environmental Authority (CEA)
National Environmental Act (Protection & Quality) Regulations, No. 01 1990.	To provide for the prevention and control of water pollution and enhancing the quality of water	Controls sewage and effluents into inland surface water	CEA
National Environmental Act (Ambient Air Quality) Regulations, 1994.	To provide for the prevention and control of air pollution	Controls emissions of air pollutants	CEA
National Environmental Act (Noise Control) Regulations No. 1 1996	To provide maximum allowable noise levels	Regulates noise pollution	CEA
Soil Conservation (Amendment) Act No. 24 of 1996	Act for conservation of soil resources and productive capacity of land	Degraded Land, prevent damage against salinity, water logging, drought, floods	Soil Conservation Board

3. Description of the existing environment

12. The sub project is located within the low country (i.e. elevation below 400 m above mean sea level) intermediate zone of the country. According to agro-ecological classification[2] the sub project area is located within IL1c agro-ecological region. Topographic features, 75% expectancy of annual rainfall, soil and predominant land use of IL1c agro-ecological region is presented below.

Table 6. Characteristics of the IL1c agro-ecological zone

Agro-ecological zone	**75% expectancy value of annual rainfall (mm)**	**Description (Land use, Terrain, Soil groups)**
IL1c	> 1,300	Rubber, paddy, mixed home gardens, sugar cane and export agricultural crops Rolling, undulating and flat terrain Reddish Brown Latosolic, Reddish Brown Earth, Low Humic Glay Soils and Immature Brown Loam Soils

Source: The National Atlas of Sri Lanka (2nd edition), Survey Department Sri Lanka

Figure 2,3,4,5 and 6 represent some of the locations through line route shall be located.

Figure 2. Forest area located within the line route

[2] The entire country has been divided in the 46 agro-ecological zones based on terrain (elevation), soil types, land use and 75% expectancy of annual rainfall.

Figure 3. Paddy fields located through the Monaragala- Wellawaya line route

Figure 4. Land with sugar cane

Figure 5. Teak Plantations through Monaragala- Wellawaya line route

Figure 6: Rubber land and mountain area

13. The tower line from Monaragala grid substation to Wellawaya gantry traverses along paddy lands (26.38%), forest area (24.6%), sugar cane (17.85%), teak plantations (7.5%), coconut (5.9%), rubber (5.64%), mango (2%) and others (10.13%; including road crossings, river crossings and degraded lands). The nearest boundary of Yala National Park with respect to the tower line is located approximately 19.7km away. This line route has been demarcated avoiding all populated areas, and any possible ecologically sensitive areas. No wildlife sanctuary, national parks or ecologically sensitive areas are present in the nearby areas of right of way. A summary of land use pattern along the tower line is presented in table 7.

Table 7. A summary of environmental features along the tower line from Monaragala to Wellawaya

No	Description	33 kV tower line from Monaragala Grid Substation to Wellawaya Gantry
1.	Length of line	36.011 km
2.	Canal / River/ tank crossings	Rivers-04 (i) Kumbukkan Oya (AP12-AP13) (ii) Menik Ganga (AP27-AP28) (iii) Kuda Oya (AP 37-AP38) (iv) Kirindi Oya (AP 67-AP68) Tanks-02 (i) Mahagodayaya Wewa (AP13-AP14) (ii) Karawilakanaththa Wewa (AP 24-AP25)
3.	(i) Forest Area (in Hectare) (ii) Wild life Sanctuary/National Park (in Hectare) (iii) Distance from nearest Wildlife sanctuary/ National Park	(i) 12.4 (ii) Nil (iii) 19.7km from Yala National Park
4.	Land Strata	Forest land, Private owned paddy fields, sugar cane, teak, coconut, Rubber, Mango and other lands
5.	Road accessibility	Main Roads: (i) A4 – Colombo to Batticaloa Highway (ii) New road (iii) B59 – Pelwatta to Passara Road (iv) B35 – Buttala to Kataragama Road (v) B522 – Buttala , Helagama to Okkampitiya Road (vi) B513 – Kumbukkana, Okkampitiya to Maligawila Road Secondary access roads : (i) Batahelayaya Road (ii) Gonagodalla Road (iii) Dencil kobbakaduwa Mawatha (iv) Silbara Road (v) Galwala Road (vi) Polgasyaya Road (vii) And several minor roads
6.	Private land (in ha.) (i) Agriculture a. Irrigated	(i) (a) 13.3 ha paddy land (b) 9 ha Sugar Cane

No	Description	33 kV tower line from Monaragala Grid Substation to Wellawaya Gantry
	b. Non-irrigated (ii) Non-Agriculture / Private Waste land. (iii) House or Building: a. Residential b. Non-Residential	(ii) 10.7 ha Coconut, Rubber, Teak & Mango (iii) (a) - (b) 12.4 ha
7.	EHV Line Crossing	None
8.	HT line crossings	Eleven number of 33 kV lines cross between TT01 – AP01, AP04 –AP05, AP09-AP10, AP14 – AP15, AP25 – AP26, AP34 – AP35, AP35 – AP36, AP42 – AP43, AP45 – AP46, AP63 – AP64 and AP65 – AP66
9.	No. of Forest Trees within the corridor	2533
10.	No. of private trees within the corridor (i) Fruit Trees: (ii) Non Fruit Trees:	i. 878 ii. 3673 Most common fruit trees observed include Wood Apple, Cashew Nut, Dam, Tamarind, Lawulu, Mango, Jack Fruit, Coconut, Arecanut etc. And non-fruit trees include Teak, Rubber, Weera, Mara, Kaya, Damunu, Gammalu, Kohomba etc.
11.	Length of line in mountainous area	7.9 km (Isolated mountain)
12.	Length of line in coastal area	None
13.	Length of line in cultivated area	23.6 km
14.	Length of line in un-cultivated area	Approx. 12.5 km (But 8.9 km Forest)
15.	Highest altitude en-route the line	210 m
16.	Nearest distance from airport	50 km to Mattala International Airport
17.	Distance from nearest religious or archaeological sites	7.5Km from Buduruwagala archaeological site. Religious places are given in table 07.
18.	Name of villages involved/Name of District	Horombuwa Kumbukkana Mahagodayaya Pettagamwela Medawala Yatiyallathota Puhulkotuwa Kumarapura Pelwatta Mahasenpura Sudupanawela Galbokka Anapallama

No	Description	33 kV tower line from Monaragala Grid Substation to Wellawaya Gantry
		Monaragala District
19.	Land to be permanently acquired: a) Area (in ha) b) Cost.(in SLR)	 a) 0.0375 b) 2.8 million

Basic demographic information of Monaragala, Buttala and Wellawaya DS divisions are presented below.

Table 8. Population details of Monaragala, Buttala and Wellawaya DS divisions

DS division	Total population	Male	Female
Monaragala	44,804	22,504	22,300
Buttala	48,270	24,297	23,973
Wellawaya	54,099	26,963	27,136

Table 9. Basic energy source for lighting

DS division	No. of households	Electricity through national grid	Electricity through local grids (mini-hydro)	Kerosene	Solar	Bio gas	Other
Monaragala	12,744	8,807	0	3,484	450	0	3
Buttala	10,924	7,679	0	3,066	173	0	6
Wellawaya	16,543	12,524	0	3,597	324	0	8

Source: Department of census and statistics, 2012

14. Distance to sensitive receptors from the tower line is presented in table 10.

Table 10. Approximate distance to this subproject from sensitive receptors

Name of Sub project	Primary School	Secondary School	Temple	Primary Clinic (PHC)	Main Hospital	Population/ Inhabitant (in pockets)	Metal access path to the Site
33 kVLynx DC line from Monaragala GS to Wellawaya proposed Gantry		365m to Pelwatta Maha Vidyalaya	1.58km to Udawela Temple	1.43km to Higuregala Health Clinic	1.97km to Wellawaya Base Hospital		A4 – Colombo to Batticaloa Highway
		1.05km to Malwaththala National School	1.6km to Kotaweharagala Temple	1.5km to Wellawaya MOH Office	2.37km to Buttala General Hospital		New Road

		1km to Ganapanguwa Kanishta Vidyalaya	2.24km to Kukuluwa Temple – Kukuranpola	1.64km to Warunagama Health Clinic	6.70km to Hingurukaduwa District Hospital		Batahelayaya Road
		1.56km to Anapallama Kanishta Vidyalaya	500m to St Marry Church - Wellawaya		6.98km to Monaragala District General Hospital		B59 – Pelwatta to Passara Road
		700m to Ranjan Wijerathna Vidyalaya – Yudaganawa	1.71km to Wellawaya Muhiyadeen Mosque				Gonagodalla Road
		800m to Kumaradasa Vidyalaya – Wellwaya	1.41km Weheragala Viweka Senasanaya				Dencil Kobbakaduwa Mawatha
		2.15km Yudaganawa Maha Vidyalaya	840m Kutumbawela Rajamaha Viharaya				B35 – Buttala to Kataragama Road
		2.40km to Waguruwela Maha Vidyalaya	420m to Happoruwa Rajamaha Viharaya				B522 – Buttala , Helagama to Okkampitiya Road
		1.8km to Buttala Dutugemunu Maha Vidyalaya	940m to Rathmalvehera Viharaya				B513 – Kumbukkana, Okkampitiya to Maligawila Road
		1.56Km to Wellassa Subhagya Vidyala	130m to Thibbotuwawa Rajamaha Viharaya				Silbara Road
		1.4km to Kumbukkana Maha Vidyalaya	1.3km to Madrasathul Hiqma Mosque				Galwala Road
		270m to Maduruketiya Maha Vidyalaya	640m to Rahathankanda Aranya Senasanaya				Polgasyaya Road
			650m to				

			Dewagiri Aranya Senasanaya				
			2.6km Waguruwela Viharaya				
			2.6km Kumbukkana Jumma Masjith				
			1.62km to Sri Manikka Vnayagar Kovil				
			1.9km to Kumbukkana Muththumari Amman Kovil				
			2.19km to Sama Viharaya – Kumbukkana				
			1.31km to Kumbukkana Gangarama Viharaya				
			285m to Mulgiri Rajamaha Viharaya				
			1.12km Owagiri Rajamaha Viharaya				
33kV Wellawaya Gantry		800m to Kumaradasa Vidyalaya – Wellwaya	500m to St Mary Church – Wellawaya	1.5km to Wellawaya MOH Office	1.97km to Wellawaya Base Hospital		A2 – Colombo to Wellawaya Highway
			1.71km to Wellawaya Muhiyadeen Mosque				A23 – Wellawaya to Ella Road
			940m Rathmalvehera Viharaya				A4 – Colombo to Batticaloa Highway

4. Screening of environmental impacts and mitigation measures

15. The IEE report developed in 2016 include a list of environmental impacts and mitigation measures. This supplementary IEE report have considered these impacts and mitigation measures while providing more specific information based on the design details.

4.1. Impacts and mitigation measures with respect to design and pre-construction stage

Selection of tower line route and gantry sites

16. As a principle the project tower line routes are selected avoiding any protected areas such as nature reserves, national parks and sanctuaries, thus avoiding impacts to fauna and flora in such areas. However, for Monaragala – Wellawaya line route no such protected area is located near the corridor.

17. The initial line route has been selected avoiding any physical relocation of people. However, during the detail designs the line route has been further refined to minimize the economic or crop loss. There shall be no acquisition of private land involved in the sub project, however adequate compensation shall be paid to those who loss trees and crops.

18. If private land is required for gantry sites, preference shall be given to purchase such land at current market value (under willing seller and buyer concept) or acquired with payment of compensation at replacement rate.

Selection of material (cables) for power line and switching yard

19. Exposure to electromagnetic interference shall be a concern of public which needs to be considered in selecting cables for the power line. In order to mitigate this issue, the power line shall be designed to comply with the limits of electromagnetic interference from overhead power lines.

20. The transformers and other equipment used in the switching yard must be free from poly-chlorinated biphenyl (PCB).

4.2. Impacts and mitigation measures with respect to construction stage

21. The impacts arising due to construction activities are location specific and mostly temporary in nature. These impacts could be avoided, minimized or mitigated through adopting the measures suggested.

Operation of labour camps, stores and yards

22. Common issues that occur due to establishment of labour camps, stores and yards are; accumulation of waste including municipal solid waste (MSW), contamination and pollution of soil and nearby water bodies by untreated wash and waste water from labour camps and leakages/ spills of oil, fuel and other chemicals. Accidental fires could also occur at these locations.

23. Following measures shall be adopted to avoid, minimize or mitigate these issues.

- Separate cooking and dining areas shall be constructed in labour accommodations and the workers shall be advised not cook or dine inside their billets.
- Cooking and dining areas shall be provided with food waste collectors with adequate capacity and shall only be disposed to authorized sites that collect municipal solid waste or facilities that recycle this waste.
- Wastewater including wash water from labour accommodations shall only be discharged outside the construction only after filtering at least through a sand gravity filter.
- All fuel, oil and other chemicals shall only be stored in an enclosure with an impervious floor and protection from storm water. A spill restrainer shall be provided where fuel is stored.
- All office, labour, store and yard facilities shall be provided with adequate type/ number of fire extinguishers.
- At the completion of work, the contractor will be required to rehabilitate and clean up all work sites. This includes repairing damage to pavements, roads, and drainage systems. All waste is to be removed from the sites. The contractor and the CEB will be responsible for implementing this requirement.

Site clearing at towers and gantry locations

24. Removal of trees, trimming branches of trees and removal of any crops located within area identified for tower footings shall be a key issue with respect to site clearing which shall have an impact on flora and fauna, and also on the income of occupants/ owners of such land. Table 10 below presents the No. of trees observed along this line route (within the corridor of 20m, 10m either side from the center line). Removing of trees is done to have an uninterrupted supply throughout the year and if a tree branch or tree is fallen on the distribution line, it will create a large fault current which will automatically interrupt the supply from the protection devices installed and eventually interrupt large number of consumers feeding from the line. All possible measures shall be taken to minimize the number of trees that need to be felled to tower construction and stringing of power transmission lines.

Table 11. Total number of trees observed within the line corridor

Sub-Project Details	**Private Land/ Government Land***		**Forest Land**
	Total number of fruit trees	**Total number of non-fruit trees**	**Total number of forest trees**
Monaragala Grid Substation to Wellawaya Gantry	878	3,673	2,533

* Government Land means the land given by government and canal reservations

25. The detailed list of trees to be removed shall be prepared by the PIU and submitted to PMU for record and further action.

26. Owners of these trees shall be compensated as per the GoSL norms (Electricity Act, 2009). The loss of crop shall also be compensated; however, the project team shall inform the farmers in advance to harvest their crops as much as possible.

27. Pruning of branches rather than cutting a whole tress should be considered to further reduce the number of tress to be removed. Conducting a tree replanting program to compensate

the No. of trees removed shall also be considered as a mitigation measure for the loss of vegetation cover. A replanting ration of 1: 3 (i.e. planting 3 plants for each tree felled) shall be considered in order to sustain the country's vegetative cover.

28. Excavation works for foundations shall create excess soil, which if left at site shall get washed off due to storm water. Such washed off soil would get deposited in near by lands, water bodies causing land and water pollution.

29. Reuse of excavated soil for backfilling, spreading the excavated soil and compacting are useful measures to minimize the wash off of excavated soil.

30. Excavation works in hilly and slope areas should be avoided during times of heavy rains to minimize any chances of slope failures or landslides. Recommendations from relevant institution should also be considered to avoid/ minimize slope failure with respect to construction works in hilly areas.

31. Prolonged exposure of soil in cleared lands to dry and windy conditions shall emit dust, which shall become a nuisance to public. Although this shall be a temporary impact care shall be taken to suppress dust at critical locations such as near settlements by damping the exposed soil surfaces and putting dry mulch over remaining exposed land especially at tower locations.

Transportation of construction material to sites and handling

32. Improper and unsafe transportation of construction material from stores/ yards to site locations shall cause accidents to workers as well as public. Movement of vehicles transporting material and other construction vehicles into nearby lands shall damage any crop/tree or even a structure located in such land. Unsafe handling of material at construction sites shall cause accidents to workers. Following measures shall be adopted to avoid/ minimize such accidents during transportation and at site.

- Transportation of construction material shall only be done using trucks which are suitable for such transportation works. These vehicles and other construction vehicles and machinery shall only be operated by trained and experienced personnel having proper licenses.
- Trained and experienced personnel shall only be used for construction activities.
- Access road to sites shall be clearly marked on ground and in case of an accidental movement of vehicle into nearby land occur, the damage shall be assessed and compensated by the contractor.

Construction activities near irrigation, drainage canals and other water bodies

33. Excavated material and other construction waste such as concrete sludge, used cement bags and metal if washed on to irrigation and drainage canals (especially within the paddy lands through which the line is routed) shall lead to loss of aquatic fauna, flora and even cause crop losses. In order to prevent such damage, the contractor shall adopt the following measures.

- All construction material shall not be stored (temporary) near such water bodies.

- No used cement bag, sand or metal or any other construction waste material shall be disposed into water bodies. Such material shall be collected and taken back to stores/ yard.
- Any accidental spill shall be immediately removed avoiding any prolonged blockage in the canal path.
- Any site near a water body should be cleared immediately after the construction works are completed.

Construction activities near settlements, other utility lines and safety of public

34. Construction activities of the tower line near other utility supply lines (mainly telecommunication and water supply) may cause accidental damages to such supply lines. In case of such damage there shall be an interruption to the supply causing an inconvenience to the public.

35. To avoid such damage the contractor shall take all possible precautions to protect the utility supply line/s that are close to any construction site. Further if this is an accidental damage, the contractor shall immediately contact the service provider and get their assistance in reinstating the supply line.

36. Proposed tower line crosses A and B class roads and few by roads. Cable stringing activities over these roads may cause a temporary disturbance to the movement of vehicles and pedestrians and treat to the safety. Flagmen shall be deployed at such locations to guide traffic and pedestrians and such activity shall be completed within the shortest possible time to minimize the disruption caused to traffic and pedestrian movements.

37. Activities related to construction of towers shall not create high noise levels causing any inconvenience to nearby settlements. However, night time construction work shall be avoided or shall only be conducted with approval from PMU and after discussing and agreeing with the residents in such areas. Tower construction activities shall not create any ground vibration.

Activities that create emissions

38. Other than the dust emitted at construction sites, emissions from construction related vehicles shall be the main contributor for gaseous emissions polluting the air.

39. All heavy equipment and machinery shall be in full compliance with the national environmental air emissions fuel and vehicle standards of Extra Ordinary Gazette 1137/35 of June 2000 updated by air emissions fuel and vehicle standards (importation standards) 1268/18 December 2002 and 1295/11 June 2003 and further amendment, 1557/14 July 2008, to minimize this issue.

40. Further all vehicles delivering material to construction sites shall duly cover the material when transporting to avoid spillage of material and emission of dust.

41. All workers shall be advised not to burn waste material at random locations, all such waste shall be collected and disposed to an authorized disposal site/s. This waste includes empty cement bags, discarded form boards used for concrete works, paper and textile waste from labour

accommodations and site offices. The empty cement bags shall be stored inside the stores used for cement bags and transported to an incinerator for burning or shall be given to a cement factory for recycling. Discarded form boards shall also be piled up at a designated location within the construction site. Few workers shall be deployed to recover any board/ part of board that can be reused, and the remaining boards shall only be disposed to an authorized collector. Discarded paper and textile waste shall be collected and given to collector/s of such waste for recycling.

Temporary disruption of the electricity supply to the area

42. The supply of electricity shall be switched off for cable stringing. While this action provides safety to workers as well as public it shall cause a disturbance to the public in the sub project area.

43. Advance notices shall be provided to the public on time of such switching off to minimize the disturbances created and public to prepare early for such temporary disruptions. And reinstating the supply within the shortest possible time shall reduce the inconvenience caused to the public.

Impacts due to hazardous working conditions (accidents to worker force and public)

44. Construction activities pose potential hazards to both workers and public. Safety to workers and the public shall be enhanced by adopting the following measures during civil works:

- Barricading and restricting any public from moving into construction sites,
- Placing of warning signboards around all construction sites,
- Regular briefing and training of workers on safety precautions, and their responsibilities for the safety of themselves and others,
- Providing workers with personnel protective equipment (PPE), and enforcing strict supervision so that the PPEs are used during they are involved in construction activities,
- Arranging for the provision of first aid facilities, readily available trained paramedical personnel, and emergency transport to the nearest hospital,
- Arranging for regular safety checks of vehicles (checks include operation of reverse horns, head and taillights, braking including parking brakes) and material,
- Provision of hazard warning signals around construction sites and directing vehicle and pedestrian traffic away from work sites.

Impacts due to site clearing (at end of construction)

45. Once all construction works are completed the sites shall be cleared of all construction waste which shall include pieces of steel; pieces of wire; empty packing boxes; scrap material from demolished labour accommodations; and scrap material from the temporary barriers put around the construction sites. If these materials are kept heaped up at the site, it will create a negative impression on the scenic beauty in the area and also attract “scrap collectors”. These “scrap collectors” may even remove valuable parts of the newly constructed towers.

46. Therefore, all these scrap materials shall be disposed to an authorized collector/s of such waste.

4.3. Impacts and mitigation measures with respect to operation stage

47. Damages could occur to the transmission line due to natural hazards such as earth slips and extreme events of storms. Such damage shall interrupt the electricity supply to the areas serviced by this transmission line. Attending to repair such damages shall minimize the inconvenience caused to the public.

48. The safety hazard to public shall be one of the key issues that needs to be considered during operational stage. Danger signboards shall be installed that clearly identify and warn of the dangers on all overhead towers warning of the electrical hazards to avoid any accidents to public. These signboards shall be maintained properly.

49. Regular maintenance operations shall be conducted along the tower line route by CEB and attend to any repairs so that the tower line shall kept operational without any failures. Such maintenance work shall cause temporary interruption to electricity supply causing nuisance and inconvenience to public. Advance notices to public and reinstating the supply within the shortest possible time shall reduce the inconvenience caused.

5. Institutional requirement, environmental management, monitoring plans and monitoring

5.1. Institutional arrangements

50. The CEB is the project executing agency (EA) and implementing agency (IA), within which a PMU has been established to manage the project. The Project Management Unit[3] headed by a Deputy General Manager, reports to the General Manager of CEB with appropriate staffing to represent the EA since the time of previous loans. An energy and environmental division (EED) have been established with oversight responsibilities for monitoring all sub projects in areas of environment and social safeguards. The duties of the EED will include at a minimum: (i) oversight of field offices and construction contractors for monitoring and implementing mitigation measures; (ii) liaising with the field offices and contractors and seeking their help to solve the environment-related issues of subproject implementation; and (iii) preparation of environmental management reports every 6 months (as required by ADB). EED shall coordinate with PIUs for monitoring as well as designing appropriate mitigation measures to address environmental and social issues.

51. Duties of the EED at the corporate level include:

- Monitoring and implementation of mitigation measures during design, construction and operation phases of the project.
- Coordinate the preparation of suitable environmental management reports at various project sites.

[3] PMU provides Institutional support for financial management and institutional capacity development to all PIUs.

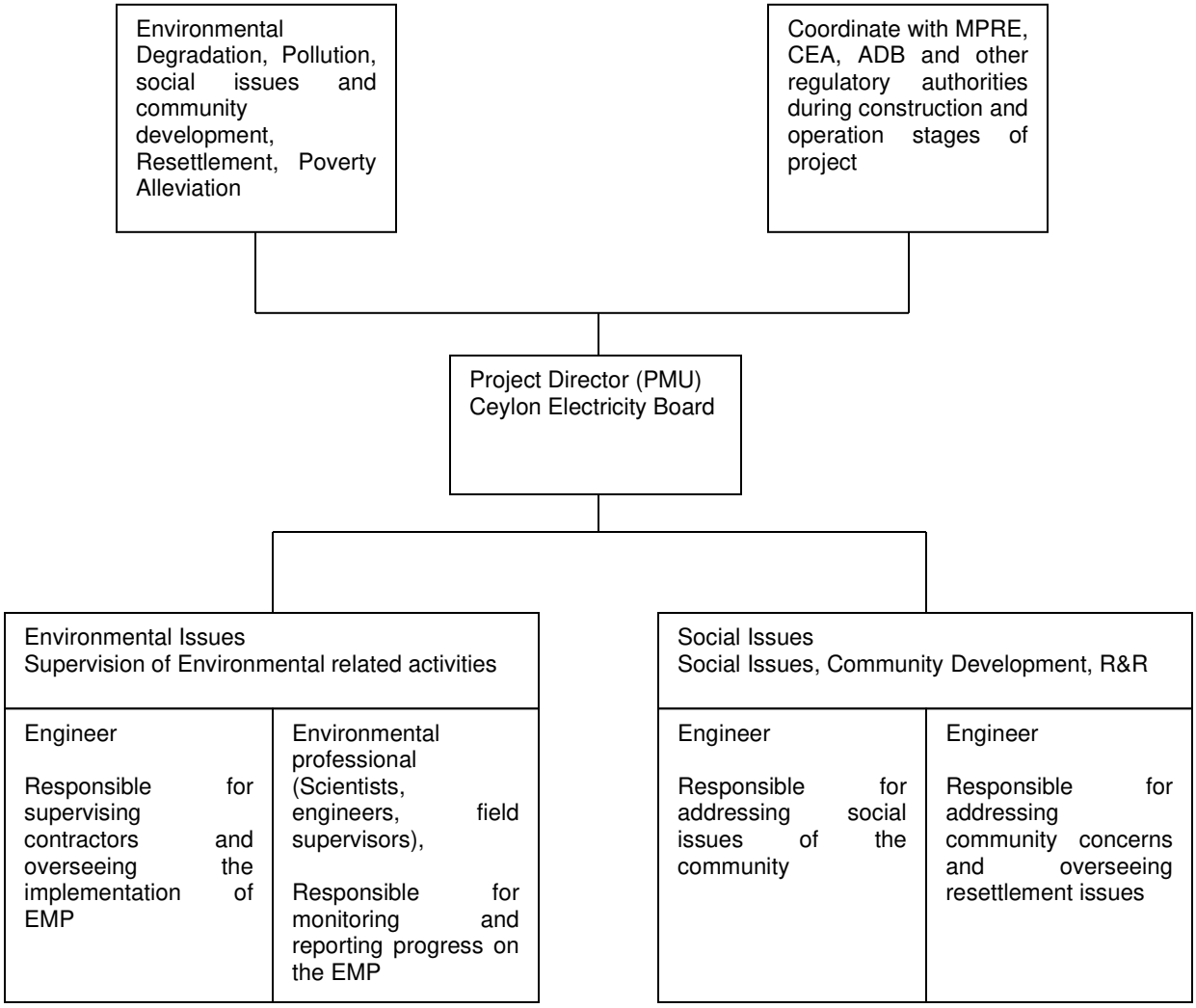
- Advising and coordinating field environmental management cells activity towards effective environment management.
- Liaise with the ministry of power and renewable energy (MPRE) and CEA, and other relevant agencies and seek their help to solve the environment related issues of the project implementation.
- Advice project planning cell on environmental and social issues to avoid negative environmental impacts.
- Provide training and awareness on environmental and social issues related to power transmission projects to the project staff.

52. Duties of the EED at the Field level:

- Implement the environment policy guidelines and environmental good practices at the sites.
- Advising and coordinating the field offices activity towards effective environment management.
- Liaise with the forest department and seek help of forest officers in resolving environment monitoring related issues.
- Carry out environmental and social survey in conjunction with project planning cell to avoid negative environmental impact.
- Make the contractor staff aware on environmental and social issues related to power transmission projects so that environmental management plan (EMP) could be managed effectively.

53. An environmental officer (EO) is assigned to the PMU in order to carry out these tasks. To assist EED in these specialist functions, CEB will hire appropriate environment and social consultants at project implementing unit (PIU) level, as deemed necessary or as stipulated by CEA's environmental clearance. Figure below presents the institutional organization structure showing the various entities within CEB and their role vis-à-vis- other government agencies.

Figure 7. Institutional Structures and Responsibility for Environmental Management Plan at CEB



5.2. Environmental management plan

54. An important objective of an environment assessment is to develop procedures and plans that could be adopted at various stages of a project to ensure mitigation measures and monitoring requirements are complied with. The environment management plan (EMP) presented in appendix 1 is an activity plan which summarize the potential impacts and mitigation measures discussed under “Screening of environmental impacts and mitigation measures”. It also includes details indicating possible locations of the impact and mitigation measures, on planned monitoring and responsibilities of different agencies for implementation of mitigation measures and monitoring.

55. The EMP activities related to construction stage shall be implemented by the contractor. The PMU/ EED has the overall responsibility of implementing and monitoring the activities listed in the EMP. A budget of approximately 0.2 million USD has been allocated for this sub project to mitigate environmental and social impacts.

56. The CEB will ensure that site engineers and contractors adhere and comply with all measures and procedures identified in the EMP.

5.3. Monitoring and reporting

Implementation of EMP

57. Implementation of EMP shall be monitored by PMU/ PIU. Activities to be monitored include: all planning, coordination and management activities related to the implementation of safeguard issues; the identification of corrective and preventive actions; records of health and safety matters and training activities; consultations with project affected people (as and when needed, particularly during the implementation); feedback, trouble shooting and project related grievances; preparation of progress and monitoring reports as required by the ADB; and verifying the projects overall compliance with safeguard measures and its progress towards achieving the intended loan outcomes.

Monitoring of selected environmental parameters

58. To ensure that project would not generate negative impacts to the overall environment quality, monitoring of environmental parameter will be performed by CEB/Contractor as per contract provisions. The monitoring activities include site supervision, verification of permits, monitoring of water quality, soil, noise and air. Monitoring of the quality of water, soil, air and noise during the construction stage is the responsibility of the contractor by the approved government agency. The measurement of environmental parameters and its periodicity for the sub project is summarized in appendix 2.

Reporting

59. Mitigation measures related to construction will be incorporated into civil works contracts, and their implementation will be primarily the responsibility of the contractors. In

addition, contractors will be required to submit monthly progress reports on the implementation of EMP measures to PMU. The PMU will report to the ADB on progress achieved against the EMP activities and milestones. Progress reports will include a description of implementable activities and their status; identify the responsible parties involved in their implementation; and provide project management schedules and timeframes for doing so, along with their associated costs.

60. The PMU will prepare and submit environmental monitoring reports to the ADB on a bi-annual basis. This report will include the results of environmental monitoring to demonstrate that sound environmental management practices are applied, and the set environmental targets are achieved. The implementation of the EMP measures shall be dealt through the conditions of the contract. These conditions will regulate the actions for CEB to enhance environmental compliance. ADB will continue to monitor project compliance with ADB safeguard requirements on an on-going basis throughout the duration of the contract.

6. Grievance redress mechanism

61. The grievance redress mechanism (GRM) for this infrastructure development project provides an effective approach for complaints and resolution of issues made by the affected community in a reliable way. This mechanism will remain active throughout the life cycle of the project. Thus, public utilities commission of Sri Lanka (PUCSL) Act creates an environment for all inhabitants of Sri Lanka and the contributors to its development, to have access to essential infrastructure and utility services in the most economical manner within the boundaries of the sustainable development agenda of the country. PUCSL's mission is to regulate all the utilities within its purview, to ensure safe, reliable and reasonably priced infrastructure services for existing as well as future consumers in the most equitable and sustainable manner.

62. ADB procedures require CEB to establish a GRM having suitable grievance redress procedure to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the subproject's environmental performance. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. A common GRM will be in place for social, environmental or any other grievances related to the project. The GRM will provide an accessible and trusted platform for receiving and facilitating resolution of affected persons' grievances related to the project. The GRM procedure for the project (including this sub project) is outlined below, which follows a time-bound schedule, with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required.

63. This GRM would consist of a grievance redress committee (GRC) that would consist of the following constitution as listed below.

- Project Head, CEB
- Division Secretary or their nominee
- Representative of Gram Niladhari/Council
- Women representative of village/council

- Representative of engineering, procurement and construction contractor
- Environment Officer at PMU or nominee

64. Grievances of affected persons (APs) will first be brought to the attention of the Project head of the PIU. Grievances not redressed by the PIU will be brought to the GRC set up to monitor sub project implementation for each sub project affected area. The GRC will determine the merit of each grievance and resolve grievances within an outer time limit of three months of receiving the complaint. Public can make their complaints, views, comments etc. via the official web site of CEB, www.ceb.lk. People can raise their complaints and grievances through relevant Government Officials in their areas; grama niladhari and divisional secretary. The proposed mechanism does not impede access to the country's judicial or administrative remedies. The AP has the right to refer the grievances to an appropriate court of law/ PUCSL if not satisfied with the redress at any stage of the process.

65. The flow chart showing the GRM is presented in figure 8.

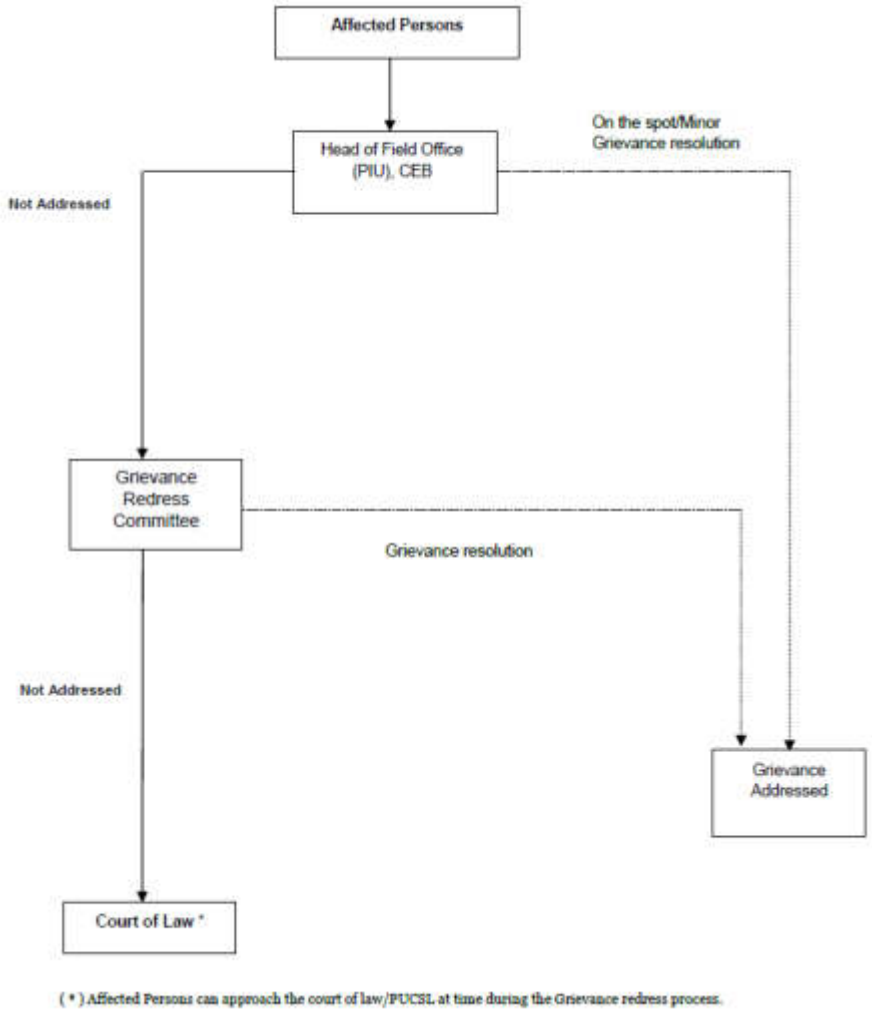


Figure 8. Process flow chart of the GRM for SESRIP

66. The PIU will keep records of all grievances received including: contact details of complainant, date that the complaint was received, nature of grievance, agreed corrective actions and the date these were effected, and final outcome.

67. There are environmental committees headed by divisional secretary for each DS division. People can forward their environmental related problems to these committees also.

7. Public consultation and information disclosure

68. PMU is following procedures defined in electricity Act and guideline introduced by PUCSL regarding the executing power line construction projects. Accordingly, at the initial stage of the project, before the surveying work started identified landowners were informed through relevant notices. After the initial surveying was completed all the affected parties due to the line route were informed through W notices. In this process relevant grama niladhari officers and agrarian officers in the area helped the project team to gather information. Through W notices, landowners informed PMU about their consent or objection on the proposed line route. All these details were collected and forwarded to the relevant Divisional Secretariat in order to solve the objections received.

69. In some cases, some landowners had special requests (like to adjust the line route to their land boundary, not to place any line towers in their land, etc.) and these were recorded by the project team. The line route was adjusted accordingly considering these requests, without violating the recommendations given by the Forest Department and other government institutions. If a request like this cannot be resolved from the project team (because of other limitations) these were forwarded to the relevant divisional secretariat for their intervention.

70. A total of 266 households (project affected parties) as 35 Nos. in Monaragala DS division, 177 Nos. in Buttala DS division and 54 Nos. in Wellawaya DS division were issued with W notices. There were 07 issues/ concerns pointed out by the landowners coming under this line route. All these issues/ concerns were resolved, by having appropriate inquiries at the relevant locations with the assistance of divisional secretariat offices under the supervision of the respective district secretariat. A map showing the final line route has been displayed at all relevant grama niladhari offices, Monaragala, Wellawaya and Buttala DS Offices. Summary of the consultations completed are presented in table 12.

Table 12. A summary of public consultations completed

Name of the component /site	**Name of the Village, grama niladhari division, district, province**	**Distance from project location**	**Names of the participants**
33 kV tower line from Monaragala GS to Wellawaya Gantry (36.011 km)	Veheragala Buttala **Monaragala District** **Uva Province**	Within the site	Ms. D.M. Ariyawathi Ms. R.M. Nayana Nandani Ms. K.D. Nishanthi Ms. Seetha Malkanthi Rajapaksha Mr. M.G. Gunapala
33kV	Wellawaya	Within the	

Name of the component /site	Name of the Village, grama niladhari division, district, province	Distance from project location	Names of the participants
Wellawaya Proposed gantry	**Monaragala District Uva Province**	site	Ms. Sita de Silva Ms. Nandani Wijayathilake Ms. K.H.M. Nirosha Priyangani Ms. K.H.M. Leelawathi Ms. A.N. Karunawathi Mr. C.J Kumara Ms. W.M Nirasha Madushani Ms. W.M Madusha Dilrukshi Mr. Y.A.D Lionel Ms. K.W.A Srimali Perera Mr. G.Weerawardana Ms. J.M Charlet Jayaweera Ms. G. Miurangi Dinusha Ms. D.M. Indrani Mr. R.M Jayasundara Mr. A.A. Subasingha Mr. D.B Dissanayake Mr. R.H. Gunathilaka Mr. R.M. Nuwan Mr. A.J.M.P. Senevirathna Mr. S.M. Sunil Udaya Kumara Mr. R.M. Sujeewa Lakmal Mr. H.M. Gunasekara Mr. R.M. Rathnayake (Women – 15)

71. The line route does not go on top of houses and all the safety measures are taken and deviated the line from the originally given line route (No of angle points have been increased to construct the line on sig sag path due to this reason). Crop compensation during the construction period and tree compensation at the time when trees are felled will be given accordingly and these have been notified to each affected party by a letter.

72. Contact details of relevant project engineer and electrical superintendent was officially informed to the relevant government institutions at the initial stages. PMU field staffs has been engaged in the field related matters of Monaragala - Wellawaya line during the past two 2 years, thus all the villagers and landowners are familiar with them. Any information related to the sub project are promptly shared by this field team with any interested or project affected party.

8. Findings and recommendations

73. Wherever possible, the line route was adjusted or sited away from houses considering the minimum clearance for the 33kV line route. Natural forests areas and dense vegetation

areas are avoided wherever possible. However, this route will pass through forests reservation areas, paddy fields, non-irrigated (sugar cane) lands, non-agricultural (coconut, rubber, mango) cultivations etc. The alignments have also avoided wetlands and geologically unstable areas.

74. Land will only be purchased or acquired for gantry-based switching station at Wellawaya end but no land will be acquired for placing distribution towers on private land thereby avoiding any relocation of project affected people. Some portion of the line goes through paddy fields, private lands, forests and scrublands. All other lands are state owned and home gardens.

75. PMU recommends and has instructed the contractor to meet the villagers or landowner with a representative of PMU staff. This is because the villagers are familiar with the project team thus it will avoid any problems, especially when selecting access routes for the construction work. The GRM process shall also be followed during construction stage. It is also recommended that the contractor develops an environmental management action plan based on the issues and mitigation measures presented in the EMP considering the significance of each environmental issue/ risk.

9. Conclusions

76. Overall, the social and environmental impacts associated with electricity distribution projects are limited to the construction period and can be mitigated to an acceptable level by implementation of recommended mitigation measures, best engineering and environmental practices.

77. The “significance” column of the EMP prepared for this sub project indicates that there are no significant negative environmental impacts. Proposed sub project shall improve the socio-economic condition of the project area by providing a reliable energy source. The environmental classification for the sub project shall remain as “Category B” and does not require any further environmental assessment including an environmental impact assessment.

Appendix 1. Environmental management plan

Activity	Issues/ impacts and mitigation measures					Monitoring indicators & methods
	Issue or impact	**Nature & significance**	**Location**	**Mitigation measure/s**	**Institutional responsibility**	
Design and pre-construction						
Selection of tower line route and gantry sites	Line traversing over settlement, crop lands. Removal of vegetation (trees) Land use restrictions, crop loss/ acquiring of private land. Slope failures/ landslides.	Direct/ Moderate	Tower line route and at gantry sites	Examine alternative routes, and select the route causing the minimum impacts on long-term land-use, and minimum possible removal of trees. Avoid/minimize traversing over settlements and crop lands wherever practicable. Payment of compensation for crop loss, advance notice to harvest crops. Purchase land or acquire land with payment at replacement cost. Adopting NBRO recommendations where necessary.	CEB Contractor Divisional secretary	Visual inspection, records by GSs. During preliminary route selection, reviewed during field visits and in final line design survey, further reviewed after the W notices are issued and DS's rulings
Selection of material for power line and switching yard	Exposure to electromagnetic interference. Use of equipment at switching yards with PCB.	Direct/ High	Power line, switching yard	Power line shall be designed to comply with the limits of electromagnetic	CEB Contractor	Designs to comply with standards.

Activity	Issues/ impacts and mitigation measures					Monitoring indicators & methods
	Issue or impact	**Nature & significance**	**Location**	**Mitigation measure/s**	**Institutional responsibility**	
				interference from overhead power lines. Use of equipment without PCB.		
Construction stage						
Operation of labour camps, stores & yards	Accumulation of MSW. Contamination and pollution of soil and nearby water sources. Spills of oil, fuel & other chemicals. Accidental fires.	Direct/ low to moderate	Labour camps, stores & yards	Provide separate cooking & dining areas with waste collection bins. Provide filtering system for wash water before discharging outside the site. Oil, fuel and other chemicals store in an enclosure with impervious floor and spill restrainer. Provide adequate type and Nos. of fire extinguishers.	CEB-PMU/ PIU Contractor	Visual inspection of availability of waste collection bin, wastewater filer system (operational). Availability of fire extinguishers.
Site clearing at towers and gantry locations	Removal of trees (loss of ground vegetation cover). Soil erosion and sedimentation.	Direct/ Moderate to high	Along the tower line and at gantry locations	Reuse of excavated soil. Compacting the left-over soil or disposal at a dedicated disposal site. Consider pruning branches rather than cutting a whole tree. Conducting compensatory tree	CEB-PMU/ PIU Contractor	Visual inspection on any soil erosion at sites. No. of trees to be removed and replanted

Activity	Issues/ impacts and mitigation measures					Monitoring indicators & methods
	Issue or impact	**Nature & significance**	**Location**	**Mitigation measure/s**	**Institutional responsibility**	
				planting program.		
Transportation of construction material to sites and handling	Accidents to workers and public. Accidental movement of vehicles to nearby lands causing damage to structures and crops.	Direct/ Moderate	At work sites. Along access routes to the tower line and at gantry locations.	Use trucks and machinery capable of handling such construction material. Use of trained and experienced workers to handle and operate equipment and material. All access roads shall be clearly marked. Pay compensation for any accidental damage done and/ or reinstate the structure.	CEB-PMU/ PIU Contractor	Accidents reported. Damages to structure/ crops/ trees reported.
Construction activities near irrigation, drainage canals and other water bodies	Washed out material causing pollution of water and affecting aquatic flora and fauna. Loss of irrigation water supply and/or blockage of drainage causing crop damage.	Direct/ moderate to high	Tower locations near irrigation, drainage canals and other water bodies.	Temporary storage of material away from water bodies. No permanent disposal allowed near water bodies. Any used material (cement bags, sand, etc.) shall not be allowed to be disposed to water bodies. Any accidental spill to be removed immediately. Sites shall be cleaned immediately after	Contractor	Visual observation of any material washed on to canals or water bodies.

Activity	Issues/ impacts and mitigation measures					Monitoring indicators & methods
	Issue or impact	**Nature & significance**	**Location**	**Mitigation measure/s**	**Institutional responsibility**	
				construction is completed.		
Construction activities near settlements, other utility lines and safety of public	Accidental damage to other utility lines causing public inconvenience. Destruction to movement of traffic and public along roads crossed by tower line. Treat to the public safety especially during cable stringing.	Direct/ Moderate to high	At tower construction and cable stinging sites crossing roads	Provide protection to existing utility lines near construction sites. In case of an accidental damage, contractor to immediately contact the service provider and reinstate the supply. Deploy a flagman during cable stinging across roads.	PMU/PIC Contractor	Reports of any damage to other public utility supply lines.
Activities creating emissions	Dust emission from exposed soil surfaces, and emissions from construction related vehicles and equipment causing air pollution.	Direct/ Moderate	All construction sites	Machinery/ vehicles used for construction shall comply with national environmental air emissions fuel and vehicle standards. All material transported to site shall be duly covered. No open burning shall be allowed. Reuse of material as much as possible. All used material shall be sorted, stored and disposed to collectors.	Contractor	Visual observation of any used material disposed haphazardly at site. Incidents of open burning at sites.

Activity	Issues/ impacts and mitigation measures					Monitoring indicators & methods
	Issue or impact	**Nature & significance**	**Location**	**Mitigation measure/s**	**Institutional responsibility**	
Temporary disruption of electricity supply to the area (for cable stringing)	Nuisance to public and disturbance to their routine activities.	Direct/ Low	Sub project area	Advance notice to public on power interruptions. Reinstating the supply within the shortest possible time.	CEB Contractor	Public grievance due to prolonged interruption of supply.
Hazardous working conditions	Occupational hazards to works causing injuries including fatal accidents. Accidents to public.	Direct/ High	At tower construction and gantry sites	Barricading and restricting access to construction sites. Placing warning signboards. Regular briefings on safety/ using PPE for workers. Provide PPE and enforce of using PPE at site. Conducting daily safety checks before commencing work. Clear diversions at site close to roads.	Contractor	Reports of accidents/ near misses.
Site clearing/ restoration (after completion of construction)	Accumulation of construction waste causing negative visual impression.	Direct/ Moderate	Labour camps, stores, yards and tower/ gantry locations	Collect, sort and dispose at authorized locations or handing over to authorized "scrap collectors".	Contractor	No scrap/ waste material left at site.
During operation						
Maintenance of the	Temporary interruption of	Direct/	Supply area	Advance notice to public.	CEB	Public grievance due

Activity	Issues/ impacts and mitigation measures					Monitoring indicators & methods
	Issue or impact	**Nature & significance**	**Location**	**Mitigation measure/s**	**Institutional responsibility**	
power line, gantries and switching yard.	electricity supply causing public nuisance and inconvenience.	Moderate		Reinstatement of supply within the shortest possible time.		to prolonged interruption of supply
Extreme weather events or occurrence of natural hazards.	Damage to the transmission line, switching yard causing interruption to supply and public safety hazards due to over hanging transmission lines.	Direct/ moderate to high	Supply area	Reinstatement of supply within the shortest possible time. Placing of permanent hazard warning signboards.	CEB	Public grievance due to prolonged interruption of supply

Appendix 2. Monitoring plan for selected environmental parameters

Environmental component	Project stage	Parameters to be monitored	Location	Frequency	Standards	Rate (LKR)	Implementation	Supervision
1. Air Quality	A. Pre- construction stage (The project after assign to contractor)	SO_2, NO_2, CO, PM10, TSPM	Inside and outside (0.5 km) of the proposed gantry, near major building (more than one sample)	A single time	NAAQS of Sri Lanka	Per sample LKR 9,000	Contractor by engaging approved monitoring agency(Sri Lankan Government)	Contractor/ CEB/CEA
	B. Construction Stage	SO_2, NO_2, CO, PM10, TSPM	Inside and outside (0.5 km) of the proposed gantry, near major building (more than one sample)	Two times	NAAQS of Sri Lanka	Per sample LKR 9,000	Contractor by engaging approved monitoring agency(Sri Lankan Government)	Contractor/ CEB/CEA
	C. Operation Stage	SO_2, NO_2, CO, PM10, TSPM	Inside and outside (0.5 km) of the proposed gantry, near major building (more than one sample)	A single time	NAAQS of Sri Lanka	Per sample LKR 9,000	CEB by engaging approved monitoring agency(Sri Lankan Government)	CEB/CEA
2. Water Quality	A. Pre- construction stage (The project after assign to contractor)	EC, TSS, DO, BOD, P^H Oil and grease, E	Nearest wells (2 wells) around gantry, water bodies, lagoons (more than one sample)	A single time	CEA Water Quality Regulations	Per sample LKR 14,000	Contractor by engaging approved monitoring agency(Sri Lankan Government)	Contractor/ CEB/CEA
	B. Construction Stage	EC, TSS, DO, BOD, P^H Oil and grease, E	Nearest wells (2 wells) around gantry, water bodies, lagoons (more than one sample)	1 time/ 3 months	CEA Water Quality Regulations	Per sample LKR 14,000	Contractor by engaging approved monitoring agency(Sri Lankan Government)	Contractor/ CEB/CEA
	C. Operation Stage	EC, TSS, DO, BOD, P^H Oil and grease, E	Nearest wells (2 wells) around gantry, Water bodies, lagoons (more than one sample)	1 time/ 3 months	CEA Water Quality Regulations	Per sample LKR 14,000	CEB by engaging approved monitoring agency(Sri Lankan Government)	CEB/CEA

Environmental component	Project stage	Parameters to be monitored	Location	Frequency	Standards	Rate (LKR)	Implementation	Supervision
3. Noise/ Vibration	A. Pre- construction stage (The project after assign to contractor)	Noise level (dB level)	Inside and outside (0.5 km) of the proposed gantry, near major building (more than one sample)	A single time	National Environmental (Noise Control) Regulations , NAAQS	Per sample LKR 6,500	Contractor by engaging approved monitoring agency(Sri Lankan Government)	Contractor/ CEB/CEA
	B. Construction Stage	Noise level (dB leve	Inside and outside (0.5 km) of the	2 times year	National Environment	Per sample	Contractor by engaging approved monitoring	Contractor/ CEB/CEA