JULY, 2024

CONSTRUCTION OF 2ND CIRCUIT OF 220 KV UNDERGROUND CABLE FROM KERAWALAPITIYA GRID SUB STATION TO COLOMBO PORT GRID SUB STATION

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT (ESIA) REPORT & ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN (ESMP)

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CONSTRUCTION OF 2ND CIRCUIT OF 220 KV UNDERGROUND CABLE FROM KERAWALAPITIYA GSS TO COLOMBO PORT GSS

PREPARED BY CEYLON ELECTRICITY BOARD (CEB) FOR

ASIAN INFRASTRUCTURE INVESTMENT BANK (AIIB)

(Last Revised 2024 July)

ABBREVIATIONS

AIIB	Asian Infrastructure and Investment Bank
dB	decibels
CD	Construction & Demolition (Wastes)
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
CMC	Colombo Municipal Council
CPSTL	Ceylon Petroleum Storage Terminal
DFR	Detailed Feasibility Report
DGM	Deputy General Manager
DSD	Divisional Secretariat Division
EHS Officer	Environmental, Health & Safety Officer
EO	Environmental Officer
E&S	Environmental & Social
EIA	Environmental Impact Assessment
EMF	Electric & Magnetic Fields
ESIA	Environmental & Social Impact Assessment
ESMP	Environmental & Social Management Plan
Ha	hectares
HDD	Horizontal Direct Drilling
HDPE	High Density Polyethylene Pipe
GDP	Gross Domestic Product
GND	Grama Niladhari Division
GOSL	Government of Sri Lanka
GPS	Global Positioning Station
GRC	Grievance Redress Committee
IEE	Initial Environmental Examination
kV	Kilo Volt
LHS	Left Hand Side
LNG	Liquefied Natural Gas
MoP	Ministry of Power
MW	Mega Watt
NBRO	National Building Research Organization
NEA	National Environmental Act
ODA	Oversees Development Assistance
OH/TL	Overhead Transmission Line
OSH	Occupational Safety & Health
PMU	Project Management Unit
PP	Prescribed Projects
PS	Pradeshiya Sabha
PPE	Personal Protective Equipment
PPV	Peak Particle Velocities
PRDA	Provincial Road Development Authority
PVC	Polyvinyl chloride

RDA	Road Development Authority
RE	Renewable Energy
RHS	Right Hand Side
ROW	Right of Way
SLN	Sri Lanka Navy
SLLDC	Sri Lanka Land Development Corporation
SLPA	Sri Lanka Ports Authority
SPM	Suspended Particulate Matters
STD	Socially Transmitted Diseases
TOR	Terms of Reference
UDA	Urban Development Authority
UG T/L	Underground Transmission Line
USD	United States Dollars
WPS	Wattala Pradeshiya Sabha

CONTENTS

ABBREVIATIONS 3
EXECUTIVE SUMMARY 12
1. Introduction 17
1.1. Project overview 17
1.2. Project Justification 17
1.3. Project Description 21
1.4. Project Location 21
1.5. Objectives, methodology and scope of the ESIA 24
1.6. Scope of the ESIA 24
1.7. ESIA Methodology 25
1.8. Purpose of revalidating the ESIA 27
1.9. Project Cost 27
1.10. Implementation Arrangements and Timeframe 27
1.11. Report Structure 30
2. Policy, Legal and Administrative Framework 31
2.1. National Energy Policy and Strategies of Sri Lanka 31
2.2. AIIB Environmental and Social Framework 39
2.3. Gaps between the environmental legislation and the AIIB ESF policy Guidelines 39
2.4. Approvals required for the project: 40
3. Project Description 42
3.1. Goal and objective of the proposed project 42
3.2. Key characteristics of the project 42
3.3. Major Construction Components of the Project 42
3.4. Cable Routing 42
3.5. Excavation Corridor 42
3.6. Construction Method Statement 44
3.6.1. Cable Installation Procedure 44
3.6.2. Trial Pits 47
3.6.3. Backfilling and Reinstatement 48
3.6.4. Methods of cutting of trenches and reinstatements 49
3.6.4.1. General site preparation 49
3.6.4.2. Notification 50
3.6.4.3. Traffic Management 50
3.6.4.4. Setting out 50
3.6.4.5. Clearance to the existing services 50
3.6.4.6. Trench Construction 50
3.6.5. Excavation beyond the asphalt layer 51
3.6.6. Trench Depth 52
3.6.7. Trench Width 52
3.6.8. Shoring 53
3.6.9. De-watering: 53
3.6.10. Safety at site 53
3.6.11. Road Intersection / Canal & River crossings 54

3.7. Associated Facilities 54
3.8. Other resources / facilities required / provided 55
4. Analysis of Alternatives 56
4.1. Alternative lay outs of the TL 56
4.2. Route Alternatives 56
4.3. Advantages and disadvantages of Alternative 1 and Alternative 2 58
5. Baseline Environmental and Social Data 61
5.1. Physical Environment 61
5.1.1. Meteorology 61
5.1.2. Rainfall 61
5.1.3. Topography 62
5.1.4. Geology & Soils 62
5.1.5. Surface Water Bodies 63
5.1.6. Drainage 63
5.1.7. Land use: 64
5.2. Environmental quality 67
5.2.1. Air Quality 67
5.2.1.1. Inventory of Emission sources 67
5.2.1.2. Air pollution levels 68
5.2.2. Noise and vibration levels 69
5.2.2.1. Noise levels 69
5.2.2.2. Vibration levels 70
5.2.2.3. Water Quality 72
5.3. Ecological Resources 72
5.4. Socio Economic Environment 72
5.4.1. Colombo DS Division of the Colombo District 73
5.4.1.1. Demographic Characteristics 73
5.4.2. Average household size 74
5.4.3. Electricity, water , communication and other utilities 74
5.4.4. Economic activities 74
5.4.5. Wattala DS Division in Gampaha District 75
5.4.5.1. Demographic Character of the Wattala DS Division 75
5.4.5.2. Economic Activities 76
5.4.5.3. Household Income & Expenditure: 77
5.4.6. Labor Force participation 77
5.4.7. Per Capita Income 78
5.4.8. Poverty 78
5.4.9. Aswesuma: 79
5.4.10. Gender 79
5.4.11. Sites of cultural and archaeological importance: 82
5.4.12. Services rendered by the Local Authorities 82
5.4.13. Health Services 83
5.4.14. Accessibility to potable water 85
5.4.15. Inflow and outflow of Vehicular Traffic 85

5.4.16. Description of the roads affected by the project 87
5.4.17. Road survey and observations: 89
5.5. Electric and Magnetic Fields (Non-Ionising Radiation) 90
6. Consultation with Stakeholders 91
6.1. Key Stakeholders and their future involvement 91
6.2. Consultation with the stakeholders: 93
6.3. Meeting with representatives of the residents and vendors: 98
6.4. Informal Discussions with the road side vendors 101
7. Environmental and Social Risks and Impacts 102
7.1. Positive Impacts 102
7.2. Negative risks & impacts 102
7.2.1. Environmental and social impacts during the pre-construction phase 102
7.2.1.1. Excavation of trial pits 102
7.2.1.2. Disruptions to access path 102
7.2.1.3. Improper use of temporary land obtained for construction activities 103
7.2.1.4. Mismanagement of labor camps and facilities . 103
7.2.1.5. Lack of community awareness: 103
7.2.2. Environmental and social Impacts during the Construction Phase 103
7.2.2.1. Air pollution due to dust 103
7.2.2.2. Impacts of dust emissions on the residents/small-time vendors and other public receptors 105
7.2.2.3. Impacts of construction noise 106
7.2.2.4. Impacts of Vibration 108
7.2.2.5. Impacts of construction and demolition (CD) and waste disposal 109
7.2.2.6. Impacts of dewatering and disposal of slurries on canals / natural drainage paths 111
7.2.2.7. Construction impacts on the road side dwellings 113
7.2.2.8. Construction impacts on the road side vendors and those running small kiosks: 114
7.2.2.9. Impacts on the road vehicular traffic 114
7.2.2.10. Hazards to road commuters/pedestrians and motorists 116
7.2.2.11. Disruptions to utility services 116
7.2.2.12. Impacts on the CMC waste collection work 116
7.2.3. Occupational safety & health Impacts (OSH) of the workers 116
7.2.3.1. Hazards to Construction Workers 116
7.2.4. Risks on Public Safety 122
7.2.4.1. Impacts of labor influx 122
7.2.4.2. Child labour and Forced labour 123
7.2.5. Chance Find 123
8. Environmental and Social Management Plan 125
8.1. Environmental and Social Management Plan (ESMP) 126
8.2. Environmental and social monitoring and reporting requirements; 135
8.2.1. Environmental and Social Monitoring Plan 136
8.3. Institutional arrangement for ESMP implementation and monitoring 139
8.4. Roles and responsibilities of the Contractor: 139
8.4.1. Role of the Project Management Unit (PMU) in ESMP implementation 140
8.5. Capacity Development and Training 141

8.6. ESMP Implementation Cost (estimated) 143
8.7. Information Disclosure and Consultation 147
9. Grievance Redress Mechanism (GRM) 147
10. Conclusion and Recommendation 151
11. References 152
12. Annexes 153
12.1. Terms of Reference (TOR) and Recommended Format For the ESIA 153
12.2. Additional scope for the ESIA 158
12.3. ESIA Team (Preparers) 165
12.4. Impact Assessment Method 166
12.5. Clarification Letter issued by the CEB on Associated Facilities 169
12.6. NBRO Env. Quality Reports on Ambient Particulate Matters (Dust) 170
12.7. NBRO Env. Quality Reports on Noise 175
12.8. NBRO Environmental Quality Reports –Vibration 180
12.9. NBRO Environmental Quality Reports – Water Quality 186
12.10. Inventory of structures along the 15.6 km of the route alignment during 2024 190
12.11. Summary of the inventory of road side structures / other receptors 200
12.12. Road profile of the route alignment by road sections 202
12.13. Photographs taken at the stakeholder meetings 212
12.14. Attendance Record of the Consultation Meeting held at the DS office Wattala 217
12.15. Trial Pit Locations 219

List of Figures

Figure 1 Renewable energy sources in Northern and Eastern part of the country 19
Figure 2 Transmission developments proposed to integrate the identified renewable energy hubs 20
Figure 3 Map showing the route alignment through the GN divisions 22
Figure 4 Map showing the Route alignment through the streets 23
Figure 5 Revised Implementation Schedule 29
Figure 6 Typical Cross section of the 220kV IC XLPE cables with different metallic sheath 45
Figure 7 Evaluation of metallic sheath *(Source: Project Feasibility Report)* 46
Figure 8 Cross section of the Trench with cables 51
Figure 9 Shoring 53
Figure 10 General Soil Map extracted for Colombo District 63
Figure 11 LAND USE MAP OF WATTALA DS AREA 65
Figure 12 Land use Map of Colombo Area 66
Figure 15 Status of the water quality of the canals running across the affected roads 113
Figure 16 Gravel Road Leading to Kerawalapitiya GSS 203
Figure 17 Work site for CEB close to the GSS Kerawalapitiya 203
Figure 18 CPTSL Road (2021) 203
Figure 19 Road is used for parking of Litro Gas laden Trucks (2024 April) 203
Figure 20 Kerawalapitiya Road (Bride Crossing) 204
Figure 21 Alwis Town Mawatha 204
Figure 22 ASP Liyanage Mawatha - Low lying area adjacent to the road 204
Figure 23 ASP Liyanage Mawatha – Canal side 204
Figure 24 Section of the cable-laid area after Mattakuliya Bridge close to the temple 204
Figure 25 Mattakuliya bridge over Kelani River along the end of Old Negombo road 204
Figure 26 View of Improvised section of Mattakuliya center Road / Aluth Mawatha 205
Figure 27 IMPROVISED SECTION OF ALUTH MAWATHA 205
Figure 28 Road close to Sathutuuyana along Aluth Mawatha RHS (divided road section 205
Figure 29 Road Opposite Sathutuuyana along Aluth Mawatha LHS 205
Figure 30 Private hospital on the road side 206
Figure 31 Discussions with house occupants Aluth Mawatha Development 206
Figure 32 Discussion with vegetable / fish vendors 206
Figure 33 Discussion with Road side House Dwellers 206
Figure 34 Road side small kiosks selling snaks 207
Figure 35 Road side small grocery shops 207
Figure 36 Scrap vendors use the narrow stretch of the road at Aluth Mawatha 207
Figure 37 Section of Aluth Mawatha rehabilitated by CMC 207
Figure 38 Water Supply pipe laying project along Aluth Mawatha (2021) 208
Figure 39 Road side to be used for water supply (2024) 208
Figure 40 Traffic Diversion barriers at lower St Andrews Mawatha 209
Figure 41 Bridge along the narrow section of Aluth Mawatha – Cables will cross this canal bridge 209
Figure 42 Passengers waiting for the bus at the intersection leading to upper St Andrews Road 209
Figure 43 Passenger transport (Public transport plying in along St Andrews Road) 209
Figure 44 Lower St. Andrews by road crossing to College street crossing Three Wheel Parks 210
Figure 45 Lower St. Andrews by road crossing to College street crossing Church 210

Figure 46 Ramanathan Mawatha Color Lights close to SLPP Gate 210
Figure 47 Foreshore Police station along Ramanathan Mawatha on RHS- l 210
Figure 48 Traffic along Ramanathan Mawatha 211
Figure 49 View of St Anthony's Road opposite St Anthony's Church LHS- 211
Figure 50 Road side parking and the row of shops along the sea beach road , 1st cross street 211
Figure 51 Cables already laid under Phase 1 along the road inside SLPP / New Hartal Bridge 211
Figure 52 Meeting with the RDA Negombo Engineers (2021) 213
Figure 53 Meeting with the Superintendent Engineer of Wattala Pradeshiya Sabha (2021) 213
Figure 54 Meeting With RDA Engineers (2021) 213
Figure 55 GNs attended at the meeting at Colombo DS Office (2021) 213
Figure 56 Meeting with CMC Works Superintendent 2021 214
Figure 57 Discussions with the CMC engineers (2024 April) 214
Figure 58 Meeting held at the DS Office Wattala 2021 214
Figure 59 DS Wattala taking part in the recent discussions with the ESIA Team 215
Figure 60 GNs took part in the recent discussions at the DS Office 215
Figure 61 DS COlombo inspecting the lay out map of the UL during the recent discussions 215
Figure 62 Meeting with the Water Engineer at the project office at Aluth Mawatha 215
Figure 63 GNs taking part in the recent discussions with DS Colombo 216
Figure 64 CEB officials took part in the recent discussion with the DS Colombo 216

List Of Tables

Table 1 Major Milestone Of Project Procurement Process 27
Table 2 A Summary Of The Legal/Regulatory Provisions Related To The Project: 33
Table 3 Details Of Excavation Corridor 43
Table 4 Location Of Trial Pits 47
Table 5 Alternative Roads Identified For The Ugtl 57
Table 6 Advantages And Disadvantages 58
Table 7 Land Use Characters Of Wattala Ds Area 64
Table 8 Industrial Estates Within 10 km Radius Of Kerawalapitiya GSS 67
Table 9 Thermal Power Plants Close To The Kerawalapitiya Industrial Estate 67
Table 10 Dust Level Data Facing Of Sensitive Receptors 68
Table 11 Air Quality Monitoring Data Near Sambodi Viharaya 69
Table 12 Noise Level Data 69
Table 13 Noise Levels Measured By the NBRO 70
Table 14 Vibration Levels Measured By the NBRO 71
Table 15 Population Disaggregated By Gender in The GN Division (Colombo) 73
Table 16 Population Characteristics In Wattala DS Division 76
Table 17 Total Population In The Project Affected GN Divisions In Wattala DS Division 76
Table 18 National Distribution Of Employed Population By Main Industry 77
Table 19 Number Of Samurdhi Subsidy Recipients 79
Table 20 District Wise Government Hospitals And Beds 84
Table 21 Traffic Intensity As Observed During The Road Survey 86
Table 22 Details Of The Road Sections By Length And Management Authroty 87
Table 23 Key Stakeholders, Their Future Involvement Of The Project 91
Table 24 Discussion Points In Summery 94
Table 25 Discussion Point In Summery With Shop Owners And House Occupants 100
Table 26 Views Of The Road Side Vendors During Informal Discussions 101
Table 27 Sensitive Receptors That May Be Exposed To Dust 105
Table 28 Noise Levels Emitted By Construction Machinery 107
Table 29 Number Of Road Side Structures Affected By The Construction Work 114
Table 30 Observable Traffic Intensity Of The Roads Affected By The Construction Work 115
Table 31 Likely Impacts Of The Road By Each Section 117
Table 32 Capacity Building Training Budget 141
Table 33 ESMP Implementation Budget 143

EXECUTIVE SUMMARY

I. Project Overview

The project constitutes laying of Underground Transmission Line (UG/TL) of 15.6 km between Kerawalapitiya Grid Sub Station (GSS) and Colombo Port Grid Sub Station. The route alignment of the UG/TL falls within the road sections maintained by the Colombo Municipal Council (CMC), the Road Development Authority (RDA), the Provincial Road Development Authority (PRDA), Wattala Pradeshiya Sabha[1] and the Sri Lanka Ports Authority (SLPA). Maps showing the project location and the route alignment are shown in section 1.4 of the Environmental and Social Impact Assessment (ESIA) report. The project will cost around $ 61 million. The total construction period is considered to be 80 weeks (18 months or within 1.5 years) .

II. Project Justification

CEB has completed the 1st phase of the Greater Colombo Transmission and Distribution Loss Reduction Project (GCTDLRP) under a Japanese ODA Loan. Further a 220kV underground transmission line (UG/TL1st circuit) between Kerawalapitiya Thermal Power Plant and the GSS at Colombo Port in the city center was constructed in 2018. Thereafter a detailed feasibility study was carried out during May 2019, by Tokyo Power Electric Co. Ltd and had submitted a Detailed Feasibility Report (DFR) to the CEB. It justified that the construction of the second circuit of Kerawalapitiya – Port 220kV TL as an indispensable activity. The goal of the 2nd UG/TL project is to increase the capacity and enhance reliability of the power transmission line in Greater Colombo urban development area. The project will thereby enable to strengthen the existing transmission network, reduce the rate of transmission losses, while improving the reliability of the power supply in Greater Colombo urban development area.

Besides the Sri Lanka Ports Authority (SLPA) expects to obtain around 400 MVA from CEB for Colombo North Port Developments and West Container Terminal – Phase 2 Developments. In addition, the requested demand for the stage 1 of Port City Development Project is 300 MVA. Accordingly, to cater the increasing demand, construction of LNG power plants in Kerawalapitiya and consequently to meet the Government's renewable energy policy target of 70% from RE in 2030, integration of renewable energy sources to the national grid is also in progress.

In order to achieve the Government's renewable energy policy targets (70% by 2030), 2nd underground cable from Kerawalapitiya Grid Substation to Colombo Port Grid Substation is very much essential to evacuate the power. With the high growth of renewable energy sources in Northern and Eastern part of the country, CEB has identified Kerawalapitiya as the main switching station to evacuate those renewable power to load centers in Colombo City. As per the Generation & Transmission Plan of the CEB, following Figure 1 & 2 shows the proposed renewable energy sources in Northern and Eastern part of the country and the planned transmission line developments proposed to integrate the identified renewable energy hubs.

The first Liquified Natural Gas (LNG) power plant is now being constructed and the bidding process for the second plant is also in progress. Moreover, the land for the third LNG plant is already finalized and the procurement process will be commenced soon. Further, as per the Transmission & Generation Planning Branch of CEB, 200 MW LNG

[1] Local government bodies or authorities in Sri Lanka are divided into three tiers, they being Municipal Councils (MCs), Urban Councils (UCs) and Pradeshiya Sabawas.

fired Internal Combustion Engine Power Plant to be commissioned in 2026 at Kerawalapitiya. This power plant is vital to give operational flexibility to balance out intermittent renewable sources in a way of mitigating power ramping and intermittency issues posed by the renewable energy sources. Hence, with the view of achieving the Government's renewable energy policy targets (70% by 2030), implantation of this plant will be expedited and whether the 2nd LNG plant is commissioned or not, CEB will take every possible effort to commission 200 MW IC Engine by 2026. Hence, with the growth of construction of LNG plants in Kerawalapitiya and increasing power demand in Colombo City, 2nd underground cable from Kerawalapitiya Grid Substation to Colombo Port Grid Substation is very much essential to evacuate the power. In addition to the LNG generation, with the high growth of renewable energy sources in Northern and Eastern part of the country, CEB has identified Kerawalapitiya as the main switching station to evacuate those renewable power to load centers in Colombo City.

III. Objective , methodology and scope for the ESIA

This Environmental and Social Impact Assessment Report (ESIA) and the Environmental & Social Management Plan (ESMP) were prepared with the aim of identifying environmental and social risks and impacts and corresponding mitigation measures of the proposed project. The project will be implemented by the Ceylon Electricity Board (CEB). The Asian Infrastructure Investment Bank (AIIB) will finance the project with a loan of $ 52 Million . The Government of Sri Lanka (GOSL) will provide counterpart funding amounting to $ 9 Million. The Terms of Reference (ToR) in Annex (11.1) as well as a sample ESIA document provided by the CEB through the AIIB was used as the framework for the preparation of the ESIA and the ESMP. The Environmental and Social Impact Assessment was carried out covering the 15.6 km of the route alignment and its immediate right of way (ROW) and the locations of the two substations and the associated facilities. The 15.6 km route alignment cuts across 06 Grama Niladhari Divisions (GNDs) of the Colombo Divisional Secretariat Division (DSD) and 05 GNDs of the Wattala DSD. The process adopted for the ESIA included:

1. Study of the project feasibility report and other relevant documents including the Environmental and Social Framework (ESF) of the AIIB;
2. Consultations with the CEB Engineering Staff and the officials of the AIIB;
3. Stakeholder consultations;
4. Collecting environmental and social baseline data through the secondary sources, site visits, a road survey & meeting with the residents;
5. Data analysis and impact assessment & drafting of ESIA/ESMP reports; (The ESIA document was updated in March 2024 considering the delay occurred in approving funding due to economic down turn experienced in the country)
6. Document Review (by the CEB & the AIIB) & document finalization.

IV. Relevant policies, laws and regulations.

The policy and the legal framework that governs the implementation of the proposed project is provided in Chapter 2 of the report. The project does not fall within the prescribed list of the Environmental Impact Assessment (EIA) regulations under the National Environmental Act (NEA). Nevertheless, project construction work shall comply with the national environmental quality standards prescribed under relevant EIA regulations. Further the approvals were to be received from a number of institutions including that of the Road Development Authority (RDA), the Colombo Municipal Council (CMC) and other relevant local authorities. (Refer Section 2.3). The ESIA will comply with the Environmental & Social Framework (ESF) of AIIB. The project has been identified as category 'B" project as the

environmental and social risks and impacts of the project are anticipated to be temporary (mostly during the construction stage) and modest.

V. Construction methods:

Project construction work will involve materials mobilization, digging of Trial pits, trench excavation, cable laying, road reinstatement, disposal of construction wastes & demobilization. Underground cables will be laid in trenches which will be excavated along main roads. The trenches have been aligned to its left along some sections of the roads, and to its right or to the median of the roads in other sections. At least 15 km of the trench will be excavated using open cutting method whereas the balance (600 m) need hydraulic direct drilling (HDD). However areas needing HDD have been drilled in the previous phase. Underground cable route will allow a Right of Way (RoW) depending on the width of the relevant section of the road. CEB plans to carry out construction work during the night time (between 8.00 pm to 6.00 am) and during the week ends to avoid possible traffic congestion and inconveniences to the general public. Typical duration for excavation, observation and backfilling will be 6-8 hours of 30 m length of the trenches and work will be carried out during night time from 2200 hrs. to 0600 hrs. on the following day. If reinstatement work cannot be completed before next day 0600 hrs. steel plates (8'x4'x1') will be used to cover the excavated area until the section will be fully reinstated. Construction method is elaborated under Project Description in Chapter 3.

VI. Project Alternatives

In analyzing alternatives, at least two route alternatives were considered together with the 'No project Alternative' which are explained in Chapter 4. In that route of the cable laying trench will have two alternative paths, one of which will be to align the path within the SLPA premises which is explained in the text under Alternative 'B' and another will be to continue along outside the port premises which is explained in the text under Alternative 'A'. CEB considers the option of having the route alignment 'A' as the most feasible.

VII. Social and Environmental baseline information and impact analysis

Relevant environmental and social data and information was collected and is presented in Chapter 5. There are a large number of housing units, business centers, and other infrastructure such as parapet walls, roller doors and intersections on either side of the roads beside the RoW of the cable route which may cause potential adverse social impacts during construction work. Density of houses is high along most of the road sections. Underground road sections also contain buried pipes for other utilities such as water supply, sewerage, power and telecommunications. The roads are busy with traffic. Representatives of the CMC, RDA, Wattala Pradeshiya Sabha, the Divisional Secretariats and the Grama Niladharis and several of the road side residents were consulted. There had been renewed consultations during the year 2024, with the DSDs and the CMC as well as other stakeholders in order to assess the potential impacts There was no major objection raised by the key stakeholders for the project. A summary description of the stakeholder consultations is provided in Chapter 6 of the report.

VIII. Significant Impacts of the Project:

Social, environmental and health & safety impacts of the project were assessed by examining available baseline data The impacts have been identified in relation to project's pre construction, construction phase and the operational phase. They have been further explained under direct and indirect impacts and permanent and temporary impacts. Due to laying of the UG T/L along the road network there could be a possibility to occur significant but reversible negative social and safety related impacts specially during the construction phase. These impacts have been explained under Chapter 7 of the ESIA Report.

Among the adverse impacts are those arising from the construction activities affecting the physical environment, such as the dust, noise & vibration during trench excavation and transport of spoils. Since the work is planned during night

time, noise & vibration could have severe impacts on the residents living close to the roads. Vibration during excavation and demolition processes can cause impacts on the structures such as parapet walls, housing units etc. located very close to the roads. Possible traffic congestion; access difficulties to the road side houses and other business entities and possible disturbances to utility services due to trench excavation are other significant impacts. Stockpiling of construction materials as well as accumulation of spoils will also impact on the traffic and the residents as well as road side vendors. Demolition of road surfaces could generate a significant volume of wastes. These impacts have been assessed in detail in Chapter 7.

IX. Environmental and Social Management Plan (ESMP)

Chapter 8 of the ESIA contains the ESMP. The ESMP incorporates the environmental and social impact mitigation measures to be implemented by Project Management Unit (PMU) together with the civil contractor. A environmental and social monitoring plan is also provided in which the institutional and organization structures for implementation of the ESMP has been explained. The roles and responsibilities, the capacity building/training requirements and a strategy for information disclosure, a grievance redress procedure and a tentative budget for ESMP implementation has been included.

A series of remedial measures have been identified to mitigate the significant impacts arising from construction activities arising from noise, vibration, dust, construction waste accumulation, possible disruptions to public utilities, traffic congestion, and potential loss of livelihood income. Mitigating occupational safety and health impacts and public safety impacts have also been considered very important and measures have been proposed to mitigate them in the ESMP.

It is proposed that the contractor should carry out a detailed crack survey prior to the construction work. Adequate community awareness shall be planned by the contractor well before the construction work to make the residents aware of any possible disruptions to utilities. Since work is confined to night times, mitigation of noise to comply with national noise standards has been recommended. Further the contractor is expected to provide temporary access to motorists, residences, business premises and other public places if the trenches could obstruct their accessibility. Since the work is carried out in the road sections, those who are engaged on pavements will be temporarily impacted. However those vendors have agreed that they would shift stalls until the construction work is completed.

Further the contractor is expected to prepare and implement a traffic management plan, and a waste management plan, health and safety plan ,waste disposal plan and an emergency response plan. Both the PMU and the contractor are responsible for monitoring the implementation of ESMP. Particularly, construction noise, vibration and air quality (dust) will be monitored by the environmental, health and safety officers engaged by the contractor.

Overall cost of implementing the ESMP will be around LKR 108 million (US $ 360,000). Details of the budget and a brief justification of the budget are provided under section 8.5. The ESIA as well as the ESMP will be made accessible to any stakeholders either in the form of electronic or hard copies. The referenced documents will be posted on CEB's website.

A grievance redress procedure has been introduced to address grievances and complaints from the general public. Chapter 9.

X. Conclusion

The ESIA concludes that the project is of vital importance to economic development of the country. The benefits of the project will be far outweighing any negative impacts. All the negative impacts are of temporary nature and that they are reversible with the suggested mitigation measures. Overall, the major environmental, social and health and safety impacts will be associated with the construction period and can be mitigated to an acceptable level by implementation of recommended measures and by best engineering and environmental practices. As the project falls

in category ‘B’ as per the AIIB E&SP guidelines, and that under the NEA, the project does not fall within the category of prescribed projects, no detailed EIA study is required to be submitted to the CEA for approval. Therefore, consultants recommended that the project be approved for funding.

1. Introduction

1.1. Project overview

Sri Lanka's electricity industry is managed by the Ministry of Power and Energy (MoPE). The Ceylon Electricity Board (CEB) is a corporate body established under the MoPE in November 1969 and is empowered to generate electrical energy, transmit the same, and distribute it to reach all categories of consumers and collect revenue. Established under the CEB Act, No. 17 of 1969 (as amended), the CEB has a statutory obligation under section 11 of the CEB Act to "develop and maintain an efficient, coordinated and economical system of electricity supply for the whole of Sri Lanka. With the enactment of the Sri Lanka Electricity Act, No. 20 of April 2009, the electricity sector was brought under the regulatory purview of the Public Utilities Commission of Sri Lanka (PUCSL), established under the Public Utilities Commission of Sri Lanka Act, No. 35 of 2002. CEB has divisions to deal with power generation, transmission and distribution and carries out its business by getting business permission from the PUCSL. The PUCSL plays the role of a licensing authority in implementing policies regarding business licenses, tariff approvals, formulation of technical and safety standards, and consumer protection, among other matters.

CEB holds six separate licenses for the above-mentioned operations. The license for the Generation Division caters to 66% of the power to the grid. The transmission network of the CEB consists of 55 Grid Sub Stations (GSS) with capacities of 132/33 kV, 220/132/33 kV, 220/132 kV, and 132 /11 kV, and 2,236 km of High Voltage (HV) Lines (both 220 kV and 132 kV). The Sri Lankan power system has a total installed capacity of approximately 4,084MW by the end of year 2022 consisting of CEB's generation of 3,071 MW and another 1,013 MW of generation through Independent Power Producers (IPPs). The maximum electricity demand recorded in 2022 was 2,708 MW and the total net generation was 15,305GWh (Source: Ceylon Electricity Board, Statistical Digest, 2022).[2]

1.2. Project Justification

A 220kV Underground Transmission Line (UG/TL) (first circuit) between Kerawalapitiya Thermal Power Plant (TPP) and the Port in the city center was constructed with a Japanese Overseas Development Assistance (ODA) loan in 2018. CEB has completed the first phase of the Greater Colombo Transmission and Distribution Loss Reduction Project (GCTDLRP) under the Japanese ODA Loan. In this regard, a detailed feasibility study was carried out in May 2019, by Tokyo Power Electric Co. Ltd and submitted a Detailed Feasibility Report (DFR) to the CEB. As per the DFR, Colombo and the surrounding area are the center of electricity demand, dominating 40% of the demand in the country.

The construction of the second 220kV UG/TL from Kerawalapitiya area to Colombo Port Grid Substation (GSS) mentioned in LTTDP is to meet the growing demand for electricity in the Colombo Port City and the peripheral areas of Colombo City with the accompanying construction of several high rise buildings for residential and commercial purposes. The Sri Lanka Ports Authority (SLPA) expects to obtain around 400 MVA from CEB for Colombo North Port Developments and West Container Terminal – Phase 2 Developments, in addition to the current demand of 300 MVA of electricity for the stage 1 of Port City Development Project. To respond to the growing demand for electricity, construction of LNG power plants in Kerawalapitiya are also in progress. Meanwhile, the Government of Sri Lanka

[2] https://www.ceb.lk/front_img/img_reports/1687251830Statistical_Digest_2022.pdf Down loaded on 3rd March 2023

(GoSL) has a target of achieving 70% of its power generation through renewable energy (RE) sources by the year 2030.

As per Renewable Energy (RE) resource estimates provided by Sri Lanka Sustainable Energy Authority (SLSEA), the northern region has the development potential of 2,460 MW of RE . In order to meet LTGEP 2023-2042 during the period 2027 – 2030, large scale wind and solar park developments are expected in Northern Province with a cumulative capacity of around 1200MW. The identified subzones with solar resource potential are located in Pooneryn, Vadamarachchi, Kilinochchi and Iranamadu while wind development subzones are located in Pooneryn, Vadamarachchi, Veravil, Chavakachcheri, Chenmani, Karachi and Pedro.

The most suitable path to transmit renewable power generated is via Kilinochchi – Vavuniya - New Habarana – Kirindiwela– Veyangoda - Kotugoda - Kerawalapitiya - Colombo Port GSS. Hence, CEB has identified the Kerawalapitiya as a main bulk power generation exchange hub in the transmission network and decided to add a new 12-line bay switching station at Kerawalapitiya. This switching station has been commissioned, allowing it to connect bulk power generation plants and facilitate the renewable bulk power transfer to the load center at Colombo. Considering the potential demand growth, the power capacity of the existing 220 kV cable will not be sufficient to cater to the load at Colombo City..

In view of the increasing demand for electricity in the Greater Colombo Area, the expansion of power generation through RE sources in different parts of the country, and the LNG power plants to be constructed in Kerawalapitiya construction of a second UG/TL from Kerawalapitiya Grid Substation to Colombo Port Grid Substation is essential for power transmission. With the expansion of renewable energy power generation projects in the Northern and Eastern parts of the country, CEB has identified Kerawalapitiya as one of the main switching stations to evacuate renewable energy to the load centers in Colombo City.

At present, a 280MW Combined Cycle Power Plant (Yugadanavi CCPP) is operating at the site of Kerawalapitiya, and the first 350 MW CCPP Liquefied Natural Gas (LNG) plant has recently been commissioned and the second plant has been awarded and the construction will start soon. Moreover, a land for the third LNG plant is finalized, and the procurement process will be commenced soon. Further, as per the Transmission & Generation Planning Branch of CEB, a 200 MW LNG-fired Internal Combustion Engine Power Plant will be commissioned in 2026 at Kerawalapitiya. This power plant is vital to give operational flexibility to balance out intermittent renewable sources to mitigate power ramping and intermittency issues posed by renewable energy sources. These power expansion projects are considered as top priority among the “Long Term Transmission Development Plan 2018-2027 (LTTDP)”

Figures 1 & 2 below show the proposed renewable energy sources in the Northern and Eastern parts of the country, and the planned transmission line developments to integrate the identified renewable energy hubs

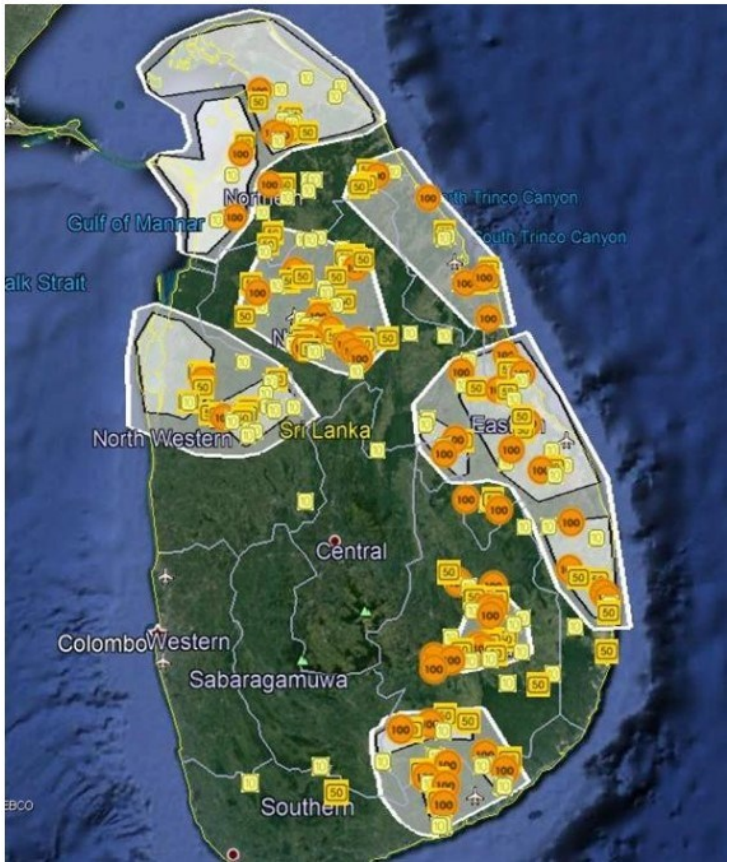

FIGURE 1 RENEWABLE ENERGY SOURCES IN NORTHERN AND EASTERN PART OF THE COUNTRY

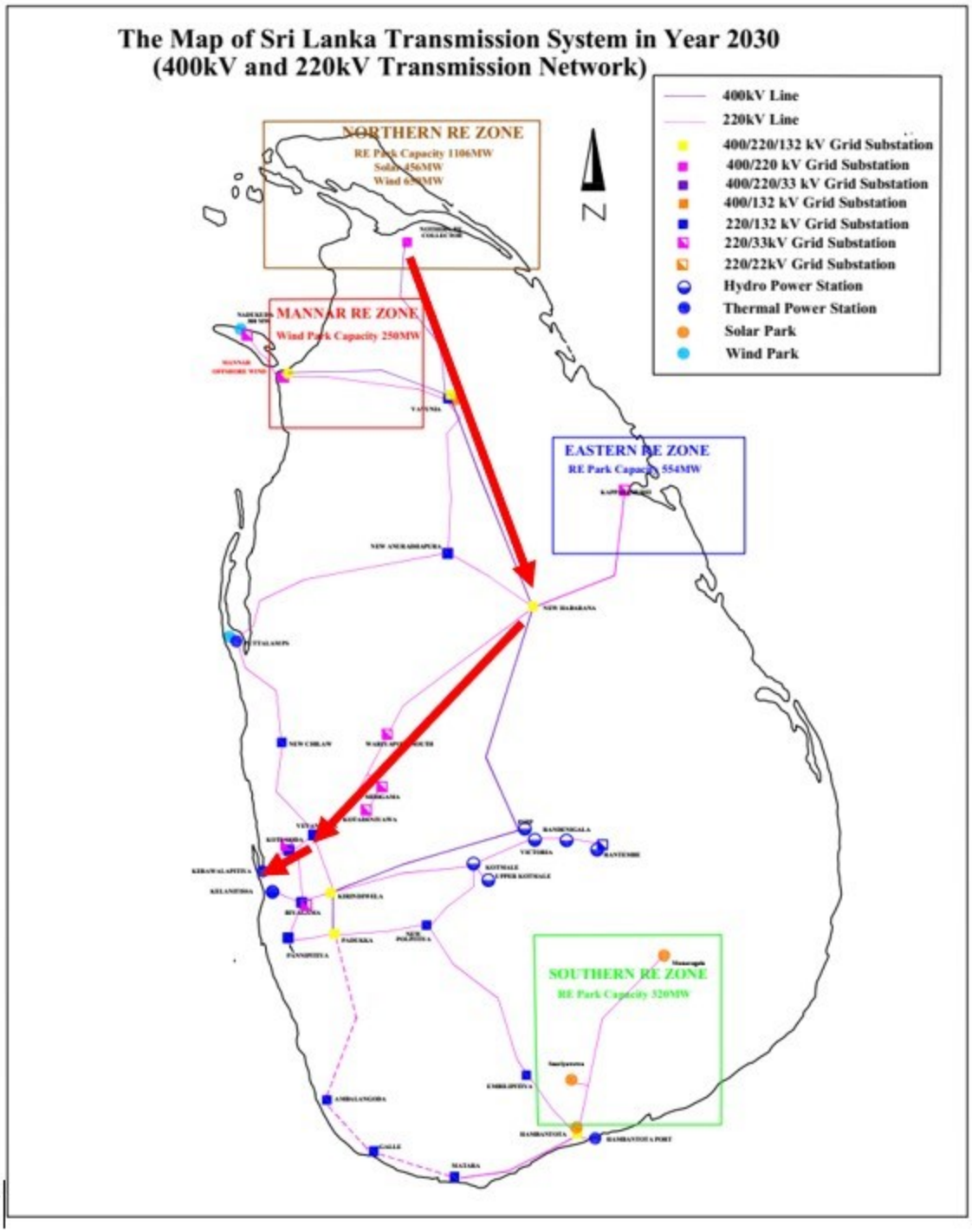

FIGURE 2 PLANNED TRANSMISSION LINE DEVELOPMENTS PROPOSED TO INTEGRATE THE IDENTIFIED RENEWABLE ENERGY HUBS

1.3. Project Description

The proposed second circuit of 220kV UG/TL, at a length of 15.6 km between the existing Kerawalapitiya Grid Substation (GSS) and the Colombo Port GSS, has been planned by the CEB, aiming to improve transmission and distribution losses, strengthen its capacity and to enhance the reliability of energy supply in the Greater Colombo area. The Kerawalapitiya Switching Substation (KSS) shall serve as one of the main gateways to transmit RE generated power to major load centers in Colombo area. The construction of the TL was planned to be commenced during the year 2022/2023 period but was delayed due to the economic draw backs the country faced. The project is now under consideration for funding and the CEB is hopeful that the construction could be commenced towards the later part of 2024. The selected underground cable route was chosen carefully to ensure the space for additional cable installation. According to the Kerawalapitiya Stage Wise Development Plan (KSWDP) prepared by CEB, one of the terminations for the 2nd 220kV UG/T/L was changed to connect the new Kerawalapitiya Grid Sub Station.[3]

1.4. Project Location

As discussed above, the Kerawalapitiya GSS is located close to the Yagadanavi Power Plant and sited in the Kerawalapitiya Industrial Park (KIP). This area falls within the Balagala Grama Niladhari Division (GND) of the Wattala Divisional Secretariat Division (DSD) in the Gampaha District. (Fig 3) Earlier, the Kerawalapitiya Industrial Park was a part of the Muthurajawela marsh /wetland. A section of the marsh is now reclaimed for establishing the industrial park. The land on which the KIP is located is owned by the Sri Lanka Land Development Corporation (SLLDC) whereas the industrial park is managed by the Board of Investment (BOI). Dart Global Logistics, Forbes and Walkers Warehouse and several other container yards and several other power producing installations and the Kerawalapitiya Intersection for the Express Highway are located in the Kerawalapitiya industrial park area. The local authority having jurisdiction over the area is the Wattala Pradeshiya Sabha (WPS).

The Colombo Port Grid Substation is located along the Chaitya Road in the Colombo Fort GND and in close proximity to the Colombo Port City. Immediate adjacent to the GSS on its Northern border is the Sri Lanka Ports Authority (SLPA). The area falls within the Colombo Municipal Council (CMC) boundaries. Both the GSS and the UG/TL fall within the Districts of Colombo and Gampaha in the Western Province

The 15.6 km long UG/TL cuts across 15 GNDs comprising 6 in the Wattala DSD and 9 in the Colombo DSD. Fig 3 . The UG/TL will traverse along several roads which are maintained by the CMC, the Road Development Authority (RDA), the Provincial Road Development Authority (PRDA) or the respective Pradeshiya Sabhas. (Fig 4). A description of the road side structures under each section the road is provided in Annex 12.10 of the report.

[3](Source; Detailed Feasibility Study for Construction of Second 220kV Underground Circuit from Kerawalapitiya GSS to Colombo port GSS, Tokyo Electric Power Services, May 2019, Draft Final Report) & Report on Implementation of 2nd 220kV Underground cable from Kerawalapitiya GSS to Colombo Port GSS

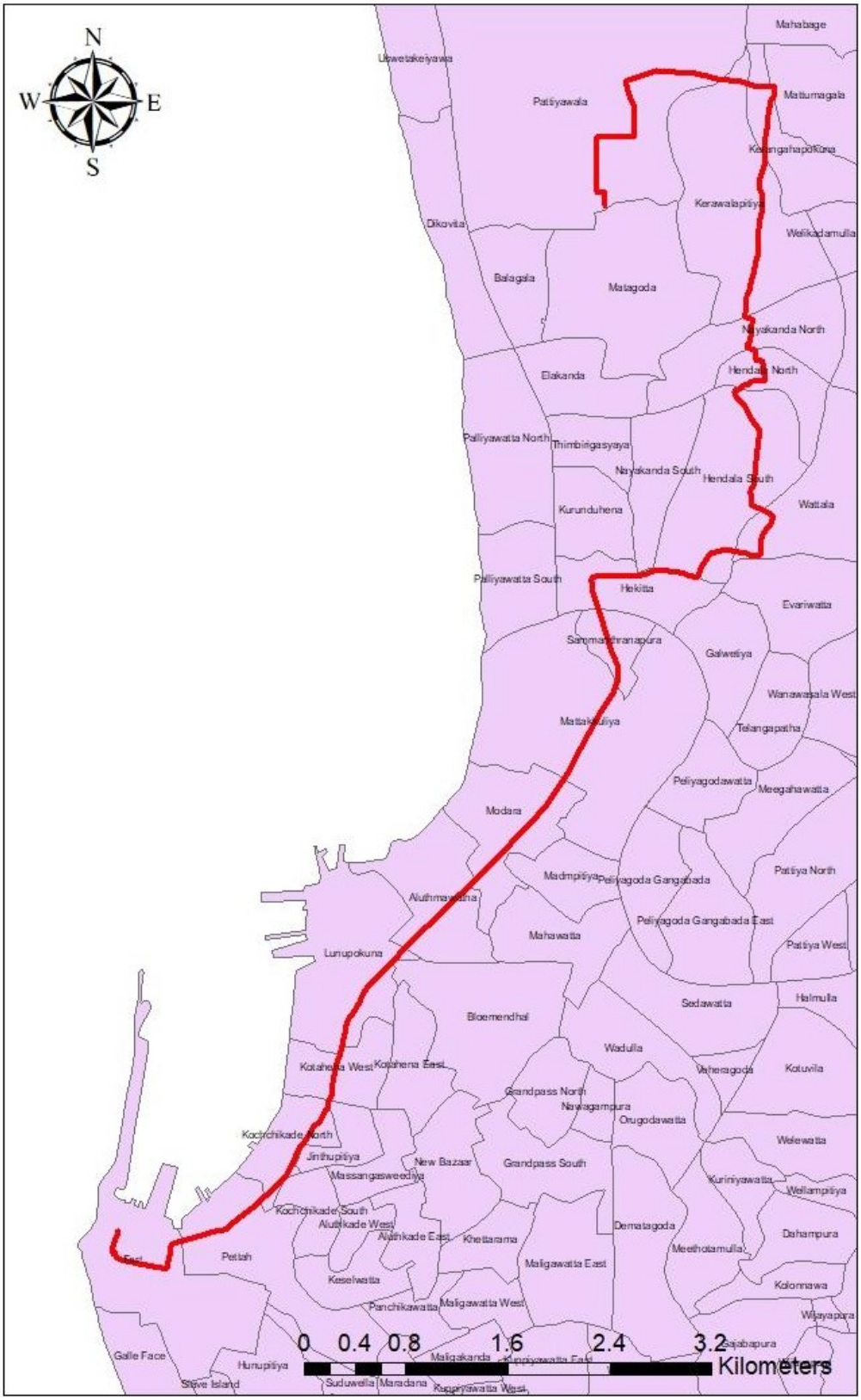

FIGURE 3 MAP SHOWING THE ROUTE ALIGNMENT THROUGH THE GN DIVISIONS

FIGURE 4 MAP SHOWING THE ROUTE ALIGNMENT THROUGH THE STREETS

1.5. Objectives, methodology and scope of the ESIA

The Environmental and Social Impact Assessment Report (ESIA) and the Environmental & Social Management Plan (ESMP) were prepared with the aim of identifying and assessing the environmental and social risks and impacts which are likely to arise from the implementation of the proposed project (construction of the 220 kV UG/TL from Kerawalapitiya to Port City GSS) and to present a set of mitigation measures to address the adverse impacts of the project. The key objectives of the ESIA are to:

A. Document the existing environmental and social baseline information in the project area and its surrounding areas;
B. Outline project activities that will be undertaken during the implementation of the project;
C. Conduct public consultations and to document the disclosure activities undertaken;
D. Identify any adverse environmental and social impacts of the project and to propose mitigation measures to address such impacts, and to
E. Outline an Environmental and Social Management Plan (ESMP) with clearly defined institutional structure that will oversee the implementation of the ESMP.

The ESIA and the ESMP shall comply with the Environmental and Social Framework (ESF) of the Asian Infrastructure Investment Bank (AIIB). According to the ESF guidelines, the project has been identified as category 'B" project on the basis that the anticipated project environmental and social risks and impacts are localized and temporary, and that they can be mitigated through effective environmental and social management. It is to be noted that the project does not fall into the prescribed list under the National Environmental Act (NEA) regulations requiring a detailed Environmental Impact Assessment (EIA). The impact area for the ESIA was demarcated as the 15.6km. long route alignment of the UG/TL covering 5m corridor from either the side of the proposed route alignment.

1.6. Scope of the ESIA

The scope of this ESIA study and the recommended format to prepare the ESIA /ESMP has been outlined in the Terms of Reference (TOR) which is given in Annex 12.1. This included the following:

- The Environmental and Social Impact Assessment will be carried out to cover the 15.6 km of the route alignment and its immediate right of the way (ROW) and the locations of the two substations and the associated facilities.
- The study will describe the project environment, the project background and project details including the construction methods and the project alternatives;
- Review relevant policy and legislation likely to be triggered by the project;
- Engage stakeholders for consultation;
- Study the current environmental and social baseline of the area;
- Identifying physical, environmental and/or social components which may be impacted by the project;
- Assess the potential impacts of the proposed interventions on the environmental and social components in the pre-construction, construction and post-construction phases
- Prepare an ESIA report together with the Environmental and Social Management Plan (ESMP) as per the TOR shared with the team of consultants by the CEB and to;
- Submit the ESIA and the ESMP for approval by AIIB.

The total cost of the project will be around USD 61 million and will be financed by the AIIB. The ESIA Team consisted of the Team Leader and Social Assessment Expert, an Environmental, Occupational Safety and Health Specialist and a GIS Officer. Annex 11.2 provides the names of the EIA team members.

The ESIA which was first drafted in the year 2021 was updated in April-June 2024 in response to the additional comments made by the AIIB on 29th Feb 2024. The additional comments (Comments Matrix) for updating the draft ESIA/ESMP is provided in Annex 12.2.

1.7. ESIA Methodology

The process followed for the ESIA included:

1. Review of documents including the Environmental and Social Framework (ESF) of the AIIB;
2. Consultations with the CEB engineering / planning staff and officials of the AIIB; (online consultation particularly with AIIB officials)
3. Consultations with the other stakeholders namely those officials of the Road Development Authority (RDA), relevant Divisional Secretariat officials (DSs) including the Grama Niladharis; Colombo Municipal Council (CMC) officials and the Wattala Pradeshiya Sabha;
4. Collection of environmental and social (E&S) baseline data; through desk reviews, site visits, investigating the structures and sensitive receptors located beside the ROW of the UG/TL, physical observations and consulting the residents and others living/operating along the ROW;
5. Data analysis and impact assessment (the detailed steps are provided in Annex 12.4)
6. ESIA report writing and preparation of the ESMP;
7. Draft document submission;
8. Document review (by the CEB & the AIIB)
9. Document finalization.
10. Document updating or revalidation

During the preparation of the ESIA, following documents were referred to among others:

- Study of the project's Detailed Feasibility Report (DFR) submitted to the CEB by the Tokyo Electric Power Services Co. Ltd,
- Construction Method Statements for excavation of Trial Pits and open trenching works, including Hydraulic Direct Drilling methods (HDD),
- Route Details initially identified by the CEB
- Typical Trench Design and the specification details of the UG/TL identified for the project.
- Maps on Google Earth files produced by the CEB project office on the proposed route alignment.
- Initial Environmental Examination (IEE) Report prepared by the Road Development Authority (RDA) for the Asian Development Bank (ADB) with reference to the Port Access Elevated Highway Project[4]
- Resource Profiles (*Sampath Pethikada*) prepared in the recent period by the Colombo and Wattala DSDs.
- Environmental and Social Framework of AIIB

[4] RDA (2018). IEE Report for SRI: SASEC Port Access Elevated Highway. Road Development Authority of Sri Lanka and Asian Development Bank.

Baseline physical, environmental and social data was collected through desk studies and field studies. Both primary and secondary data and information were gathered. Field studies were carried out through several reconnaissance surveys undertaken jointly by the consultants and the CEB officials. A road survey was undertaken in which the houses, by roads, road intersections, bridges and culverts, other road side structures and the types of sensitive receptors including wetlands and waterways which are likely to be affected by the construction work were inventoried.. The information collected and observations made during the field visits were revalidated through additional field visits during April 2024. Other social aspects such as people's livelihoods that could be affected due to construction work were also observed. Present conditions of the roads, and the ongoing development work along the different sections of the roads were observed. Since the project area falls within the urbanized and the semi-urbanized areas, special attention was paid to assess impacts on low-lying areas such as wetlands and areas vulnerable to floods during rainy seasons. This is considered to be helpful during the subsequent discussions with the residents living around such areas and to discuss their issues and concerns. An inventory of important receptors was prepared together with their GPS coordinates.

Baseline information on the environmental aspects such as the quality including water, air and noise levels etc. that are likely to impact due to the construction work was gathered through laboratory analyses. Samples were tested through laboratory tests for the water and the air quality. These tests were carried out by the National Building Research Organization (NBRO). Additional baseline data were collected from the published sources such as previous environmental assessment studies.

The status of vehicular traffic along those roads was also collected through observations and through secondary information. No extensive fauna and flora assessment was necessary as there were hardly any sensitive eco systems that were encountered along the route and it's RoW. There is a canal running parallel to ASP Liyanage Mawatha. The road excavation work will not have any adverse impacts on the canal eco system because the excavation work will be taking place on the opposite side (RHS) of the canal. In addition, since there is no significant presence of fauna or flora in the canal there was no necessity to carry out an extensive fauna and flora studies within the canal systems.

In the initial stages of the assessment, virtual consultations were conducted with the AIIB representatives and the CEB officials on the final scope for the ESIA and the ESMP. (Refer to Section 6 – Stakeholder consultations). Further consultations were conducted with relevant CEB officials to elicit relevant technical and other information. Public consultations were held with the officials of the Divisional Secretariats, the Grama Niladharis (GNs), CMC and the National Water Supply and Drainage Board (NWS&DB), the RDA and the Pradeshiya Sabhas (PS). There had been discussions conducted with representatives of the residents living along the roads facilitated by the GNs (Refer Chapter 6 and 6.1). These discussions were centered around the existing environmental conditions along the road where the TL will be laid and the potential impacts that could occur due to project implementation. Additionally, a few of the road side house occupants, vendors of small kiosks were also consulted.

With a view to updating the stakeholder consultations, a fresh round of consultations was undertaken during April 2024 with the stakeholders such as the Divisional Secretaries, the GNs, and the officials of the CMC and the NWS&DB. The outcome of such meetings were recorded and incorporated into Chapter 6 (Stakeholder Consultation) of the report.

1.8. Purpose of revalidating the ESIA

The ESIA was carried out in the year 2021 in an environment where the country experienced the worst economic down turn which occurred immediately after the Covid 19 Pandemic. Although the report was ready for consideration for review and approval by the funding authorities thereafter, there had been a significant delay in resuming such a review and the approval process by the funding agencies. This delay resulted a necessity to update the baseline information as it was the view of the AIIB officials that the environmental and social landscape might have gone through several changes during the last few years. The information pertaining to several aspects including that of the baseline socio economic information and the stakeholder engagement of the ESIA was updated during early 2024. As part of this revalidation process, physical observations of the road conditions was revisited during the year 2024. Additional stakeholder consultations were carried out in which the key stakeholders such as the DS Officers were informed of the CEB's intention to commence the project implementation. The revised project implementation plan was explained to them. During the document updating stage, attempt was made to conduct a fresh round of community discussions with the involvement of the Grama Niladharis. GNs were of the strong view that the community members were well aware of the project by now. On the other hand the GNs were also fully involved with implementing various other welfare programmes of the government e.g. Distribution of free rice to low income families, registering 'Aswesuma' beneficiaries etc.), and therefore the GNs suggested that such meetings can be conducted only immediately prior to the construction work. However, informal discussions were held with house occupants, vendors and other vulnerable groups.

1.9. Project Cost

The total project cost is estimated to be around US $ 61 million of which $ 52 Million will be procured through AIIB loan and the rest will be funded by the CEB.

1.10. Implementation Arrangements and Timeframe

The implementation of the project will be by the CEB. The CEB will procure civil contractors upon the completion of financial arrangements. AIIB concurrence for the financial evaluation will be upon approval of the ESIA. The acceptance and approval of the ESIA and ESMP by the AIIB is scheduled for June 2024.The estimated timeframe for completion of the project will be 1 ½ years commencing from August, 2024. Initial planning work of the project commenced in 2021. This will follow the procurement process and is scheduled to be completed by July, 2024. Major milestones of the procurement process as finalized by the CEB are summarized in Table 1 below. Fig 5 presents the Revised Implementation Schedule (Plan) ..

TABLE 1 MAJOR MILESTONE OF PROJECT PROCUREMENT PROCESS

No.	Major Milestone	Date
1	Appointment of Technical Evaluation Committee	01-09-2021
2	Obtaining Standing Cabinet Appointed Procurement Committee (SCAPC)'s approval for the Bid Document	21-03-2022
3	Publishing Tender Notice	24-03-2022

4	Closing of Bids	17-08-2022
5	Obtaining SCAPC's approval for Interim TEC report 1	20-10-2022
6	Calling clarifications from Bidders – Round 1	21-10-2022
7	Obtaining SCAPC's approval for Interim TEC report 2	30-11-2022
8	Calling clarifications from Bidders – Round 2	05-12-2022
9	TEC report of technical proposal to SCAPC	20-01-2023
10	SCAPC's approval for TEC report of technical proposal	28-02-2023
11	AIIB Concurrence for the technical evaluation	13-12-2023
12	TEC report of financial proposal to SCAPC	30-01-2024
13	SCAPC's approval for TEC report of financial proposal	01-02-2024
14	AIIB Concurrence for the financial evaluation	04-03-2024
15	Cabinet approval for the award	Pending

Revised Project Implementation Schedule

#	Description	Weeks	2024									2025											
			A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J
1	Agreement Signing with AIIB		Completed																				
2	Appointment of TEC		Completed																				
3	Scrutinizing bidding document by TEC		Completed																				
4	Review TEC recommendation by AIIB		Completed																				
5	SCAPC Approval for the Bid Doc		Completed																				
6	Invitation for bidding		Completed																				
7	Closing of bidding		Completed																				
8	Technical Bid Evaluation		Completed																				
9	Review TEC recommendation by SCAPC		Completed																				
10	Review TEC recommendation by AIIB		Completed																				
11	Financial Bid opening		Completed																				
12	Evaluation of Financial Bid by TEC		Completed																				
13	Review TEC recommendation by SCAPC		Completed																				
14	Review TEC recommendation by AIIB		Completed																				
15	Cabinet Approval process	4																					
16	Letter of Award	2																					
17	Acknowledgement of Award	2																					
18	Agreement signing with Counteractor	3																					
19	Commencement of Contract	2																					
20	Implementation of Contract	72																					

FIGURE 5 REVISED IMPLEMENTATION SCHEDULE

1.11. Report Structure

Following chapters constitute the ESIA report.

1. Executive Summery
2. Chapter 1 Introduction
3. Chapter 2 Policy, Legal and Administrative Framework
4. Chapter 3 Project Description
5. Chapter 4 Analysis of Alternatives
6. Chapter 5 Baseline Environmental and Social Data
7. Chapter 6 Consultation with Stakeholders
8. Chapter 7 Environmental and Social Risks and Impacts
9. Chapter 8 Environmental and Social Management Plan
10. Chapter 9 Grievance management Mechanism
11. Chapter 10 Conclusion and Recommendations
12. Chapter 11 References.
13. Chapter 12 Annexes

2. Policy, Legal and Administrative Framework

2.1. National Energy Policy and Strategies of Sri Lanka

This is the overarching policy in the energy sector. The primary objective of the energy policy is to ensure energy security through supplies that are cleaner, secure, economical and reliable, to provide convenient, affordable energy services to support socially equitable development in the country. The policy defines energy policy elements, implementing strategies and specific targets, milestones and institutional responsibilities, to meet the increasing demand for energy. The policy and strategies have been disclosed to the public by the Gazette Notification Extraordinary of 1553/10 dated 10th June 2008. It articulates among others, the need for protection from adverse environmental impacts of energy facilities, as one of the key energy policy elements. The policy recognizes that adverse impacts on society and the environment arising out of the electricity and petroleum sub-sector activities have not been receiving adequate attention therefore that the state recognizes that it is the prime duty of the state to protect the public and employees in this respect.

The policy spells out 10 pillars which impact the Society, Economy and the Environment. Caring for Environment; Securing Land for Future Energy Infrastructure; and Providing Opportunities for Innovation and Entrepreneurship are a few of those pillars, which have a direct relevance to the project in terms of policy guidelines. For example, key strategies that will be employed towards 'Caring for Environment', among others, are spelled as follows:

- Impacts to the environment in the context of climate change due to the construction and operation of energy sector facilities will be minimized.
- Necessary Health, Safety and Environmental (HSE) standards will be introduced and relevant regulations enforced, making it an offence for a person to operate any energy related infrastructure without complying with the prescribed HSE standards.

Further it outlines that all developmental and operational aspects of the energy sector facilities shall follow the relevant environmental regulations and standards of Sri Lanka.

Key strategies that will be employed towards 'Securing Land for Future Energy Infrastructure' are among others:

- Available corridors will be used to lay multiple pipelines and power transmission lines wherever possible
- All existing and future underground utility infrastructure including electricity, water, communication, town gas and petroleum would be made available in a common mandatory geographic information system (GIS) to facilitate optimal location of future underground cable routes and pipe transport traces
- Roadside utility infrastructure corridors including electricity distribution, sewer, water, communication and gas supply shall be coordinated with transport infrastructure, in such a manner that clear demarcation of ownership, flexibility of maintenance, and room for expansion would be ensured.

Further, following statutory provisions are applicable to the project:

- Sri Lanka Electricity Act, No. 20 of 2009 amended by Act No. 31 of 2013;
- Ceylon Electricity Board Act No. 17 of 1969
- National Thoroughfares Act, No. 40 of 2008 Motor Traffic (Speed Limits) Regulations, No. 1 of 2012;
- Motor Traffic (Amendment) Act, No. 8 of 2009;
- National Environmental Act No. 47 of 1980. National Environmental (Noise Control) Regulations No.1 1996; National Environmental (Ambient Air Quality) Regulations, National Environmental (Protection & Quality) Regulations & Interim Standard on Vibration Pollution Control for Sri Lanka
- Road Development Authority Act No. 73 of 1981 & Road Development Authority (Special Provisions) Act No. 5 of 1985;
- Pradeshiya Sabha Act No. 15 of 1987;
- Municipal Council Ordinance No, 29 of 1947;
- Nuisance Ordinance Chapter 230 No. 15 of 1862
- Irrigation Ordinance No. 32 of 1946, Act No.1 of 1951 and No. 48 of 1968, Law No. 37 of 1973;
- Factories Ordinance
- National Minimum Wage Ordinance
- Occupational Health and Safety Policy 2014
- The Shop and Office Employees' Act No. 19 of 1954 and amendments (Nos. 60 of 1957 and 28 of 1962)
- Employment of Women, Young Persons and Children's Act No. 47 of 1956 and its amendment Act No. 29 of 1973
- Sri Lankan Manual on Traffic Control Devices (Part II - Road Work Areas);
- Fauna and Flora Protection Ordinance as amended by Act No. 49 of 1993 and subsequent amends.
- The Antiquities Ordinance, No.9 of 1940 (This is now an Act) and the subsequent amendments; particularly the Antiquities (Amendment) Act No. 24 of 1998;

The relevant provisions in the above Acts and the Ordinances and their applicability to the project are summarized in Table 2 below: :

TABLE 2 A SUMMARY OF THE LEGAL/REGULATORY PROVISIONS RELATED TO THE PROJECT:

Name of the Act	Legal and Regulatory Provisions	Applicability to the project
1. Sri Lanka Electricity Act, No. 20 of 2009 amended by Act No. 31 of 2013.	The electricity sector in Sri Lanka is governed under this Act. Chapter 111, Part 1 provides for generation, transmission and distribution of electricity. It also stipulates that No person other than the Ceylon Electricity Board, established by the Ceylon Electricity Board Act, No. 17 of 1969 shall be eligible to apply for the issue of a transmission license.	The planning and design of the transmission network and its implementation is carried out by the CEB under the said provisions. .
2. Ceylon Electricity Board Act No. 17 of 1969	Ceylon Electricity Board (CEB) established under this Act and is under legal obligation to develop and maintain an efficient, coordinated and economical system of electricity supply in accordance with Licenses issued. CEB is responsible for most of the generation and distribution licenses while being sole licensee for transmission. The Act provides for the regulations of: ● generation, ● transmission, ● distribution, ● supply and use of electricity.	CEB is responsible for the implementation of the project and for the compliance of environmental and social impact mitigation measures, monitoring of the environmental and social management plans, grievance handling and payment of any compensation that may be required during the reinstatement of the roads and any other residential places or buildings at the time of construction of the UG/TL.
3. National Thoroughfares Act, No. 40 of 2008	Section 26 of National Thoroughfares Act, prohibits any government department carry out any services on a road, public road or a national highway without the permission of the RDA.	Permission of should be obtained from the RDA for construction of trenches laying of pipelines and reinstatement of the roads falling under the purview of RDA.
4. Motor Traffic (Amendment) Act, No. 8 of 2009	Motor Traffic (Signs, Signals, Symbols and Road Markings) Regulations, No. 01 of 2014, published in the Government Gazette (Extraordinary) No. 1845/31 dated 17.01.2014. All traffic signs, barricades, and lighting devices to be used during excavation shall comply with schedule (1) of the said Regulations dated No. 01 of 2014.	The contractor is expected to prepare a Traffic Management Plan which should be approved by the respective police station. Need to comply with relevant signs, barricades and lighting devises.
5. National Environmental Act No. 47 of 1980 and its amendments (Act Numbers 56 of 1988 and 53 of 2000) and the following Regulations	This Act is the overarching legislation enacted for the protection of environment and natural resources and provides for establishment of the Central Environmental Authority. NEA provides for enforcement of regulations to protect and improve	Following regulations should be adhered to during the construction phase: Taking into consideration of this Act and the Regulations described, Contractor's works (under the supervision of

a. National Environmental (Noise Control) Regulations No.1 1996- Gazette Notification Number 924/12 dated 23rd May 1996. (Stipulates maximum allowable noise levels for construction activities during proposed project activities) b. National Environmental (Ambient Air Quality) Regulations, 1994, published in Gazette Extraordinary, No. 850/4 of December, 1994 and amendment gazette No. 1562/22 of 2008 c. National Environmental (Protection & Quality) Regulations, No 01 2008 (Gazette Notification No. 1534/18 dated February 1st, 2008) amended by Gazette Notification No. 2264/17 dated Jan 27th, 2022) d. Interim Standard on Vibration Pollution Control for Sri Lanka (2001) e. National Environmental (Ambient Water Quality) Regulations, No. 01 of 2019 (Gazette No. 2148/20 – dated November 5th, 2019). f. National Environmental (Prohibition of open burning of refuse and other combustible matters inclusive of plastics) Regulations No. 1 of 2017 g. National Environmental (Municipal Solid Waste) Regulations No. 1 of 2009 (Gazette Notification No. 1627/19 dated November 10th, 2009)	quality of environment. (Part IV B). Regulations have been gazetted to protect against pollution of Inland waters (water quality), atmosphere (Noise dust and Vibration etc.); soil etc.	the CEB as the Developer) shall be carried out in such a way that; - Noise emissions will not exceed the stipulated limits of 75 dB(A) and 50 dB(A) for daytime and night-time respectively during the construction works. - There is no deterioration in ambient air quality such that the limits specified in Gazette No. 1562/22 dated August 15th, 2008 for different air pollutants (especially PM_{10} and $PM_{2.5}$ largely expected from construction works) are not exceeded and fugitive emissions too are well controlled considering Schedule IV (Fugitive Dust Emission Standards) of the National Environmental (Stationary Sources Emission Control) Regulations No. 01 of 2019 (Gazette No. 2126/36 – June 5th, 2019) - Construction works do not generate significant vibration causing damages (i.e., not exceeding the interim vibration standards for built structures) to nearest built structures and causing inconvenience to occupants. - Construction works will not cause siltation and pollution of nearest waterways such that the limits specified in Gazette No. 2148/20 – dated November 5th, 2019 for different categories of water use (Beneficial Uses) are not exceeded. - Construction works will not generate or dispose hazardous wastes such that it will cause pollution of the environment (soil, water and air). - Contractor will not be permitted to openly burning of any refuse or other combustible matters inclusive of plastics. Contractor will be prohibited from dumping of solid wastes (MSW) in sensitive environments and roads/highways, other than places designated for dumping by the relevant local authorities
6. Road Development Authority Act No. 73 of 1981 & Road	The Road Development Authority (RDA) was incorporated as a statutory body under the Ministry of	Permission should be obtained from the RDA for excavation of roads falling under the RDA. The road

Development Authority (Special Provisions) Act No. 5 of 1985	Highways by the RDA Act No.73 of 1981. The functions of the RDA were expanded in 1986 when it became the successor to the Department of Highways. Since then, the RDA is responsible for the maintenance, development and upgrading of the National Road network of Sri Lanka.	section in Kerawalapitiya and Hekitta Road are RDA Roads.
7. Sri Lankan Manual on Traffic Control Devices (Part II - Road Work Areas)	This manual includes requirements for traffic control devices, signing of road work areas during trenching of roads. It also prescribes the essential safety measures to ensure the safety of road users and workmen, during day and night.	A Traffic Management Plan has to be prepared and implemented by the project using the guidelines published by the RDA in Manual on Traffic Control Devices Part 2 Road Work Areas. This is required as part of the ESMP.
8. Pradeshiya Sabha Act No. 15 of 1987	Pradeshiya Sabhas (PS) are empowered to formulate by-laws for governance of the areas under their jurisdiction on the subjects devolved to them under the Pradeshiya Sabha Act No. 15 of 1987. Some activities falling under this Project such as excavation of the roads which come under the relevant Pradeshiya Sabha (PS) and reinstatement of the road construction & waste disposal etc. need approval.	Permission of should be obtained from the Wattala Pradeshiya Sabha and the CMC for excavation of roads in the CMC area and ASP Liyanage Mawatha and Alwis Town Mawatha (In Wattala PS Area). Permission is also required from the relevant local authority for the disposal of wastes.
9. Municipal Council Ordinance No, 29 of 1947	Section 97 of the Municipal Councils Ordinance No 29 of 1947 empowers a Municipality to construct through or under any enclosed or other land, alter or extend such public mains or other drains, sewers and water courses necessary for the effectual draining of the municipal area. Section 100 authorizes an MC to cause all public drains, culverts, gutters and watercourses to be so constructed and maintained and kept as not to be a nuisance or injurious to health and to be properly cleaned and emptied. Any person who fills up or obstructs with the free flow in, any public drain is liable for conviction (Section 102).	Aluth Mawatha section of the road which falls within CMC is currently improved with line drains and road has been widened. CMC approval is needed if this section of the road will be excavated. The contractor also should ensure that drains are not blocked due to excavated spoils.
10. Nuisance Ordinance chapter 230 No. 15 of 1862	This provides for the preservation of public health and the suppression of various types of nuisances	The project actions should not cause nuisance to the neighboring settlers
11. Irrigation Ordinance No. 32 of 1946, Act No.1 of 1951 and No. 48 of 1968, Law No. 37 of 1973	The Ordinance and the subsequent amendments vested power and authority with Department of Irrigation and the Provincial Irrigation Department to manage all major and minor irrigation systems in Sri Lanka.	Contractors should comply with any measures required by the Irrigation Department to protect the canal network encountered during the underground excavations.

12. Factories Ordinance (No. 45 of 1942); and its amendments (1945, 1946, 1961, 1965, 1971, 1976, 1984, 1998, 2000, 2002 and 2021)	This Ordinance supplemented by 15 Regulations has been designed to prevent work related accidents and to protect their health and safety in the workplace (construction sites and operating facilities will be applicable). Some of the special provisions of the Ordinance applicable to this project will include safeguarding machinery and equipment including statutory examination of lifting equipment such as hoists (Section 27), chains, ropes and lifting tackles (Section 28), machinery such as cranes and other lifting mechanisms (Section 29), safe procedures to be adopted when working in confined spaces (Section 32), provision and maintenance of potable/drinking water for workers (Section 46), appropriate first aid stations (Section 50), implementation of measures to protect workers against inhalation of dust or fumes or other impurities injurious to health (Section 51), prevent eye injuries (Section 53), protect workers against radiation and vibration (Section 54), high noise (Section 58A) and lifting excess weights (Section 58), etc. There are also General conditions as to the hours of employment of women and young persons including overtime matters (generally, the total hours worked, exclusive of intervals allowed for meals and rest, shall neither exceed nine in any day not exceed forty-eight in any week, except in the case of young persons, who are defined in the Ordinance as persons who have attained the age of 16, but under the age of 18), employment of women at night, restriction of employment inside, and outside working areas (Section 67) and overtime employment of women and young persons over sixteen (Section 68). Additionally, the following Regulations (but not limited to) under this Ordinance will be applicable to this project. a. Factories (General Standards of Lighting) Regulations, 1965.	Civil contractor will be required to comply with guidelines such as provision of PPE and secure safe working environment for the employees. A health and Safety Plan should be prepared and implemented by the Civil Contractor.

	b. Factories (Sanitary Conveniences) Regulations 1965 (applicable for rest rooms and labor quarters, etc.) c. Factories (Dangerous Occurrences Notification) Regulations 1965. d. Factories (Noticeable Industrial Diseases) Regulations 1972. e. Factories (Protection of Eyes) Regulations 1979. f. Factories (First Aid) Regulations No. 1 of 1995.	
13. National Occupational Safety and Health Policy 2014	This is formulated by the Ministry of Labour and Foreign Employment and it is applicable to all workplaces in all sectors of the economy and all forms of work. It is guided by the national laws (e.g., Factories Ordinance and Workmen's Compensation Ordinance) and policies, other relevant International Labour standards and conventions related to occupational safety and health.	Civil contractor will be required to comply with this Policy. In this respect, there needs to be a Safety Culture and establishment of a Safety Committee for continual improvement in OHS management matters. It needs to include provisions for training, education and awareness on good OHS measures, etc. Top Management commitment is essential with adequate financial, technological and human resources allocated for OHS compliances, etc.
14. Workmen's Compensation Ordinance No 19 of 1934 and its amendments (1957, 1959, 1966, 1990, 2005, 2022).	This Ordinance together with the Factories Ordinance covers the Civil Contractor's responsibilities regarding employee's occupational health and safety. Workmen's Compensation Ordinance provides for the payment of compensation towards injuries faced by workers, while working. The administrator of this Ordinance is the Commissioner for Workmen's Compensation	Civil contractor will be required to comply with this Ordinance. Therefore, insurance of workers/employees against accidents and ill-health, etc. occurring during or as a result of work is mandatory.
15. The Shop and Office Employees' Act No. 19 of 1954 and amendments (Nos. 60 of 1957 and 28 of 1962)	The maximum number of working hours is 9 in a day, including a 1 hour meal-break and 45 hours in a week. A rest-break will also be given to employees if they work for more than 8 hours. This rest-break must be given between 11 am and 2 pm during the day and the rest break for employees working during the night should be given between 7 pm and 10pm	This needs to be adhered to by the Civil Contractor with reference to employment of executives and above (both contract and permanent staff).
16. Employment of Women, Young Persons and Children's Act No. 47	A special law which states that no person shall employ at any time during the night, a person under the age of	Civil Contractor is required to abide by this law. Therefore, as a rule, Contractor must not employ any

of 1956 and its amendment Act No. 29 of 1973	eighteen years, in a public or private industrial undertaking or in a branch thereof. Furthermore, this law has special provisions safeguarding women; example, no woman shall be compelled to work at night against her will or after 10 pm unless written permission has been obtained by the Civil Contractor from the Labour Commissioner and there shall be appointed female wardens to see to the welfare of women workers who work at night etc.	person less than 18 years of age (hence copies of birth certificates and national identity cards must be maintained at Site Office and with the relevant staff at Head Office of the Contractor). This law is not applicable to women holding responsible positions of a managerial or technical character.
17. National Minimum Wage of Workers Act No 3 of 2016	Requires that employees should be paid minimum monthly / daily wages as stipulated by the government.	Civil Contractor should comply with minimum wage requirements when engaging unskilled workers.
18. Fauna and Flora Protection Ordinance as amended by Act No. 49 of 1993 and subsequent amends.	This provides for protection, conservation, prevention of commercial and other misuse of the fauna and flora and their habitats, and conservation of the biodiversity and makes provision for the establishment of protected areas, regulates human involvements to such areas and their fauna and flora.	The project will have no significant impact on the biodiversity of the project lands and nearby aquatic plants or species since the work will be along the existing roads.
19. The Antiquities Ordinance, No.9 of 1940 (now Act) and the subsequent amendments; particularly the Antiquities (Amendment) Act No. 24 of 1998 is the primary Act	Section 43 stipulates the necessity to carry out an impact assessment of any development activity if it causes consequences on the antiquarian, historical or archeological aspects of the land in question or any antiquities in it.	The project will not have an impact on the archeologically and historically valuable buildings along the path way, but still a chance find procedure has been identified in the ESMP for the compliance by the contractor in the event any archeologically valuable items are found during the trench excavation.

2.2. AIIB Environmental and Social Framework

The Asian Infrastructure Investment Bank (AIIB) will provide funds to implement the underground transmission line project and therefore compliance with the AIIB's Environmental and Social Framework (ESF) is an integral part. The Environmental & Social Policy (ESP) as outlined in the ESF provides mandatory environmental and social requirements for each project. The Framework contains Environmental and Social Standards (ESS) which include the broad guidelines for Environmental and Social Assessment and Management, Involuntary Resettlement and Indigenous People.

The project has been identified as category 'B" project on the basis that the anticipated project environmental and social risks and impacts will be localized and temporary and can be mitigated through effective ES management.

Under Category 'B' following guidelines are stipulated:

(a) Categorization. A Project is categorized B if: (i) it has a limited number of potentially adverse environmental and social impacts; (ii) the impacts are not unprecedented; (iii) few if any of them are irreversible or cumulative; (iv) they are limited to the Project area; and (v) they can be successfully managed using good practice in an operational setting.

(b) Assessment and Instrument. The Bank requires the Client to conduct an initial review of the environmental and social risks and impacts of the Project. On the basis of this review, the Bank, in consultation with the Client, determines the appropriate instrument for the Client to assess the Project's environmental and social risks and impacts, on a case-by-case basis. The Bank may determine that an ESIA or another similar instrument is appropriate for the Project. Commonly used instruments for Category B include an ESMP or an ESMPF.

(c) The scope of the assessment may vary from Project to Project, but it is narrower than that of the Category A ESIA. As in the case of a Category A Project, the assessment examines the Project's potentially adverse and positive environmental and social impacts and recommends any measures needed to avoid, minimize, mitigate, offset or compensate for adverse impacts and improve the environmental and social performance of the Project.

The project will trigger ESS 1 that requires adoption of Environmental and Social Assessment and Management). The ESS2 (Involuntary Resettlement) will not be applicable to the project as no land acquisitions or resultant compensation payments are not anticipated.

2.3. Gaps between the environmental legislation and the AIIB ESF policy Guidelines

In terms of national legislation, under the provisions of section 23 Z of the NEA the EIA process applies only to "Prescribed Projects" (PP). The list of prescribed projects has been specified by the Minister in charge of the subject of Environment in Gazette Extra-Ordinary No. 772/22 of 24lh June 1993. The list of

prescribed projects was amended by the Gazette Extra Ordinary No. 1104/22 of 05lh November 1999. However, this project has not been considered under the prescribed projects and therefore there is no requirement for a rigorous E&S assessment under the NEA.

Since the project is not under the prescribed Project List and that no EIA/IEE is required, thus no public disclosure would be required under the national environmental legislation. This is a significant gap between the ESF of the AIIB and NEA. The gap is now addressed by conducting an ESIA in compliance with the ESS1 of the AIIB's ESF. The ESF considers this project as a category 'B' project. The project triggers ESS1. The ESIA has assessed the potential environmental and social impacts arising from the project during the construction and operational phases. Further under Section 64, the ESF stipulates the need for public disclosure of environmental and social information.

Further the requirements of public disclosure and information dissemination, grievance management and E&S monitoring are covered in the ESMP. The ESIA is accompanied by an Environmental and Social Management Plan (ESMP) and the same will be disclosed well in advance in the relevant web site of the CEB as part of the procurement process. The requirement to have a grievance procedure is also laid down in the EIA process, but since the project is not required to have an EIA under the national environmental regulations, the grievance procedure has been adopted under the guidelines of the ESS. This is also contained in the ESMP.

There are several other existing national laws and regulations including environmental quality standards which have a strong bearing on the project in terms of assessing and mitigating environmental impacts, social impacts as well as occupational safety and health impacts. They comply with those requirements as identified in the ESS.

2.4. Approvals required for the project:

The project requires prior approvals from the following institutions:

1. Approval by the AIIB for obtaining the funds;
2. Approval from the respective road maintenance authorities namely:
   - I. Road Development Authority (RDA) – for excavation and reinstatement of major roads owned and maintained by the RDA
   - II. Provincial Road Development Authority - for roads maintained by the PRDA
   - III. Colombo Municipal Council - for excavation and reinstatement of the roads owned and maintained by the CMC and also if any disruptions are anticipated for the utility services such as their sewer network and approval for disposal of construction and demolition wastes etc.
   - IV. Wattala Pradeshiya Sabah - for excavation and reinstatement of the roads owned and maintained by the Pradeshiya Sabah and utility structures located along the roads and disposal of construction and demolition wastes Sri Lanka Land Development Corporation (SLLDC) since Kerawalapitiya Industrial Park and its road infrastructure is currently owned and managed by the SLLDC.
   - V. Approval from the Sri Lanka Navy if the excavation for the TL ingresses through Navy headquarters.

Further it is necessary to keep the following institutions informed of the project's construction schedule as there could be possible construction overlaps of underground service lines installations:

- National Water Supply & Drainage Board (NWSDB) and other institutions providing utility services such as the Sri Lanka Telecom (SLT) and the Dialog Axiata Pvt Ltd. - for any potential disturbances to water supply main lines, distribution utility system & underground pipes
- Coast Conservation and Coastal Resources Management Department (CC&CRMD) since some sections of the UG/TL will traverse within the coastal belt (However, CEB has not sought approvals were sought rom the CC&CRMD when the first circuit of the UG/TL was laid.
- Sri Lanka Police - for traffic management and implementation of a joint traffic management plans.
- Colombo Divisional Secretariat Division - for assistance in grievance handling, and engagement of the GNs in community awareness programs.
- Wattala Divisional Secretariat Division for assistance in grievance handling, and engagement of the GNs in community awareness programs

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3. Project Description

3.1. Goal and objective of the proposed project

The goals of the 2nd Circuit Underground Transmission Line (UG/TL) between the Kerawalapitiya GSS and the Colombo Port GSS is intended to increase the capacity and enhance the reliability of the power transmission in the Greater Colombo Urban Development Area. The project will thereby enable to strengthen the existing transmission network, reduce the rate of transmission losses while improving the reliability of the power supply in the Greater Colombo Urban Development Area. The ultimate goal is to promote investment environment and to contribute to the economic development in Sri Lanka. By reducing the rate of transmission and distribution losses and making the power supply system more efficient, the proposed project is expected to reduce the greenhouse gases (Draft Feasibility Report).

3.2. Key characteristics of the project

The underground cables of the 220 kV transmission line will have a length of 15.6 km running from the Kerawalapitiya GSS to the Colombo Port GSS and will be laid along several sections of the main roads. The cables will be laid in trenches which are 1.5 m deep and 1.2 m wide. Critical civil components of the project are to excavate the trenches, to lay the pipes and the cables and the road restorations. The trench will be excavated using open cut method but in the case of canal/bridge crossings the methods of excavation will be to use hydraulic direct drilling (HDD). The cables consist of single core copper conductors of 1600 mm^2.

3.3. Major Construction Components of the Project

The project will have the following construction components:

- Finalizing route alignment for underground cable laying (Cable Routing)
- Cutting of trenches
- Cable installation
- Cable jointing
- Road reinstatement

3.4. Cable Routing

The route alignment of the second circuit of the UG/TL will fall within two DSDs, namely the Wattala and Colombo. The road sections that will be affected by cable installation are maintained by the RDA, the PRDA, the Wattala Pradeshiya Sabah and the CMC. The cables will traverse in parallel to the already installed first Circuit UG T/L.

3.5. Excavation Corridor

Table 3 below provides details of the excavation corridor by type of excavation and the length of each road section. The excavation path aligns to the left-hand- side (LHS) of some road sections, to the right-hand side (RHS) of some road sections and to the median center of the remaining road sections. This variation in the locations is because of the presence of other utility lines such as water supply, sewerage, power transmission and the telecommunication lines which are laid underneath within the same corridor.

The advantage of underground cable installation is that it will traverse the existing roads, and unlike in the overhead cabling, the necessity to remove the standing trees and to pay compensation for those affected trees will not arise. The cost of post project maintenance will be significantly low as no way leave clearance and maintenance are required. Moreover, the selected corridor is parallel to the first circuit of the UG/TL, there are sections where ducts for cable laying are already installed such as in the areas crossing the Kelani River. The availability of such ducts can significantly reduce the excavation costs.

However, the initial construction cost will remain high due to carrying out Trial Pits and possible deeper excavations required for some road sections. . Deeper excavations will be needed when other utility pipes are laid within the same corridor. Also, the construction costs will be high when excavation methods such as HDD is used in areas where surface water sources such as streams and canals are present and the ground water table is high. Additionally, some of the roads which are newly constructed will have to be cut-open again and reinstated.

TABLE 3 DETAILS OF EXCAVATION CORRIDOR

Road Section	Trenching Method	Length(km)
Inside Kerawalapitiya GSS	Open Cut	0.10
Access Road from Kerawalapitiya GSS to CPSTL Muthurajawela Terminal Road	Open Cut	0.41
	HDD / Under Crossing	0.02
CPSTL Muthurajawela Terminal Road	Open Cut	1.95
Kerawalapitiya Road	Open Cut	2.58
	HDD / Cable Support Structure	0.02
	Under Crossing	
Hendala Road	Open Cut	0.26
Alwis Town Mawatha	Open Cut	1.10
ASP Liyanage Mawatha	Open Cut	0.95
	HDD	0.05
Hekitta Road	Open Cut	0.84
	Under Crossing	0.01
Aluth Mawatha (As identified below)		
• Hekitta Road to HDD entry point at Kelani River	Open Cut	0.08
• Kelani River Crossing	HDD	0.29
• Box Culvert	HDD	0.05
• HDD exit point to New Negombo Road	Open Cut	0.05
• New Negombo Road	Open Cut	0.55
• Mattakuliya Centre Road	Open Cut	0.70
• St. John's way crossing to St. James street crossing	Open Cut	0.70
• St. James road crossing to Lower St. Andrews by road crossing	Open Cut	0.83

• Canal Crossing	HDD / Cable Support Structure	0.02
• Culvert Crossing	Under Crossing	
• Lower St. Andrews by road crossing to College street crossing	Open Cut	0.30
Srimath Ramanathan Mawatha	Open Cut	1.00
St. Anthony's Mawatha	Open Cut	0.30
N.H.M Abdul Cader Mawatha - Sea Beach Road	Open Cut	1.10
Sir Baron Jayathilaka Mawatha	Open Cut	0.63
	Cable Support Structure/ HDD	0.05
Janadhipathi Mawatha	Open Cut	0.21
Galle Buck Road / Upper Chatham street	Open Cut	0.25
Chaithya Road up to Port Sub	Open Cut	0.20
Alternative 2 (from Abdul Cader Mawatha)		
SLPA Gate 03 to Hartal Bridge through inside SLPA premises	Open Cut	0.23
Hartal Bridge	Under crossing	0.05
Port main road to Port Sub	Open Cut	0.93

3.6. Construction Method Statement

3.6.1. Cable Installation Procedure

The type and size of the cable of the second circuit of UG T/L is the same as that of the first circuit of the 220kV UG/TL specifications of which are as follows:

Type:

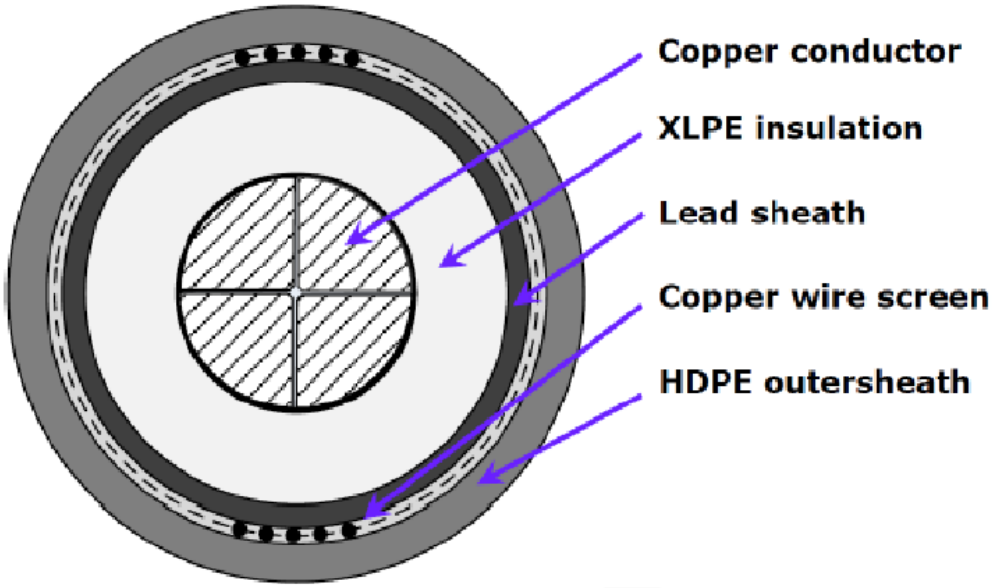
Cross-Linked Polyethylene (XLPE) Insulated cables: Part of the route of 220kV underground cables shall be laid in the High-Density Polyethylene (HDPE) pipe.

Installation condition and parameters

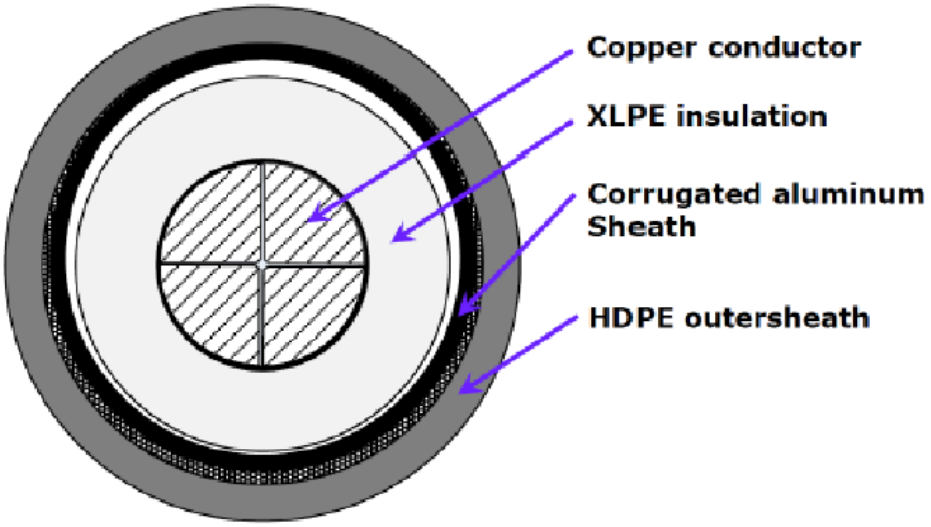
Installation condition and parameters are as recommended in the DFR:

- Laying conditions: Laid in 250mm dia. HDPE pipe, direct buried
- Cable burial depth: 1.5 m
- Cable configuration: Horizontal with 400mm spacing at cable center

The cross profile of the cable, as shown in the feasibility report is reproduced in Figure 6.



a) Typical cross-section of 220kV 1C XLPE Cable with Lead Sheath



b) Typical cross-section of 220kV 1C XLPE Cable with Aluminum Sheath

(Prepared by the Study Team)

Figure 4.1-2 A Typical cross-section of 220kV 1C XLPE cables with different metallic sheath

FIGURE 6 Typical Cross section of the 220kV IC XLPE cables with different metallic sheath

(SOURCE: PROJECT DRAFT FEASIBILITY REPORT)

Table 4.3-1 Evaluation of the metallic sheath

Type of metallic sheath	Lead alloy	Extruded corrugated Aluminum
Short-current of 40kA-one second	○: Additional copper wire layer is required	◎
Continuous Current Capacity	◎	◎
Water Impermeability	◎	◎
Corrosion in the Water	◎: Steady	○:Sensitive
Flexibility	◎	◎:Required annular shaped corrugation
Weight of Cable	○: (As 100%)	◎: (Approx.60- 70%) [Less Cable pulling tension, compared to lead sheath]
Mechanical Protection	○	◎
Economical Evaluation(cost)	○(As 100%)	◎ : (Approx.80－90%)
Environmental Effects	△:Toxic	◎
Total Evaluation	○	◎

(Prepared by the Study Team)

Note: ◎---Very good, ○----Good, △----Not suitable

FIGURE 7 EVALUATION OF METALLIC SHEATH *(SOURCE: PROJECT FEASIBILITY REPORT)*

The cable installation procedure is explained in the DFR as follows:

The Cable routes are located in the urban area of Colombo city. Commonly the infrastructure facilities have been developed in most of the areas and available underground space is heavily congested. Consequently, any trench opening shall carry out with great care at all times. Generally, authorities will allow cable route within road corridor or at the immediate roadside. Excavation on the heavy traffic circulation road may be permitted only in the night time or public holidays to minimize the congestions. Therefore, trenching works shall be carried out by per unit section at night time and immediate reinstatement allowing daytime traffic on the following day.

The burial depth to the cable centers selected as 1.2 m, same as the first 220kV underground cable circuit from Kerawalapitiya GSS to New Colombo Port GSS. This depth is larger than the average for installation of city streets. It is considered as appropriate in the present case in order to provide higher protection against the various excavations carried out from other utility operators.

The backfill will have a height of 0.7 m and placed equally above and below the cable, hence the minimum depth of the trench will be equal to 1.5 m. In order to install the 3 single 220kV XLPE cables in HDPE pipes of horizontal configuration with a spacing of 0.4 m center to center, it is necessary to have the minimum width of trench 1.2 m. A layer of cable protective concrete slabs, having thickness of 0.1m, shall

be laid on top of the special backfill to protect the cable system against mechanical damage. This mechanical damage is expected to cause by traffic vehicles weight from road top and excavation machines. Backfilling of the trench will be completed using compacted native soil to a depth of approximately 0.4 m, which allows for reinstatement of the road layers to a quality equal to that of the original road surface.

3.6.2. Trial Pits

Trial pits shall be excavated prior to finalizing the final trench profile. There will be several Trial Pits (0.8 m x 2.0 m x 2.0 m as a minimum) excavated along some of the main roads shown in Table 4 to verify the exact position of the underground road profile.

TABLE 4 LOCATION OF TRIAL PITS

Trial Pit No	Location	Coordinates (WGS84)
Trial Pit 06	Aluth Mawatha (Near Madampitiya junction)	6°57'52.20"N 79°52'9.39"E
Trial Pit 07	Aluth Mawatha (Near St. Wilfred Lane)	6°57'47.85"N 79°52'5.20"E
Trial Pit 10	Aluth Mawatha (Lower St. Andrews place junction)	6°57'24.79"N 79°51'42.39"E
Trial Pit 13	Srimath Ramanathan Mawatha (Near George R de Silva Mawatha junction)	6°57'1.17"N 79°51'26.03"E
Trial Pit 14	Srimath Ramanathan Mawatha (Near St. Anthony's Shrine)	6°56'49.54"N 79°51'23.51"E
Trial Pit 17	N.H.M Abdul Cadre Mawatha/Sea Beach Road	6°56'35.72"N 79°51'16.10"E
Trial Pit 18	N.H.M Abdul Cadre Mawatha/Sea Beach Road	6°56'24.92"N 79°51'9.35"E
Trial Pit 19	N.H.M Abdul Cadre Mawatha/Sea Beach Road	6°56'17.22"N 79°51'0.75"E
Trial Pit 20	Sir Baron Jayathileka Mawatha	6°56'12.98"N 79°50'54.56"E
Trial Pit 21	Sir Baron Jayathileka Mawatha	6°56'10.54"N 79°50'40.06"E
Trial Pit 22	Janadipathi Mawatha	6°56'9.04"N 79°50'35.40"E

The trial pits also shall assist:

- To identify the underground power cable positions and other utilities (i.e., telecommunication cables, pipe-borne water pipes and sewage lines, etc.) to allow adequate clearances.
- To measure the thermal resistivity of native soil.
- To investigate the soil condition and ground water level.

Excavated material (spoil) would be reused for re-filling/backfilling. Contractors are expected to reinstate the trial pits on the same day. Refer to Annex 11.15 for the visuals of officers visiting at some of the Trial Pit locations.
Following methods are suggested for Trial Pit excavation:

The trial pit excavation will be done using machinery and manual methods. Frequency of trial pits and locations will be predetermined after observing road condition and available details from road authorities and other utility service providers.

The minimum size of a standard trial pit size would be 0.8m in length, 2.0m of width and 2.0m of depth. The size of the trial pit may change according to the site condition. Joint bay size would be 0.8m in length, 3.0m of width and 2.5m of depth. During excavation, the Pit will be laterally supported by sheeting, shoring and supporting walls if required.

Generally required tools and machinery are,

1. Angle Grinder (6", 4") – Electrical
2. Asphalt Cutter
3. Breaker Machine (70kg) – Electric
4. Hand Rammers
5. Plate Compactor Mechanical
6. Soil Compactor -Vibrating Roller
7. Porker Vibrator (with engine)
8. Backhoe Loader
9. Generating set (with fuel)
10. Submersible Water Pump 4" dia. (with fuel)
11. Dump Truck

During excavation work groundwater table can be encountered, and the level will be recorded which is important during the trenching work. Further, if the area is vulnerable for flooding, it will be verified by observing flood marks in adjacent buildings, light posts etc. and obtaining information from the local people. Dewatering will be carried out using submersible water pumps. The excavated soil will be removed from the site if it interferes with the public and the traffic movements. If necessary, an in-situ testing of the native soil will be done at various locations including trial pit locations to determine the natural soil thermal resistivity along the cable route.

Since the trial pits have been excavated, this information should be shared with CMC as per the discussion with them. It is understood that dredging permits will be necessary for any further excavation of the Trial Pits.

3.6.3. Backfilling and Reinstatement

Backfilling and road reinstatement will be carried out as per the specifications given by the relevant road authorities such as the CMC, RDA, PRDA, the Local PS, and the SLPA. Further, as a guideline published by the CIDA (Formally known as ICTAD) publication No SCA/5 “Standard Specifications for Construction and Maintenance of Roads and Bridges” will be followed during the backfilling. The relevant road authority shall also approve the status of reinstatement work.

Backfill materials shall be placed in layers no more than 200mm thick and will be compacted with Hand Rammers and Plate Compactors. Water shall be added to allow proper compacting. Filling around existing services lines will be done carefully with sand or quarry dust. If the excavated material cannot be used for backfilling, pre-approved soil/quarry dust will be used.

Typical duration for excavation, pipe laying and backfilling per 25 m unit of pipes will be 6-8 hours. Each unit of pipe will be laid and reinstated in a given day (Night time)[5]. If reinstatement work cannot be completed before next day 0600hrs, all unfinished sections of excavated areas will be closed with steel plates (8'x4'x1').

The safety procedures stipulated in "Manual on Traffic Control Devices in Road Work Areas – Part II" published by the Road Development Authority shall be strictly followed during the execution of the works.

It is recommended to use a metal detector and power cable locating detector to identify underground services and the live power cables before commencing excavation work. However, it is possible that existing utility lines get damaged during excavation. In such situations, the relevant authorities shall be informed, and repair work shall be carried out within the working hours without cost to the CEB. Further all the steps shall be taken to avoid any dangers to the general the public and the property.

The details of the identified utility cables shall be recorded and will be produced in a drawing with other details. Based on the details it is determined whether relevant space is available for the cable trench while keeping necessary clearances to other existing service lines. Cable route is determined and finalized accordingly.[6]

3.6.4. Methods of cutting of trenches and reinstatements

This activity consists of the following steps.

- General site preparation
- Setting out
- Trench Construction

3.6.4.1. General site preparation

Before the commencement of work in a particular section, the contractor's Site Engineer will carefully plan all the arrangements, considering the physical site conditions and other practical aspects such as visible underground services, culverts, traffic condition, and the public interferences. The duct installation, backfilling of the trenches and the reinstatement of the excavated sections will be completed before proceeding to the trenching work of the next section. It is estimated that a single team can complete a 25m stretch of the proposed cable laying work during which time they will excavate, lay the cable and complete the road reinstatement. Four of such construction teams will be working at a given time. (It is expected that a section of 100 m of pipe laying will be carried out at a time)

[5] Draft Feasibility Report

[6] Document entitled : Greater Colombo Transmission & Loss Reduction Project; Trials Pits ; Method Statement

3.6.4.2. Notification

The CEB (PMU) together with the contractor's Site Engineer will notify the work program to the public as per the communication plan and necessary permissions will be obtained from all relevant organizations including the local authority concerned, the Police Department, etc. and will obtain permissions where appropriate. The PMU shall obtain copies of the relevant permission letters and distribute to the contractor's Engineer who will keep them at the site during the work execution.

3.6.4.3. Traffic Management

Before commencement of the excavation work a Traffic Management Plan (TMP) will be prepared according to the "Manual on Traffic Control Devices Part 2 Road Work Areas", 2nd Edition published by the Ministry of Highways and Road Development and the Road Development Authority. The Site Engineer shall ensure that the TMP is practically adequate to the site conditions and is effective enough to ensure the safety of the personnel working on the project and the public.

3.6.4.4. Setting out

The setting out of the trench is done in accordance with the approved construction drawing. The contractor's Site Engineer sets out of the trench location to the required alignment and level. Drawings indicating details of the existing underground services in the section is made available at the site before commencement of work. These drawings are prepared giving due consideration to the information obtained from trial pit excavations and by reference to the drawings of underground services obtained from other authorities. The existing underground services within the limits of the trench will be marked on the surface according to the drawing to prevent damages to such services, using the spray paint.

3.6.4.5. Clearance to the existing services

Once trial pits are completed, a clearance chart will be prepared for approval. In the event of crossing existing services, sufficient clearance is maintained as per the approved clearance chart. The approved clearance chart for different services will be tabulated and made available at site before commencement of work. (As of now this clearance chart is not available and cannot be appended). The position, depth and the separation of the cable line to existing services will be recorded. In case of damage caused to the existing services the relevant authority will be notified immediately and remedial action shall be taken immediately to restore them to the satisfactions of the relevant authority.

3.6.4.6. Trench Construction

A cross profile of the trench installed with cable carriage way is provided in Fig. 8 (Trench Design). At least 15 km of the trench will be constructed by open cutting whereas the balance (600 m) will be drilled using HDD machinery. This is required in areas where there are rivers, and culvert/canal crossings. Out of the 600 m of HDD, another 290 m of the cable had been already laid by the CEB when the first phase of the cable laying was undertaken at the crossing of the Kelani Bridge at Mattakuliya.

Also open cutting of trenches will be further reduced for a section of 850 m (along Hekitta Road) as the pipe laying work had been already completed by the CEB when the RDA was widening this section of the

road. In the case of the Aluth Mawatha, part of it has been already widened (Section coming under Mattakuliya Center Road). Remaining section has to be widened. Widening of this section of the road cannot be expected before the commencement of the construction of UG/TL. However, according to the route alignment, the pipes will be laid on the LHS of the center lane where the road is already widened. Rest of Aluth Mawatha where the road is narrow, pipes will remain to be buried in the center of the road.

Considering the above, the length of the trenches with open cutting will be 15 km and the length to be covered with HDD will be 600 m.

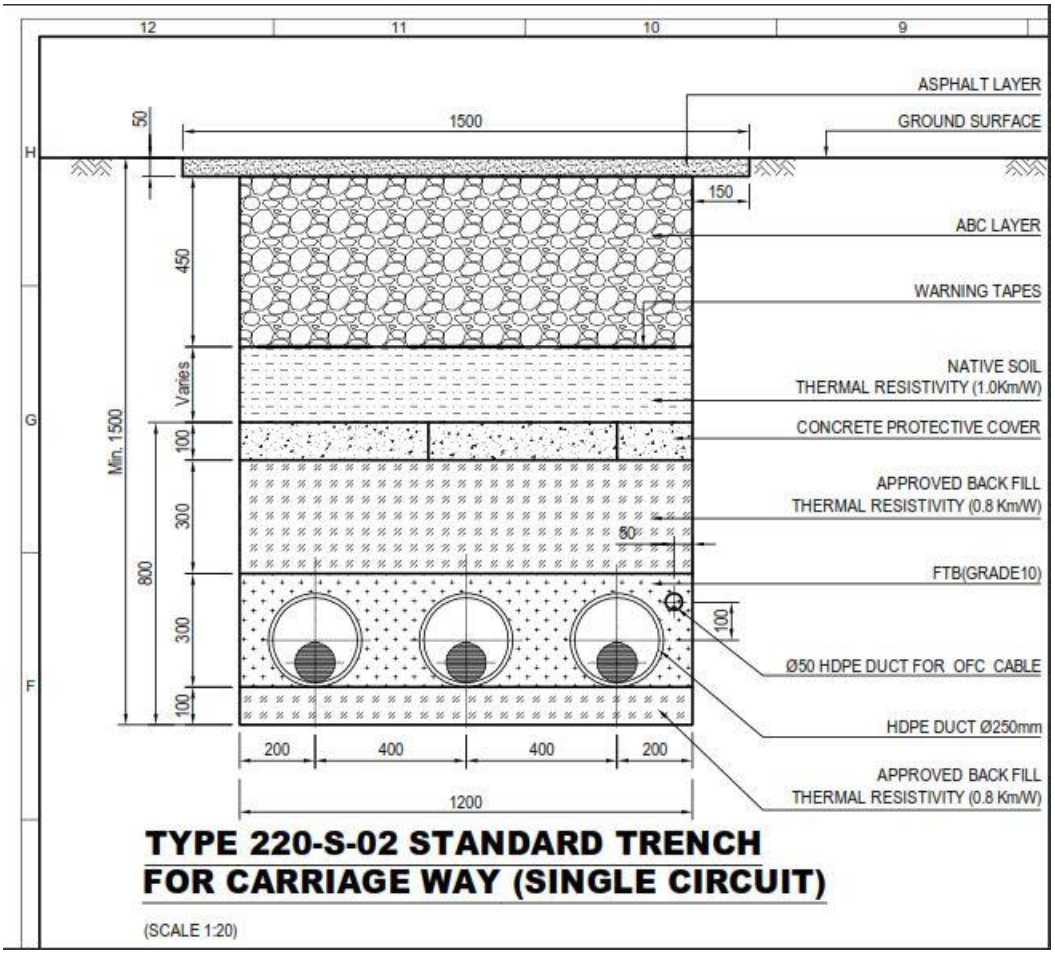


FIGURE 8 CROSS SECTION OF THE TRENCH WITH CABLES

The removal of the top asphalt layer of the road which is approximately 100mm thick will be done with the human operated asphalt cutter. The cut surface will be removed using the excavator and directly loaded to a lorry and removed from the site.

3.6.5. Excavation beyond the asphalt layer

Following requirements have been stipulated in the DFR:

- Contractor should get the approval from the Engineer for the depth spacing chart obtained from cable designer/manufacturer before commencing trenching work.

- Before the start of excavation, it will be ensured that the necessary measures have been taken before excavation as per the Technical Specification clause 6.28(b).

- The method of excavation, whether manual or machine, is decided based on the nature of existing underground services, road traffic, existing trees, towers etc. The finer excavations are done manually. The excavated material shall be dumped and stored in a generally accepted method to avoid interference to the public and traffic movement.

- Contractor must make sure to protect trenches by ingress of surface water and proper flood control system has to be in place during rainy season.

- Excavation works for trenches shall be done avoiding possible settlements in adjacent areas and proper remedial action shall be taken.

- If the earth that could be used as back filling material shall be stored based on the date of excavation for necessary testing to obtain Engineer's approval. Same can be used once Engineer approved for subsequent trenching work.

- Reusable material, such as curb stones, paving or slabs, shall be laid aside by the contractor in accordance with special instructions and shall be stacked separately from the filling material and from other materials for later reuse after getting the approval from Engineer.

- Prior to the start of the construction measures, the "state prior to the start of construction shall be recorded as evidence. This will be executed as per the Technical clause 6.2.9.1.

3.6.6. Trench Depth

Trenches are excavated to the specified depth (1500mm) as indicated in the approved construction drawings. However, if the depth of the trench requires changes from the specified values due to the nature of the existing services, the width of the trench shall be changed accordingly. In such event Contractor's Site Engineer will decide the size of the trench using the depth spacing chart approved by the Engineer.

3.6.7. Trench Width

The trench is excavated to the width (1200mm) specified in the approved construction drawings except where the depth of the trench changes from the normal specified value due to the clustering of underground services. If the depth of the trench is varying from the normal specified value, the width of the trench is decided by reference to the approved depth spacing chart. To provide adequate room for jointing the ducts in the trench, the width of the trench is decided by reference to the depth spacing chart approved by the Engineer.

3.6.8. Shoring

During excavation, the sides of the trenches/pits should be adequately protected against cave-in by sheeting, shoring and supporting the walls. The shoring or shuttering arrangement is required for prevent the collapsing of sidewalls down the pit. For an average depth of about 3 meters of a pit, three frames (steel joist or wooden beams) are placed at different levels inside the pit. After fixing the frames wooden planks are inserted in between the frames and the wall of the pit. For trenching works, since the depth is around 2m, corrugated sheets will be used as shoring sheets.

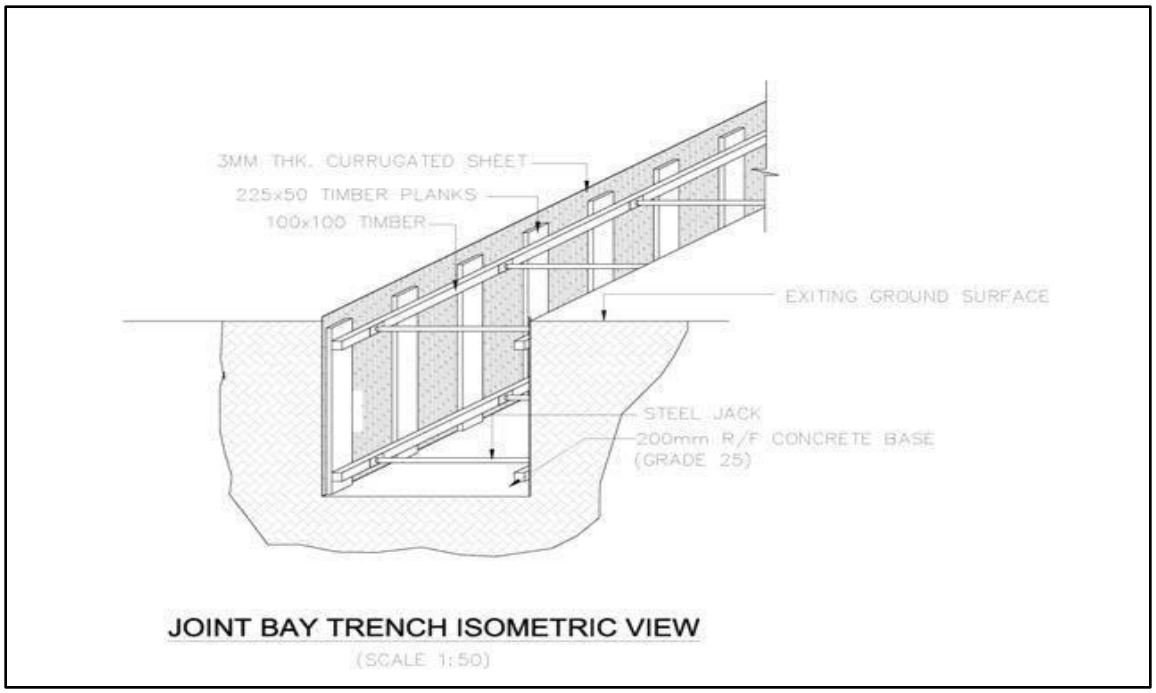


FIGURE 9 SHORING

3.6.9. De-watering:

The groundwater table is high along some sections of the road (such as the A.S.P. Liyanage Mawatha which is parallel to the Kalu Ela),and hence frequent dewatering of the trenches will be necessary. Rainwater accumulation could occur in the cut trenches (especially where there is significant clay material in the soil) during the heavy rainy seasons while the works will be on-going, hence requiring dewatering. De-watering has to be carried out by fuel driven submersible type pumps. The equipment used should be with sufficient capacity to keep the excavations are free of water seeping to bottom level until the excavation is refilled. Collected water will be disposed to the nearest storm water drainage system.

3.6.10. Safety at site

The Occupational Health and Safety Plan (Refer GCTDLRP/PK-2/MJL/OTH-003) shall be strictly followed in order to ensure the safety of the employees and the road users. The required safety measures shall be taken to minimize the disruption and inconvenience to road users during construction. The emergency response procedure will be followed as given in the aforementioned manual. The emergency contact Nos. will be available & displayed at site at all times.

Further, Timber or steel trench crossing bridges will be installed at all driveways where vehicular accesses are required. All open trenches shall be barricaded adequately following the procedures described in the safety manual. In addition to the aforementioned safety regulations, a check list will be prepared to avoid interruptions and ensure smooth work flow at the time of trenching.

3.6.11. Road Intersection / Canal & River crossings

There are several road intersections and canal and river crossings encountered along the proposed route alignment. Most of them are considered to be congested with traffic during day time. Nevertheless, the draft report of the feasibility suggests following measures of excavation at points of intersections.

- Methods such as horizontal directional drilling and micro-tunneling will be also be considered for the excavation works. (It is noted that areas needing horizontal direct drilling were already completed when the cable laying was carried out under the 1st circuit.)
- Trench excavation performed during the night hours and opened trenches in intersections shall be backfilled or covered with heavy duty steel plates for allowing full traffic circulation for the following day.
- Places having difficult access for compaction, a fluidized thermal backfill may be used for obtaining the thermal stability of surrounding.

Methods of Canal Crossing

Conventional excavation methodology is proposed for under-crossings. Cable support structures (through-type plate girder, supported on Reinforced Concrete abutments) are proposed for over-crossings. Site conditions, restrictions and economic feasibility are the important factors to determine what to apply on this project.

Feasible methods are as follows;

(a) Cable support frame structure attached to the box-girders or beams of the existing bridge
(b) Cable support structure with additional supports from piers of the existing bridge
(c) Separate cable support structure or bridge cable support frame structure

Method ‘a’ or ‘b’ that is attaching to the existing bridge shall have issues such as vibration and will affect the cable life span. Therefore, separate cable bridge (methods ‘c’) is selected for methods of Canal Crossing in this project.

3.7. Associated Facilities

As per Section 34.1 of the ESF, Associated facilities are activities that are not included in the description of the Project set out in the Legal Agreements governing the Project, but which, following consultation with the Client, the Bank determines are: (a) directly and materially related to the Project; (b) carried out, or planned to be carried out, contemporaneously with the Project; and (c) necessary for the Project to be

viable and would not be carried out if the Project did not exist. In the above context, there had been consultations by the team of consultants with the CEB officials. It was transpired that the proposed transmission line will facilitate power evacuation of the 2 x 350 MW LNG power plants proposed to be established in Kerawalapitiya but they could not be considered associated facilities for the proposed project. When this matter was discussed with the AIIB officials they were also of the opinion that the objective of the transmission line can be achieved without the power plant. In other words, the power plant is not necessary for the transmission line to achieve its objective. Therefore, it is concluded that there are no associated facilities for the project to be considered for the ESIA.

3.8. Other resources / facilities required / provided

In terms of other resources or facilities required for the construction of the proposed UG/TL, there could be storage facilities needed to stockpile construction equipment such as the pipes and cables. Since a labor force will be engaged, the contractor will have to find temporary accommodation for labor camps, material stockpiling area and vehicle parking facilities. Temporary acquisition (on rent or lease) of land and accommodation facilities will be required. The contractor will require to establish the material stock piling areas, labor camps, solid waste disposal areas and vehicle parking areas away from community settlements and other socially and environmentally sensitive areas. Day to day operations, housekeeping and maintenance should not cause ground or surface water pollution. The selected locations should receive prior approval from the respective LAs and the project engineer.

Labor camps need to be equipped with proper water and sanitary facilities. Although there is no indication that female labour force will be engaged, in the event the contractor opts to engage women labour, the contractor will comply with the relevant regulations such as having separate toilet facilities, accommodation, and transport facilities considering gender requirements.

Water supply will not be an issue but still the contractor should supply potable water to the workers and provision of hygienically sound sanitation facilities which are to be set up in and around labor camps as per the labor regulations. On completion of the use of temporary labor camps, the ground needs to be reinstated to its original state. All temporary acquisitions of land and space shall be properly compensated.

4. Analysis of Alternatives

The purpose of this section is to present and compare the different alternatives that have been considered for the layout of the proposed UG/TL. The analysis concludes with selection of the most favorable alternative, which is then described in detail. For the project's route selection and alignment, two different route alternatives were considered and analyzed based on their economic, social, environmental and technical merits. Sections below provide a description of the project alternatives considered during the study.

4.1. Alternative lay outs of the TL

Layout of the power transmission lines can be either through overhead (above ground) or underground. During the planning stage, the CEB ruled out the possibility of constructing of an overhead transmission line (OH/TL) and opted for an underground transmission line (UG/TL). This was to avoid both costly and technically difficult task of constructing the above ground transmission line from Kerawalapitiya to Colombo Fort which is an area with high population density. A large number of high-rise buildings had already been constructed along this route. Furthermore, overhead transmission lines to cross the urban areas along the proposed route are not possible and should be avoided. In summary, high population density, difficulty in finding land and the high cost involvement for any land acquisition and compensation, and obstruction from existing commercial buildings (high rise buildings etc.) are most important considerations that opted the CEB to consider a UG/TL as against an overhead transmission line.[7]

Furthermore, an overhead transmission line requires construction of several suspension towers and angle towers and way leave clearance (ROW). Once the towers are aligned to the existing road edges, it would prevent further way leave clearance of the roads, therefore underground laying of pipes has been considered the most prudent approach.

4.2. Route Alternatives

The preliminary route selection for the proposed UG/TL is done by the CEB based on the previous underground transmission line that was already laid. That was the 220kV underground transmission line (first circuit) between Kerawalapitiya (Thermal Power Plant (TPP) and the Colombo Port in the city center which was constructed via a Japanese ODA loan in 2018. According to the DFR, a field investigation for the second 220kV UG/TL from 220kV Kerawalapitiya GSS to 220kV New Colombo Port GSS had been conducted to find suitable route for the 2nd underground cable. At least two layout alternatives were considered during the feasibility studies and these alternatives are given in Table 5 below.

According to the DFR, the road conditions are similar to the first cable route. The distance of connecting the Kerawalapitiya GSS and the Colombo Port GSS is approximately 15.6 km at the shortest. During the road survey it was clear that although the road condition is similar to the first cable route, some of the road sections namely the Center Road (Aluth Mawatha) has been widened to a 4 lane road by now. The DFR

[7] A comparative analysis of cost benefits of the alternatives is not available for reference.

mentions that the selected underground cable route (1st route) was chosen carefully to ensure the space for additional cable installation. For selection of optimum route, the following points have been considered:

(i) The route of the proposed transmission lines will be able to use the ducts that have been left for future expansion. For example, the ducts that were left immediately passing the Kelani Bridge at Mattakuliya when the Phase 1 of the cable laying project was completed could be used.

(ii) Possibility of not interfering with any monument of cultural or historical importance.

(iii) The proposed route of transmission line does not affect any public infrastructure like playgrounds, schools, other establishments etc.

(iv) By selecting the 1st route, it will be possible to prevent the risk of two circuits blackout of power supply at the same time in the event other utility operators excavate the cable laid areas. The 1st route allows separation of road sections for the cable route.

TABLE 5 ALTERNATIVE ROADS IDENTIFIED FOR THE UGTL

Road Section	Length(km)
Alternative 1	
Inside Kerawalapitiya GSS	0.10
Access Road from Kerawalapitiya GSS to CPSTL Muthurajawela Terminal Road	0.43
CPSTL Muthurajawela Terminal Road	1.95
Kerawalapitiya Road	2.60
Hendala Road	0.26
Alwis Town Mawatha	1.10
ASP Liyanage Mawatha	1.00
Hekitta Road	0.85
Aluth Mawatha (As identified below)	3.57
● Hekitta Road to HDD entry point at Kelani River	0.08
● Kelani River Crossing	0.29
● Box Culvert	0.05
● HDD exit point to New Negombo Road	0.05
● New Negombo Road	0.55
● Mattakuliya Centre Road	0.70
● St. John's way crossing to St. James street crossing	0.70
● St. James road crossing to Lower St. Andrews by road crossing	0.83
● Canal Crossing	0.02
● Culvert Crossing	
● Lower St. Andrews by road crossing to College street crossing	0.30
Srimath Ramanathan Mawatha	1.00
St. Anthony's Mawatha	0.30
N.H.M Abdul Cadre Mawatha - Sea Beach Road	1.10

Sir Baron Jayathileka Mawatha	0.68
Janadipathi Mawatha	0.21
Galle Buck Road / Upper Chatham street	0.25
Chaitya Road up to Port Sub	0.20
Total Length	**15.60**
Alternative 2 (from Abdul Cadre Mawatha)	
SLPA Gate 03 to Hartal Bridge through inside SLPA premises	0.23
Hartal Bridge	0.05
Port main road to Port Sub	0.93

Source: : Field Notes

Above Table 5 indicates that both the routes are identical in terms of the route and the length (length differs only by a margin of 130 m.) except Alternative 'B' which will have its route changed from the end of Abdul Kapoor Mawatha at SLPA Gate No 3. From this point onwards, the only difference would be that under Alternative 'B' the route is expected to pass through the SLPA premises for a distance of at least 1.21 km until it reaches the Colombo Port Switching Station or the Grid Substation. Alternative 'A' does not deviate into the SLPA premises but will take along the main roads until it reaches the Colombo Port Switching Station along Chaitya Road.

4.3. Advantages and disadvantages of Alternative 1 and Alternative 2

Refer Table 6 below:.

TABLE 6 ADVANTAGES AND DISADVANTAGES

Alternative 1	Alternative 2	No Project Alternative
ADVANTAGES		
The route as identified under Alternative (A) was selected similar to the first circuit UG/TL. This will enable the CEB to use the spare ducts especially placed at major bridge crossings. (e.g. close to Mattakkuliya Bridge)	The existing Hartal Bridge cable crossing spare duct can be used for the 2nd circuit as well without resorting to another bridge crossing.	There will not be any project impacts if the project is not implemented. The existing socio economic baseline will remain as it is. For example, there will not be noise, vibration or obstructions to resident houses or that there will not be any traffic congestion arising from the construction work,
The route will not be able to connect to the bridge crossing at Hartal Bridge, as in the case of first circuit, from the point of Abdul Cadre Mawatha)	Since the cable could be laid underneath the proposed Port Access elevated Highway, the construction of the underground cable route within the port premises would be more convenient than that of the road	

	sections identified along Alternative 'A'.	
	The route alignment through the port could have minimized the traffic congestion which otherwise could be greater when excavation work will be started on the busy roads in the Colombo Fort area.	
DISADVANTAGES		
The disadvantage is that the cost will be escalated due to additional bridge crossing if the CEB has to build a cable crossing over the bridge near the Customs Office along Sir Baron Jayathileka Mawatha.	From the point of Abdul Cadre Mawatha, since the route aligns along the SLPA premises, a fresh approval from the SLPA has to be obtained.	No project alternative means that the project i.e. the 2nd 220kV UG T/L from Kerawalapitiya area to New Colombo Port GSS will not take place.
	There is a possibility that overhead bridge inside the SLPA (Former Colombo Port Commission Building entrance) can serve as a bottleneck which will prevent passing the underground cables.	Kerawalapitiya generators will be shut down and a stable supply to power grid could not be achieved if there is no project to evacuate power. Consequently, the construction of the second circuit of Kerawalapitiya – Port 220kV TL is indispensable.
	The occupational safety and health risks to the workers will be high due to continuous port operations during the night hours. Straddles and other container laden truck movements are high within the Port premises.	Without construction of the 2nd circuit UG/TL, reliability of energy supply would be forfeited impeding the nation's social economic development, particularly the Colombo Port City and the peripheral development.

On the basis of above analysis, CEB planning officials have selected Alternative 'A' as the most

feasible option. The criteria for opting Alternative ‘A’ can thus be:

- Availability of Spare Ducts (At Kelani Bridge crossing)
- Minimization of cost for constructing additional bridge crossings (Hartal Bridge)
- Avoidance of obtaining SLPA approval which is cumbersome in terms of the procedure

Therefore, Alternative Route A or 1 can be taken up for detailed survey and was considered for the ESIA

5. Baseline Environmental and Social Data

5.1. Physical Environment

The project constitutes two Grid Sub Stations and a 15.6 km long underground cable laying route along the public roads cutting across the Colombo DSD in the Colombo district and Wattala DSD in the Gampaha District. Overall the project falls within the Western Province. Western Province is located in the south west of Sri Lanka. It has an area (land and water) of 3,684 square kilometers ($km^{2)}$. Western Province occupies a total land area of 3,593 km^2 of which 676 km^2 falls within the Colombo District and 1341 km^2 in the Gampaha District. The rest belongs to the Kalutara District. Colombo is 10 m above mean sea level (amsl) whereas Gampaha is about 11 m amsl.

5.1.1. Meteorology

Colombo weather is fairly temperate throughout the year. However, from December to March the weather remains fairly dry. The average temperature in Colombo is 28ºC and the maximum temperature is 31ºC. The temperature during night time drops down to an average of 22ºC between November and March, where the average temperature remains to be at 27ºC. The highest temperatures seemed to have occurred in February and March when it rises up to 36ºC, still the average temperature remains at about 28 ºC, which is also equal to the average temperature all through the year. While the daytime temperature usually settles at 28 ºC to 29 ºC, the average daily minimum only falls to 25 ºC to 26 ºC. There is very little range in temperature both during the day and through the whole year. There is high humidity year-round, and rainfall fluctuates depending on whether the season is wet or dry.[8]

5.1.2. Rainfall

The Western Province is in the low country wet zone receiving an annual rainfall of 2000-2,500 mm | 94.0 inch[9]. The rainfall is influenced predominantly by the South-West Monsoon. It lies in a part of the Wet Zone which receives 2000–2500mm of rainfall per year. There are two periods of heavy inter-monsoonal rainfall immediately preceding and following the monsoon period lasting from mid-May to September. The Gampaha District is located in the wet zone and receives rain from both the southwest and northeast monsoons. In Gampaha, the average annual rainfall is 2,540 mm and the average annual temperature varies from 29º C to 35º C. The relative humidity average is 76% during the day and 89% during the night. Some low-lying areas across the project path are vulnerable to recurrent flooding.

[8] *Source: Preparatory Survey on Traffic Improvement Project around New Kelani Bridge, Dec 2013*

[9] https://en.climate-data.org/asia/sri-lanka/western-province-2616

5.1.3. Topography

The Colombo District which incorporates the project area falls into the lowest peneplain of Sri Lanka (after P.G. Cooray – Geology of Sri Lanka, 1984). The elevation variation of Colombo District situated in this coastal peneplain ranges to a maximum elevation of 150 m from the sea coast. The terrain in Colombo largely consists of gently undulating plains and low-lying flatlands with a high density of drainage paths formulating a geography consisting of a mix of land and water.

The area under the project is located on an elevation of not more than 08 m above mean sea level (MSL). The road network of which the UG-TL shall cut across is located through the populated areas. The topography is characterized with the presence of residential areas, urban housing complexes and temporary settlements including shanties and commercially built up areas. The immediate surroundings of those roads consist of undulated flat land and or mildly sloping low-lying terrain. The slopes encountered in the project area are flat to mild.

5.1.4. Geology & Soils

According to the General Soil Map of Sri Lanka (Fig 9), the proposed project area falls within Colombo and Wattala area where two different types of soils are prominent. While the reclaimed area of Muthurajawela where Kerawalapitiya Industrial park together with the CEB GSS are located constitute soils of acid swamps (Bogandhalf-bog) soil group, the rest of the area consists of reddish-brown earth and their drainage associates. The geology of Colombo is representative of the geology of the western coast of Sri Lanka and has existed for much of the Quaternary era. This is shown in the 1:10,000 and 1:50,000 geological maps of Colombo region produced by the Geological Survey and Mines Bureau. The typical rock types of this basement include Biotite gneiss, Hornblende Biotite gneiss, Charnockites, Charnockitic gneisses, Quartzite and undifferentiated Meta sediments. The floodplains along Kelani River and the Kalu Ganga rivers consist mainly of alluvial deposits. The floodplains of Kelani River also provide thick alluvial profiles for unconfined aquifers, in addition to the productive overburden along tributary banks. According to Survey Department soil maps (Figure 9) the main soil types in the project area are as follows.

- Red Yellow Podzolic soils with soft or hard laterite and undulating terrain
- Bog and Half bog soils: flat terrain
- Alluvial soils of variable texture and drainage: flat terrain
- Regosols on recent beach sands: flat terrain

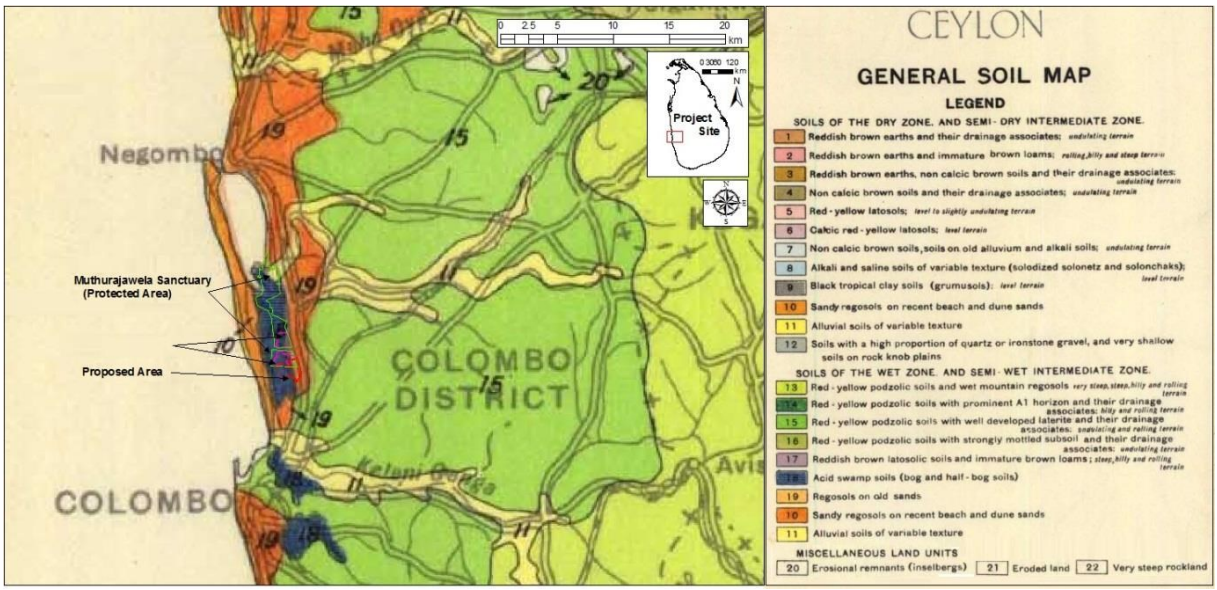


FIGURE 10 General Soil Map extracted for Colombo District

5.1.5. Surface Water Bodies

Kerawalapitiya and its adjacent areas are characterized by several canals which exist since the time of the Dutch period. Olanda Ela (Dutch Canal) and the Hamilton Canal traverse upto the Kelani River and consist of several tributaries such as the Kalu Ela and the Mudun Ela. Other than these canals, the Muthurajawela Marshes and the Negombo Lagoon are the most illustrious water bodies in this area. The project area encompassing Colombo DSD has its northern end the Kelaniya River outfall, the Beira Lake and the Kalu Ela which meanders crossing Aluth Mawatha. The canals are heavily polluted with low DO (Dissolved Oxygen) levels and high loads of organic pollution (BOD_5 and COD), while they seem to be heavily silted too. Visual pollution is very intense due to high levels of turbidity, solid waste disposed and aquatic weeds. Heavy growth of water hyacinth (*Eichhornia crassipes*) is a bio-indicator of nutrient pollution as per the visuals of those canals in Fig . There are some low-lying areas where water bodies are found in the close proximity to the trench (see Fig. 18). For example, the water bodies along the road stretch of ASP Liyanage Mawatha is almost located on either side of the road.

5.1.6. Drainage

Gampaha area is drained principally by the Maha Oya and the Attanagalu Oya and in the extreme southeast by the Kelani Ganga. Much of the area is comprised of coastal low lands. The Attanagalu Oya brings significant discharges of agricultural and industrial effluent and sewage in to Muthurajawela-Negombo lagoon system. The Colombo Drainage System comprises a network of large open drainage canals, smaller tributary canals and low-lying marshes functioning as natural retention basins. It functions to serve the drainage needs of the Greater Colombo area and reduces incidence of flooding and thereby protects the urban community, particularly the urban poor who inhabit low-lying regions of Colombo.

The canal system has four outlets and three of which namely, Dehiwala, Wellawatte Outfalls and Mutwal Tunnel directly discharging in to the sea, while the North Lock discharges in to the Kelani River.

5.1.7. Land use:

The total land area of the Colombo District is 699km^2 and the Gampaha District is 1387 km^2. Land use map of the Wattala DSD and the Colombo CMC Area provided in Fig 11 and Fig 12 depict that the project area of Wattala DS Division falls within the built-up area and in the CMC area the project roads falls within a highly urbanized area where the presence of business and commercial activities is very high. Residential areas are more found to the north of Colombo. The intensity of the road network too is very high within the Colombo central.

Land use in the Wattala DS Division is mainly characterized by wetlands and industrial activities. The land use map of the area shows that the GNDs in which the project is located have a significant proportion of their land area allocated for built-up areas with the rest under marsh or homesteads. Table 7 provides details.

TABLE 7 LAND USE CHARACTERS OF WATTALA DS AREA

Land use feature observed	Area in Ha	% of land area
Lagoon	0.39771	0.01
Coconut	1065.313	18.78
Build up area	1742.895	30.73
Stream	56.65334	1.00
Water hole	19.13481	0.34
Rubber	12.79443	0.23
Sand	9.458713	0.17
Scrub Land	55.5198	0.98
Sea	3.007601	0.05
Paddy	1186.459	20.92
Marsh	1520.544	26.81
Total	5672.177	100.00

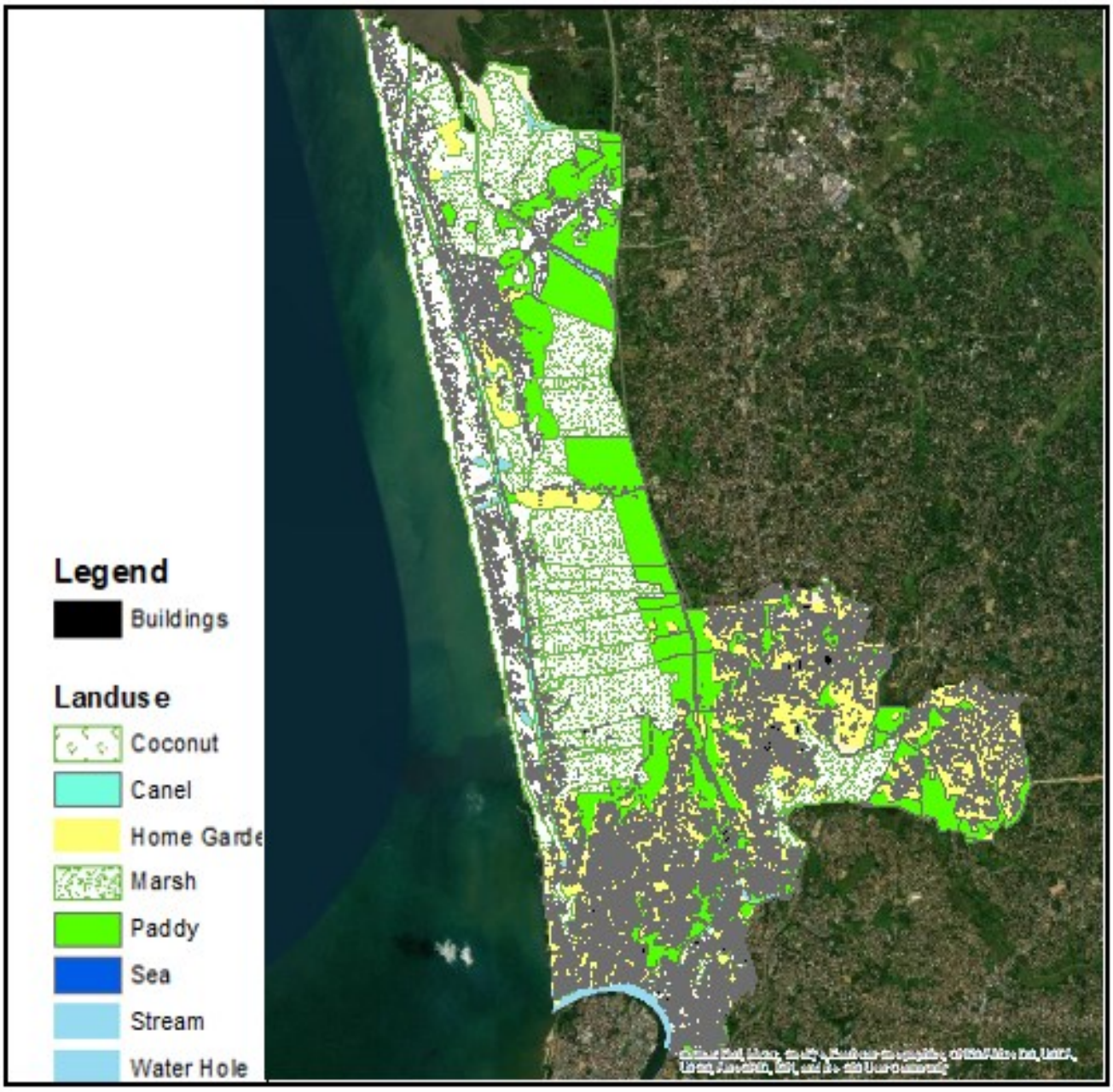


Figure 11 LAND USE MAP OF WATTALA DS AREA

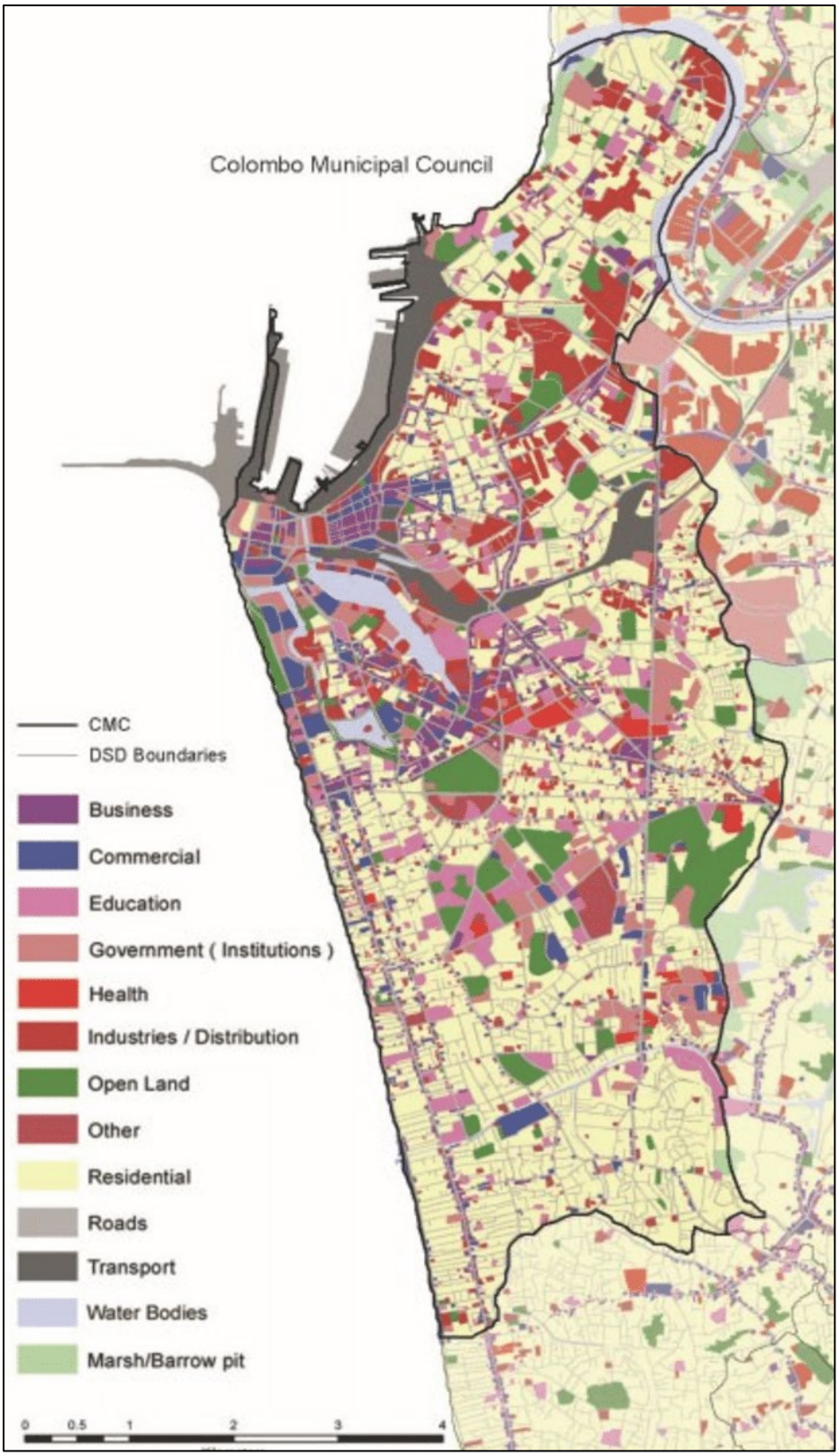


FIGURE 12 LAND USE MAP OF COLOMBO AREA

https://www.researchgate.net/figure/Colombo-Municipal-Council-Land-use-2013-Source-JICA

5.2. Environmental quality

5.2.1. Air Quality

5.2.1.1. Inventory of Emission sources

There are no known or visible stationary sources of air pollution in terms of point sources[10] (except in the Kerawalapitiya industrial zone) other than emissions from vehicles (mobile sources of air pollution). In the Kerawalapitiya area, mobile source emissions also include exhaust emissions from vehicles using the Colombo-Katunayake Expressway (E3), the Colombo-Katunayake main road (A3) and other A-grade roads and B-grade roads (that have high traffic density) occurring close to the Industrial area (EML Consultants, 2017).

The area around Kerawalapitiya Industrial Estate is relatively industrialized with more than 500 industries (EML Consultants, 2017). Tables 8 and 9 below provide details pertaining to Industrial entities within 10 km radius of the Kerawalapitiya Industrial Estate and details of Thermal Power Plants and some of High Polluting Industries within 10 km of the Kerawalapitiya Industrial Estate, respectively. Recent additions to the Kerawalapitiya Industrial Zone are the 10 MW capacity waste-to-energy plant (high-temperature incinerator plant) owned by Western Power Company Pvt Ltd and 18 tons/day capacity biomedical waste incineration plant operated by Sisili Hanaro Encare.

TABLE 8 INDUSTRIAL ESTATES WITHIN 10 KM RADIUS OF KERAWALAPITIYA GSS

Industrial Estate	Number of Industries
Peliyagoda	180
Orugodawatta	40
Ja Ela -Ekala	62
Sapugaskanda	132

(Source: EML Consultants, 2017)

TABLE 9 THERMAL POWER PLANTS CLOSE TO THE KERAWALAPITIYA INDUSTRIAL ESTATE

Industry	~Distance (km)	Capacity (MW)	Fuel consumption (kg/hr.)
Combine Cycle Power Plant Kerawalapitiya	1.5	300	58,740
BMPP Thermal Power Plant Colombo Port	8.5	60	12,300
AES Combine Cycle Power Plant Kelanitissa	8	165	29,000

[10] Stationary sources are fixed emitters of air pollutants, which can be further divided into two major subcategories: point sources (usually associated with manufacturing and industrial processes and many point sources could be available on site within facilities) and area sources (small emission sources that are widely distributed, but may have substantial cumulative emissions; examples include residential water heaters and small engines). Best examples of stationary point sources are boilers, thermal power plants, cement kilns, electric arc furnaces, blast furnaces, incinerators and coke ovens, etc.

CEB Combine Cycle Power Plant, Kelanitissa	8	165	29,000
Asia Power Thermal Power Plant Sapugaskanda	10	51	10,250
Ceylon Petroleum Refinery, Sapugaskanda	11	-	-
SR Steel Factory	0.25	-	-
IWW Steel Factory	3.8	-	-
Mel wire Steel Factory	8.9	-	-

(Source: EML Consultants, 2017)

Kerawalapitiya GSS is located within the Kerawalapitiya Industrial Park area and pipeline laying will extend to a stretch of 2.48 km (0.02 km for HDD works and the balance for open cut works)

5.2.1.2. Air pollution levels

Table 10 presents the air quality levels (in terms of PM_{10} and $PM_{2.5}$) in the vicinity of the sensitive recipients located within the project sites. The dust level measurements were taken by the CEB using the services of the National Building Research Organization (NBRO). According to the results presented in Table 10, PM_{10} and $PM_{2.5}$ levels have not exceeded the limits of 100 µg/m^3 and 50 µg/m^3 , respectively as stipulated by the CEA under the National Environmental (Ambient Air Quality) Regulations 1994; Gazette No. 1562/22 dated August 15th, 2008. NBRO report on Ambient Air Quality (Dust) is provided in Annex 11.6.

TABLE 10 DUST LEVEL DATA FACING OF SENSITIVE RECEPTORS ALONG PROJECT TRACE

Location	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)
At the premises of St Joseph Church, Kerawalapitiya	17	9
At the premises of Vidyaloka Maha Viharaya, Kerawalapitiya	18	10
At a location close to the entrance of Lyceum International School, Wattala	87	48
At the premises of Sathutu Uyana, close to the Jesus Lives Church (Colombo 15)	42	23
At the premises of Kovil, Ramanathan Mawatha, Colombo 13	20	11
At the premises of Bodhiraja Viharaya, Colombo 1	44	24
At the premises of CEB power station, close to Sambodhi Chaitya (Chaitya Road)	22	12

A previous study (carried out for a report produced by the Road Development Authority) also showed that air quality in the vicinity of Sambhodhi Chaitya (Chaitya Road), where there is less traffic (partly due to restricted access to vehicles imposed by the SLPA/Sri Lanka Navy) is within acceptable limits. (Table 11).

TABLE 11 AIR QUALITY MONITORING DATA NEAR SAMBODI VIHARAYA

Concentration	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} (μgm^{-3})	NO_2 (ppm)	SO_2 (ppm)
24 hr. limit under the National Environmental (Ambient Air Quality) Regulations 1994	50	100	0.05	0.03
Minimum	5	9	0.002	0.001
Maximum	24	86	0.01	0.009
Average	14	32	0.005	0.004

(Source: Road Development Authority, 2018)

5.2.2. Noise and vibration levels

5.2.2.1. Noise levels

Major source of noise in the project sites is the noise generating from the vehicular traffic. Generally, noise is expected to be higher during day time due to higher traffic. Noise levels have been recently measured for the EIA of the proposed Port Access Road project stretching from Ingurukade junction and Port City area. (Road Development Authority, 2018) and noise levels are primarily influenced by traffic noise. For example, the noise levels measured close to St Anthony's Church are summarized in Table 12 and it is evident that noise levels have exceeded the daytime (6 am to 6 pm) and night time (6 pm to 6 am the following day) limits of 63 dB(A) and 50 dB(A), respectively stipulated for Municipal Council and medium noise areas under the CEA's National Environmental (Noise Control) Regulations No.1 1996 - NEA (Gazette No. 924/12-Thurdsay, 21st May 1996).

Table 12 NOISE LEVEL DATA

Location	Day time noise in dB(A)	Evening noise levels in dB(A)	Night time noise levels in dB(A)
Near St. Anthony's Shrine	74	75	70

(Source: Road Development Authority, 2018)

Tables 13 presents the noise levels measured (by the Developer using the services of the NBRO) at the sensitive recipients occurring within the project sites. Refer to NBRO Reports on Noise Levels presented in Annex 12.7 for further details.

Table 13 NOISE LEVELS MEASURED BY THE NBRO

Location	Time	Measured residual noise levels L_{eq} dB(A)	Background noise levels L_{90} dB(A)	Remarks
At the premises of St Joseph Church, Kerawalapitiya	Day time	67	57	Wattala Pradeshiya Sabah areas
	Night-time	65	59	
At the premises of Vidyaloka Maha Viharaya, Kerawalapitiya	Day time	72	61	
	Night time	68	64	
At a location close to the entrance of Lyceum International School, Wattala	Day time	66	57	Wattala Urban Council area
	Night time	62	55	
At the premises of Sathutu Uyana, close to the Jesus Lives Church (Colombo 15)	Day time	65	61	CMC areas
	Night time	67	60	
At the premises of Kovil, Ramanathan Mawatha, Colombo 13	Day time	74	67	
	Night time	74	69	
At the premises of Bodhiraja Viharaya, Colombo 1	Day time	72	69	
	Night time	71	69	
At the premises of CEB power station, close to Sambodhi Chaitya (Chaitya Road)	Day time	73	61	
	Night time	66	58	

(Source Report on the Measuring of Noise Levels for CEB 2021-NBRO)

As per the results obtained by the NBRO, the following conclusions could be drawn,

- Vehicular noise is the main contributor to the measured noise levels.
- Measured noise levels are higher than the daytime and night time limits of 55 dB(A) and 45 dB(A), respectively for Pradeshiya Sabah areas stipulated under the afore-mentioned noise regulations
- Measured noise levels are higher than the daytime and night time limits of 63 dB(A) and 50 dB(A), respectively for Urban Council and Municipal Council areas stipulated under the afore-mentioned noise regulations
- Measured noise levels at night time exceed 50 dB(A), which is the limit stipulated by the CEA for night time construction works under the afore-mentioned noise regulations

5.2.2.2. Vibration levels

Vehicular traffic is also a potential source of intermittent vibration. Table 14 presents the vibration levels measured (by the Developer using the services of the NBRO) at the sensitive recipients occurring within

the project sites. It is noted that the measured vibration levels for the Type 3 structures[11] within the frequency range of 10-50 Hz is well below the CEA's interim standard of 2 mm/sec (for continuous type of vibration). NBRO report on Vibration is presented in Annex 12.8

Table 14 VIBRATION LEVELS MEASURED BY THE NBRO

Location	Type of vibration	Vibration axis	PPV (mm/sec)	Maximum PPV levels (mm/sec)	Frequency range (Hz)
At the premises of St Joseph Church, Kerawalapitiya	Continuous / ground	Transgenic	0.155	0.190	10-50
		Vertical	0.105		
		Longitude	0.103		
At the premises of Vidyaloka Maha Viharaya, Kerawalapitiya	Continuous / ground	Transgenic	0.143	0.187	10-50
		Vertical	0.112		
		Longitude	0.112		
At a location close to the entrance of Lyceum International School, Wattala	Continuous / ground	Transgenic	0.158	0.191	10-50
		Vertical	0.110		
		Longitude	0.102		
At the premises of 'Sathutu Uyana', close to the Jesus Lives Church (Colombo 15)	Continuous / ground	Transgenic	0.158	0.337	10-50
		Vertical	0.296		
		Longitude	0.206		
At the premises of Kovil, Ramanathan Mawatha, Colombo 13	Continuous / ground	Transgenic	0.567	0.653	10-50
		Vertical	0.378		
		Longitude	0.205		
At the premises of Bodiraja Vihara, Colombo 1	Continuous / ground	Transgenic	0.087	0.146	10-50
		Vertical	0.118		
		Longitude	0.118		
At the premises of CEB power station, close to Sambhodhi Chaitya (Chaitya Road)	Continuous / ground	Transgenic	0.079	0.131	10-50
		Vertical	0.126		
		Longitude	0.110		

[11] As per CEA's categories of built structures (i.e., considering the vibration standards), Type 3 structures are single and two-storied houses and buildings made of lighter construction, using lightweight materials such as bricks, cement blocks, etc., not designed to resist earthquakes.

5.2.2.3. Water Quality

The reports produced by the NBRO in Annex 12.8 shows the results of the water quality of the waterways occurring in the vicinity of the cable trace. The following were noted considering the limits stipulated by the CEA for Category C (aquatic life protection) - National Environmental (Ambient Water Quality) Regulations, No. 01 of 2019 (Gazette No. 2148/20 – dated November 5th, 2019).

- pH of the waterways are relatively acidic, but within the range of 6.0-8.5. However, dissolved oxygen (DO) levels are extremely low indicating severe pollution in all the waterways. According to Ileperuma (2000), the relationship between water quality and DO levels is 8.0-9.0 mg/L – Excellent, 6.7-8.0 – Slightly polluted, 4.5-6.7 – moderately polluted and < 4.5 mg/L – Highly Polluted. All the waterways are highly polluted considering the relationship between DO and water quality. The NBRO reports indicate a value of <4.5 mg/L (Annex 12.9)

- Organic pollution is also eminent since the biochemical oxygen demand (BOD_5) and the chemical oxygen demand (COD) values have exceeded the stipulated limits of 4 mg/L and 15 mg/L, respectively. Low DO levels are attributed to the biodegradation of the high loads of organic material input from various point and non-point sources of pollution.

- High turbidity due to high loads of total suspended solids (TSS) is noted in the Wali Oya along Kerawalapitiya Road. (GPS Points 7.01468N & 79.88719E).

- In the Aluth Mawatha canal, (GPS Points 6.95774 N and 79.86268 E), high levels of NO3-N were noted, indicating high nutrient input. It is very likely the organic N and NH3-N load may be higher too. In fact the luxurious growth of water hyacinth (*Eichhornia crassipes* Mart. Solms) is a visual indicator of nutrient pollution (to be discussed later).

5.3. Ecological Resources

Muthurajawela Marsh and Negombo Lagoon which are located in the Gampaha District and the canal network in Colombo (Beira Lake) are the major ecological sources having located within 10 km of the project. Muthurajawela wetland represents a large area of brackish marshes, mangrove swamps and fresh water marshes merging into an estuarine lagoon about 32 km^2 to the northwest. The marshes cover an area of approximately 31 km^2. The lagoon opens to the sea at its northern end and receives fresh river water input from the Ja-Ela and the Dandugam Oya.

5.4. Socio Economic Environment

As discussed above, the project falls within two DS Divisions within the Colombo and Gampaha Districts of the Western Province. Both the districts record highest population in the country compared to the rest of the districts. In terms of administrative structure, the Colombo District consists of thirteen (13) DS Divisions, three (03) Pradeshiya Sabhas, five (05) Municipal Councils, five (05) Urban Councils, fifteen (15) Electorates and 557 GN Divisions.

Gampaha District consists of Thirteen (13) DS Divisions, twelve (12) Pradeshiya Sabhas, two (2) Municipal Councils, five (05) Urban Councils, fifteen (15) Electorates and 1,177 GN Divisions.[12] Since the project falls within the GN divisions of both the Colombo DSD of the Colombo District and the Wattala DSD of the Gampaha District , socio economic baseline information was collected for the relevant GNDs falling within the 2 DSDs.

5.4.1. Colombo DS Division of the Colombo District

Colombo DSD is one of the 13 DSDs in the Colombo District. The DSD is bounded to the North by the Kelani River, to the South, by the DSD of Thimbirigasyaya, to the West, the sea and to the East, Kolonnawa DSD. There are 35 GNDs in Colombo DSD. Of them, nine (09) GNDs will be impacted by the proposed UG/TL project. Of the total length of the TL (15.6 km), at least 8 km falls with these 09 GNDS. All those roads fall within the Colombo Municipal Council (CMC) area.

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5.4.1.1. Demographic Characteristics

The population in Colombo District stood at 2,324,349 with 1,140,472 males and 1,183,877 females (2012). The population in the district was estimated to be around 2,480,000 by 2021 which was 11.42% of the country's total population. Colombo District has a land area of 699 $km^2$and its population density was estimated to be around 3,548 persons per km^2 (2021).

The Colombo DSD with a land area of 18 km^2 recorded a population density of 18,687 persons per km^2 with a population of 336,558 in the year 2017[13]. Colombo DSD is therefore considered the DSD with the highest population density among the DSDs of the Colombo District. The population in Colombo DSD has been increased to 339,176 by 2019 as per the data published by the DS Colombo in its Resource Profile.

The population in those 09 GNDs is around 106,794. This constitutes nearly one third (1/3) of the population of the Colombo DSD (Table 15).

TABLE 15 **POPULATION DISAGGREGATED BY GENDER IN THE AFFECTED GN DIVISION (COLOMBO)**

Name of the DS Division	Name of the GN Division	Female	Male	Total Population
Colombo	Fort	431	1125	1556
	Pettah	74	1958	2032
	Kochchikade North	4578	5286	9864
	Kotahena West	5061	4877	9938

[12]http://www.statistics.gov.lk/Pocket%20Book/chap01.pdf

[13] Statistical Handbook 2017 - Colombo

	Lunupokuna	6412	6710	13122
	Aluth Mawatha	7418	6973	14,391
	Modara	9467	9288	18,755
	Mattakkuliya	14,759	14,818	29,577
	Sammanthranapura	4,026	4243	8269
	Total	**51,881**	**54,938**	**106,794**

(Source - Resource Profile-2022)

5.4.2. Average household size

The average household size in the Colombo DSD is 4.8 persons which exceed the national average of 3.8 persons (2020). Of the affected GNDs, Mattakuliya, Modara and Aluth Mawatha represent the highest population. The had been 65,051 housing units in the Colombo DSD division comprising 42,467 single unit houses, 6,515 double (twin) houses, 3,691 shanties, and 9,636 flats/condominium units (2012)[14].

5.4.3. Electricity, water , communication and other utilities

Around 160,000 housing units in the Colombo city are connected to the grid electricity. Electricity distribution system in the city is almost underground. Similarly, water distribution network in the Colombo City is also fully underground. Piped water is the main source of drinking water for the households. The total number of households accessing pipe borne water in the Colombo DSD is 3,719. Other sources of water are the public wells, private wells located in the homesteads and those having access to several community water supply schemes. Telecommunication services are provided by Sri Lanka Telecom (SLT) and Dialogue Axiata Pvt Ltd.

5.4.4. Economic activities

Colombo is the commercial capital of Sri Lanka. Trading is the main economic activity in the Colombo City Center where a large number of retail and wholesale traders are engaged in business activities. Business establishments located in Pettah operate wholesale and retail businesses. Therefore, Pettah is more crowded than the Colombo Fort area. A large number of cross roads in Pettah are always packed with shoppers and pavements are full of small stalls. The Main Street as well as cross streets of Pettah consists mostly of wholesale and retail shops dealing with clothes, electronic goods, dry fish and spices. The Cross Streets where each of the five streets specializes in a specific business - First Cross Street is mostly for electronic goods; the Second Cross street is mostly for cellular phones and fancy goods. At the end of the Main Street further away from Fort is the Sea Street which is the Sri Lanka's gold market. This mile-long street is full of jewelry shops.

While Sri Jayewardenepura Kotte serves as the modern administrative hub with majority of the administrative offices now located there, the Fort Railway Station, the Main Bus Station, and the old

[14] Department of Census and Statistics (2012) –Census of Population and Housing

parliamentary complex as well as the newly reclaimed area of the Port City are located within the Colombo City limits. The World Trade Centre (WTC) located in the City Center (in Colombo Fort) is a 40 storied Twin Tower complex and is the center of important commercial establishments. The Sri Lanka Port Authority (SLPA) which is the main commercial port of Sri Lanka is situated in Colombo Fort and is extended along the Beach Road up to Aluth Mawatha and Mattakkuliya.

A majority of the communities living in the periphery of Colombo City occupy small houses / apartments. Most of them work as daily paid workers or run their own small scale (household level) businesses activities. Most of the daily paid work is in the informal sector which has a high labor absorption capacity and caters to needs of the larger city population. They provide an immense service to keep the informal sector economic activities alive and active, they being the providers of such services as pavement hawkers selling sundry items, selling food and beverages (through small kiosks), work as suppliers of labor / porters (pulling carts with loads of goods) and engaged in loading and unloading of goods to the lorries and buses and other being transport suppliers (e.g. Three-wheel drivers) and those who are engaged as traffic wardens and various other ancillary work demanded by the formal and the informal sector.

Parking space for vehicles is limited, and especially during peak hours, and traffic congestion is a major issue that hamper economic activities in the city. Nevertheless, a large number of in migrating population as well as foreign tourists could be seen within the city limits. In order to accommodate the tourists and other foreign visitors, a large number of hotels are established in the city as well as its immediate neighborhood. The availability of hotel rooms from the year 2006 to 2017 has been increased from rooms 3,209 to 5,310 within the Colombo city indicating a steady rise in tourist arrivals to the Colombo city areas.

5.4.5. Wattala DS Division in Gampaha District

Wattala DS Division falls within Gampaha District. The District is located in the west of Sri Lanka and has an area of 1,387 km^2. The District's population was 2,294,641 in 2012 and in 2017 this was increased to 2,391,000. This constitutes around 44% of the population of the Western Province. Share of urban population is Gampaha District is 16.3% while the rural population remains to be 83.6%. The population density of Gampaha district is 1700/km2. The average size of the HH is 3.8 persons (by 2016). Total number of occupied housing units in the district as per 2012 statistics was 598,420.[15] About 40.1% of the district's land (141,890 ha. In all) is covered under home gardens.

5.4.5.1. Demographic Character of the Wattala DS Division

The DSD of Wattala is bounded to the north by Negombo Lagoon, to the south by the Kelani River, to the west by Ja-Ela and Mahara DSDs and to the east by the sea (Indian Ocean). The total extent of land in the DSD is 57.7 km^2 (5,770ha) and has a population density of 3,425 persons per one km^2. The total population is 197,623 comprising 94,202 (47.67%) males and 103,421 (52.33%) females (2019)[16]. The total number of housing units stands at 44, 350 which are occupied by 47, 673 families. The majority of the population is Sinhalese as shown in the Table 16 below:

[15] https://knoema.com/atlas/Sri-Lanka/Gampaha
[16] Resource Profile of the Wattala DSD (2019)

TABLE 16 **POPULATION CHARACTERISTICS IN WATTALA DS DIVISION**

Race	Sinhalese	Tamil	Muslim	Burger	Others	Total
Total	144,783	35,569	13,709	3,036	526	197,623
%	73.26	17.9	6.9	1.5	0.26	100%

(Source: Sampath Pethikada)

The DS Division has 46 GNDs consisting of 239 villages. The route alignment for the trench for laying of the cables of the project falls within 06 GNDS. The details of the number of GN divisions, their population and the local authorities that fall within the route are provided in the Table 17 below. :

TABLE 17 TOTAL POPULATION IN THE PROJECT AFFECTED GN DIVISIONS IN WATTALA DS DIVISION

Name of the DS Division	Name of the GNDs	Population (Female)	Population (Male)	Total Population
Wattala	Balagala (171 B)	5680	4840	10,520
	Nayakanda North	1541	1366	2907
	Kerawalapitiya (171)	6594	6266	12,860
	Hendala North (172 A)	2381	2532	4,733
	Hendala South (172	2039	1787	3826
	Hekitta (169)	2826	2715	5541

(Source: Resource Profile Wattala DSD 2022)

5.4.5.2. Economic Activities

Gampaha district has a land area of 1,387 km^2. Agriculture is the main economic activity in the Gampaha with 73% of the total land area under agriculture. The major crops cultivated in the district are paddy, coconut, rubber, vegetables, fruits and flowers. Large areas still exist under agricultural production and paddy cultivation. The major fruit crops grown are pineapple, banana, rambutan and papaya. Coconut plantation covers 51% (56,751 ha) of the land and paddy covers 19% (11,977 ha) . Remaining land is used for rubber and other highland crops cultivations.

Both the Colombo district and the Gampaha district have a high concentration of industrial activities in Sri Lanka. According to the Annual Survey of Industries (2000), 28.1% of the industrial establishments in the country are located in the Colombo and Gampaha districts and they account for for more than 73.2% (LKR 237,242 million) of the total industrial production in Sri Lanka. There are at least two or three Industrial Zones operated by the BOI in the Gampaha district. (Industrial estate in Ekala, Industrial Park in Kerawalapitiya, Industrial Zone in Biyagama are some of them.

Sri Lanka's main commercial airport (Bandaranaike International Airport) is located in Katunayake. Besides Negombo is also considered a major tourist destination for its clean beaches. Kerawalapitiya is becoming a commercial hub with land area earmarked for various types of power sector projects and logistics projects by Sri Lanka Land Development Corporation (SLLDC). The land for such projects were reclaimed from Muthurajawela Marshes and they are mostly confined to Kerawalapitiya GN Division. This GND is located about 12km north of the Colombo City Centre. The Urban Development Authority (UDA) has declared reclaimed areas of Muthurajawela as a zone in which waste management projects / electricity generation power plants can be sited / implemented and is vested with the BOI.

5.4.5.3. Household Income & Expenditure:

According to the latest survey carried out by the Department of Census and Statistics in 2019, the average household income per month in Sri Lanka was LKR 76,414. The average household expenditure per month in Sri Lanka was LKR 63,130. In the Colombo and Gampaha districts, the average household income was recorded at LKR 132,433 and LKR 100,455 respectively. The average household expenditure in the Colombo and Gampaha districts were reported as LKR 108,893 and LKR 84,413/-.[17]

5.4.6. Labor Force participation

The employed population over 15 years in Sri Lanka was 8,180,692 comprising 5,368,896 males and 2,811,796 females (2019).[18] The estimated economically active population was about 8.6 million and they represented 65.0% males and 35.0% females (2023)[19]. In the year 2023, the male labour force participation rate declined to 68.6% from 70.5% compared to its previous year while the female labour force participation rate too fell to 31.3% from 32.1% in the same period.

In absolute terms, the employed population declined by 137,821 to just above 8 million in 2023, with male and female employed population declining by 66,402 persons and 71,412 persons respectively. The youth unemployment rate has continued to rise in the year 2023. Youth unemployment has risen from 16.2% in 2022 to 17% in 2023. Unemployment is higher among the female population. In the Gampaha district a total of 50.7% of the population is considered as economically active population. Colombo District has a labor force participation of 52.6% .

National distribution of employed population by main industry (first quarter 2023) were as follows

Table 18 **National Distribution of employed population by main industry**

Sector	Number	%
Agriculture -	2,187,563	26.7%
Industries	2,090,031	25.5%

[17] Department of Census and Statistics – Household Expenditure Survey October 2019
[18] Department of Census and Statistics (2019) Labor Force Survey
[19] Department of Census and Statistics (2023) Labor Force Survey

Services	3,922,198	47.8%

(Source: http://www.statistics.gov.lk/LabourForce/StaticalInformation/Bulletins/1stQuarter2023)

5.4.7. Per Capita Income

According to World Data Atlas, in 2020, Gross Domestic Product (GDP) per capita for Sri Lanka was USD3,679 which declined to USD3,610 in the year 2022, a decline by 9.75% compared to the year 2021. The GDP per capita income of Sri Lanka increased from USD 984 in 2001 to USD 3,679 in 2020 growing at an average annual rate of 7.46%.

The Western Province (that includes the Districts of Colombo, Gampaha and Kalutara) provides the highest contribution to the GDP contributing 41.2% of the Provincial Gross Domestic Product (PGDP). The per capita income of the Western Province was 1.4 times the national per capita income in 2015. Colombo district has the highest mean monthly household income with LKR. 77,723 while the Gampaha district records a mean monthly income of LKR 58,248 in the year 2019. .

5.4.8. Poverty

According to the Sampath Pathikada (Resource Profile) in the Colombo DS Office, of the total population living in the GN divisions affected by the project (as shown in Table 17 above), 48% are low income households. About 15% of this population is engaged in self-employment mainly in preparation of food items for the local market and selling various items in streets and buses. Around 25% of the working population is engaged in semi-permanent employment in the private sector while 12% are employed in the government sector.

About 70% of the women in working age are engaged in some kind of elementary occupations including labor hiring in the construction industry, waste collection, small kiosks, hospitality industry and shops etc. People engaged in marginal (subsistence) fishery are high in Balagala and Dikkowita GNDs whereas 61% of the people of Kerawalapitiya work in the private sector mostly as paid labourers. Those who are working in the private sector are significant in all the GNDs which show that there is a demand for the skilled and unskilled labor from the private industrial sector services in the area.

The number of beneficiaries eligible to receive welfare assistance from the state (under Samurdhi Program) in any GND indicates the prevalence of poor people whose monthly household incomes remain below the poverty line. The household income is considered the main determinant to make the households eligible for welfare assistance under the Samurdhi Subsidy Program. The official national poverty line declared by the Central Bank in March 2017 was LKR 4,222. This cut off point has been increased to LKR 16,975 by February 2024. Corresponding to this year, the district poverty line in Colombo was recorded at LKR 18,308 while it was LKR 18,214for Gampaha district [20]

[20] http://www.statistics.gov.lk/povertyLine/2022_new (downloaded on the 5th April 2024)

The number of Samurdhi subsidy recipient families in the two DSDs is shown in Table 19 below. (The figures presented may have substantially increased by now considering the fact that the cut off point for poverty line has been substantially increased.

TABLE 19 NUMBER OF SAMURDHI SUBSIDY RECIPIENTS

DS Division	LKR. 420	LKR 1500	LKR 2500	LKR 3500	Total
Colombo DS Division	2	2762	1097	1807	5668
Wattala DS Division	226	3776	1737	3796	9535

(Source: Government Statistical Handbook 2022 data)

Malnutrition is also an indication of poverty. According to the Sri Lanka Development Update published by the World Bank, it says that the latest data show that 16.2% of children under five years of age are underweight as of June 2023, up from 14% in June 2022; and the share of pregnant women with anemia increased from 13.3 percent to 16.2% during the same period.

5.4.9. Aswesuma:

This programme is now being implemented to replace the Samurdhi programme. The selection of beneficiaries is based on revised criteria. The objective of introducing this programme is to alleviate the hardships faced by the populace amidst the profound economic challenges experienced in 2021 and 2022. It is also intended that shortcomings of previous programs such as Janasaviya and Samurdhi could be avoided through this new programme. All Divisional Secretariats have been asked to call for applications from eligible candidates from among the DSDs in the rural areas. The provision of Aswesuma welfare benefits commenced from 1 July 2023. Under the Programme, a monthly allowance of LKR 2,500 is provided to transitional category of families, LKR 5,000 to vulnerable category, LKR 7,500 to poor category, and LKR 15,000 to extremely poor category. It is to be noted that Aswesuma programme is yet to cover urban areas such as Colombo District.

5.4.10. Gender

The construction of the proposed 220kV underground transmission line from Kerawalapitiya to Colombo Port City at a total length of 15.6km cuts across two districts (Colombo and Gampaha), 2 Divisional Secretariat Divisions/DSDs (Colombo and Wattala), and 15 grama niladhari divisions (GNDs). The estimated population in the Colombo and Gampaha districts in 2022 was 2,477,922 and 2,439,069 respectively. The total population of the Colombo DSD was recorded at 344,615 comprising 50.4% males and 49.6% females (2022).[21] The population in the Wattala DSD was less than half of the population in the Colombo DSD and accounted for 150,414. The female population in this DSD exceeded their counterpart males with 51.7% and 48.3% respectively (2022).[22] The total population of the 15 GNDs which included 9 in the Colombo DSD and 6 in the Wattala DSD is reported as 112,360, which constitutes 22.7% of the total population in the two DSDs. The gender composition of the GND population represents 51.3% males and

[21] http://www.statistics.gov.lk/statistical%20Hbook/2023/Colombo/2.6.pdf

[22] http://www.statistics.gov.lk/statistical%20Hbook/2023/Gampaha/10.2.pdf

48.7% females.[23] The women headed households in the Colombo and Gampaha districts represented 22.6% and 23.9% respectively (2019).[24]

The construction work of the transmission line can directly or indirectly affect a significant proportion of the population in the 15 GNDs. However, the project will not cause alterations to the demographic profile of the area or its gender composition such as through population displacements, as the main purpose of the project is the transmission of power from Kerawalapitiya grid substation to the Port City substation in order to enhance the reliability of power supply, and to meet the growing demand for electricity in the Greater Colombo Area. Moreover, project's impacts on the private and public properties will be minimal as the transmission cables will be laid underground. Nevertheless, the populations occupying spaces closer to the right-of-way of the transmission line will experience temporary impacts due to project's construction work such as dust emissions from trench excavations, noise generated by the operation of construction machinery and vehicles, traffic congestions, and disruptions to their access paths. The project will implement a robust ESMP to avoid or mitigate such construction related impacts.

The official poverty line (i.e. the minimum expenditure required per person per month to fulfill the basic needs) in the Colombo and Gampaha districts stood at LKR 17,924 and LKR 17,832 respectively (March, 2024).[25] In 2019, 1.8% of the households in the Colombo district and 4.2% in the Gampaha district lived below the then poverty line which on average was around LKR 7,494.[26] The economically active population in the Colombo district included 65.3% of males and 34.7% of females. Meanwhile, their counterparts in the Gampaha district comprised 63.9% males and 36.1% females. The female labor force participation rate (of those 15 years and above) in the two districts was around one-third of the male labor force participation. In the Colombo district, male and female labor force participation was 70.5% and 32.1% respectively. Their corresponding figures in the Gampaha district were 69.1% and 33.1% (2022). The unemployment rate in the Colombo district stands at 5.1% whereas it is 4.5% in the Gampaha district (2022)[27]. Women's unemployment rate is twice as high as that of men.

The energy sector is dominated by men, with a low share of women employees. In the Ceylon Electricity Board (CEB), women accounted for 13% of its total workforce of 25,727 in 2018 which comprised 15% women engineers, 17% in the management and executive levels, and 12% in all other lower levels.[28] Low participation of female engineers in the utilities are attributed to the hazardous work environments, lack of flexible working hours, family responsibilities and travel restrictions to undertake extensive field visits or to be stationed away from their homes and families, safety concerns, and other gender norms and social concerns over the safety and dignity of women that divide the gendered roles as hard work for men and soft work for women. The dearth of female engineers is also a reflection of the limited number of female

[23] Resource profiles of Colombo and Wattala DSDs, 2022

[24] http://www.statistics.gov.lk/Resource/en/GenderStatistics/Special_Concerns/FemaleHeadedHouseholdsBySector,ProvinceAndDistrict2016.pdf

[25] http://www.statistics.gov.lk/povertyLine/2021_Rebase#gsc.tab=0

[26] http://www.statistics.gov.lk/IncomeAndExpenditure/StaticalInformation/HouseholdIncomeandExpenditureSurvey2019FinalReport

[27] http://www.statistics.gov.lk/LabourForce/StaticalInformation/AnnualReports/2022

[28] World Bank. *South Asia Country Baseline Assessment for Women Engineers in the Power Sector*.

students entering the engineering fields in the universities and other higher educational institutions. They comprised only 25.1% of the 2,466 engineering students admitted to 6 state-run universities[29] in the year 2019–2020.[30]

The proposed transmission line project may have the potential to generate some employment opportunities for the local population in the project affected areas mainly in manual labor work. However, opportunities for women to find similar work will be rather remote. Women will be less likely to seek employment in manual work as the civil works of the project is planned to be carried out at night (to avoid inconveniences to the public) and the type of civil works under the project such as excavating trenches and laying cables are labor intensive. Such work can also be hazardous for the engagement of women. On the other hand, the contractors may not like to hire women for night time work because of the prevailing legal restrictions that disallow the employment of women in night time work. The *Employment of Women, Young Persons and Children Act* (1956 and amended in 1973) requires employers who want to hire women to work after 10 pm to get written sanction from the Commissioner of Labor. Also, employers need to hire female wardens to ensure the safety of female employees at night, and no women can be employed for more than ten days per month of work at night. Furthermore, the *Shop and Office Employees Act* (1954 and amended from time to time) restricts the number of hours a day that female employees can work and their ability to work at night in specific businesses. Despite these legal restrictions for the engagement of women in labor work, there will be a greater possibility for the engagement of young girls and women, especially those from poor households in clerical and allied services at the PMU and the contractor's office, environmental and OSH supervision, coordination etc. Engagement of poor young girls and women in such positions, at least for a short-term, can contribute to reducing women's unemployment rates, enhancing women's personal and technical capabilities, and a reduction of their household poverty.

Almost one-third of the labor force in the Colombo and Gampaha districts are self-employed in the informal sector. They account for 33% and 28.5% respectively. The ESIA conducted for this project observed a substantial number of households and individuals who are engaged in a variety of informal economic activities such as food/meal supplies, running retail grocery outlets, and sale of vegetables, fish and fruits or providing other informal services beside the transmission line corridor, operating either from their respective residences or else in mobile structures. A majority of those economic activities are conducted by poor households and persons where the participation of women and women headed households, either as business operators or contributing family workers is quite significant. Any disruptions to their livelihood activities due to construction work of the project can cause drastic impacts on their living conditions as most of them survive on their daily incomes. The project, through the implementation of the ESMP will ensure that construction work will not cause any disruptions to such livelihood activities of the poor men and women, access to their business operations is restored in the following mornings, and in the event of any temporary loss of livelihoods and incomes, adequate compensation is paid to the affected parties.

The project has yet to assess its labor requirements. However, it is anticipated that there will be a labor influx to the project area as not all labor requirements could be found within the local communities. The labor teams of the contractor will be male dominated. In such circumstances, the risks of gender-based-

[29] Peradeniya University, Moratuwa University, Jaffna University, Ruhuna University, Sri Jayawardenapura University and Southeastern University.
[30] UGC. *University Admission*.

violence (GBV), sexual exploitation and abuse (SEA), and sexual harassment (SH) exerted particularly towards young girls and women in the local communities could be rated as substantial. The project will ensure that GBV, SEA and SH are zero tolerated and that offenders are immediately reprimanded for their misconduct. Moreover, the contractor will provide a Code of Conduct for each and every worker, and conduct continuous awareness and training activities (such as through toolbox talks) to ensure that workers comply with the Code of Conduct. The contractor will also ensure that local communities are aware of the workers' Code of Conduct to enable them to report any concerns or non-compliance.

5.4.11. Sites of cultural and archaeological importance:

Colombo District was part of the pre-colonial Kingdom of Kotte. There are many sites with religious, cultural and/or archaeological importance within the Western Province. The following are culturally and archaeologically important places located within the Colombo DSD.

- Cargills Building, Fort, Colombo
- Colombo Chartered Bank Building, Colombo
- Ghafoor Building, Colombo
- Maligawaththa Muslim Cemetery, Maligawaththa
- Kayman's Gate, Dematagoda Colombo
- Old Colombo Dutch Hospital, Colombo
- Old Parliament Building, Fort, Colombo
- St. James Building,Colombo
- Vidyodaya Pirivena Maligakanda, Colombo

The old buildings such as Colombo Port Commission Building, Colombo Port Customs Building (which are located within the Sri Lanka Ports Authority premises), Califon Burg House (Navy Headquarters) in Fort, the former General Post Office building located along Janadipathi Mawatha, Walkers Building along Sir Baron Jayathileka Mawatha, St Anne's Church in Kochchikade are other buildings which are of culturally and archaeologically important, as they belong to the colonial architecture.[31] Although these buildings are located close to the roads affected by excavation of the trenches, none of them will be adversely impacted due to the excavation work.

Although in the Gampaha District there are several religious temples which are of culturally and archeologically important, no such buildings are located within the Wattala DSD.

5.4.12. Services rendered by the Local Authorities

Colombo City is the Commercial Capital of Sri Lanka. The city population is expanded by nearly 500,000 daily with a floating population. The city covers an area of 37 Sq. Km. The Colombo Municipal Council (CMC) is the main local authority and is responsible for the collection and disposal of solid wastes and sewage disposal services and for maintaining of the cleanliness of the roads, managing the road network and the drainage systems. CMC is also responsible for the beautification of the city limits, street lighting and collection of assessment taxes from the residents.

[31] List of Archaeological Protected Monuments in Colombo District as published in the gazette of the *Democratic Socialist Republic of Sri Lanka*. 1116. 21 January 2000.

The solid waste collection and management services are carried out by the CMC in Colombo city (wards) and by the Wattala Pradeshiya Sabha (WPS) for the areas falling under the Wattala DSD. For purpose of solid waste collection, the CMC has divided the CMC area for several sub-districts and wards. The roads along which the excavation will take place for the UG/TL within Colombo DSD falls into CMC District 1 and District 2A. These consist of the wards of Mattakuliya, Modara, Mahawatta, Aluth Mawatha, Lunu Pokuna; Bloemendhal and Kotahena East, Fort and Pettah. According to Grama Niladharis of these GNDs, the collection times fall at night in most cases. Most of the compactors use the main road when they collect the garbage from the by roads. Since the excavation work and pipe laying work will take place during the night times, it is necessary that the construction work does not interfere with the easy mobility of solid waste collection compactors.

Besides the above, the CMC launched a Development Programme to rehabilitate the drainage systems (way side culverts and the line drains) along Aluth Mawatha. Aluth Mawatha is also being widened under a separate project.

The local authority serving the GNDs around Kerawalapitiya is the Wattala Pradeshiya Sabha (WPS). The total population in the wards under the WPS is around 160,000. According to the officials of WPS, over 55 metric tons of waste per day is generated both from Wattala PS and the Wattala UC area. It is estimated that of the waste collection, around 60%is degradable wastes. Solid waste is collected during the day time and disposed at the Muthurajawela (Kerawalapitiya) where a 20-acre waste management park is established. The proposed construction work will not cause severe problems for the normal waste collection work carried out by the WPS, except there could be some temporary traffic delays along the narrow roads such as Alwis Town Mawatha and ASP Liyanage Mawatha. The authorities envisage that if the traffic will be accumulated along these roads, it will be difficult to swiftly carry out waste collection work.

As discussed above, the solid waste collection and management services are carried out by the CMC in Colombo city (wards) and by the Wattala Pradeshiya Sabha (WPS) for the areas falling under Wattala DS Division. For purpose of solid waste collection, the CMC has divided the CMC area for several sub-districts and wards. The roads along which the excavation will take place for the UG/TL within Colombo DS Division falls into CMC District 1 and District 2A. These consist of the wards of Mattakuliya, Modara, Mahawatta, Aluth Mawatha, Lunu Pokuna; Bloemendhal and Kotahena East, Fort and Pettah. According to Grama Niladharis of these GNDs, the collection times fall at night in most cases. Most of the compactors use the main road when they collect the garbage from the by roads. Since the excavation work and pipe laying work will take place during the night times, it is necessary that the construction work does not interfere with the easy mobility of solid waste collection compactors.

5.4.13. Health Services

The health services in Sri Lanka are well established. The health services provided to the communities in the Colombo district are provided through the national (Teaching hospitals) and Base Hospitals, district hospitals and Divisional hospitals. Among them are the Colombo National Hospital, Kalubowila Teaching Hospital and other District /Regional Hospitals such as the Homagama base hospital and Piliyandala Divisional Hospital. In addition, both Colombo and Gampaha districts have a number of hospitals operated by the private sector for inpatients as well as outpatients. The breakdown of the number of different types of hospitals (government) and the number of beds available are shown in the Table 20 below:

TABLE 20 DISTRICT WISE GOVERNMENT HOSPITALS AND BEDS

	# of Teaching Hospitals	# of Beds	# of District Hospitals	# of Beds	Base Hospitals	# of Beds	Divisional Hospitals	# of Beds
Colombo District	07	8039			03 Type A 01 Type B	1286 286	01 Type A 06 Type B 02 Type C	91 404 66
Gampaha District	01	1569	02	1440	01 Type A 02 Type B	636 291	04 Type A 01 Type B 07 Type C	632 84 216
Total	08	9608	02	1440	07	2499	21	1483

(Source: / Ministry of Health Nutrition and Indigenous Medicine (2019) Annual Health Statistics 2017 Sri Lanka, Colombo)

The health services are decentralized through the offices of Medical Officers of Health (MOH). Colombo District has several MOH offices. Regional level health services are overseen in the Colombo Municipal Council area by one of the MOH offices.

Colombo is considered the high risk area for the Dengue epidemic with 18.5% [32]of all the detected dengue patients from the Island. This report also noted that the homesteads with a land extent of less than 5 perches were higher in the dengue impacted groups in Colombo (35.5%). This shows that the communities living in the project impacted areas especially those living in the GNDs in the Colombo DSD and Wattala DSD are more vulnerable to vector and water borne diseases.

The prevalence of HIV/AIDs in Sri Lanka is considered to be at low level. However, drug addiction is high in the Western Province[33]. The published reports indicated that Colombo and Gampaha districts were highly correlated with male sex workers and direct/indirect drug users respectively. The report had concluded that the Colombo district was at high risk for all tested Sexually Transmitted Diseases (STDs). In terms of STD/HIV, the Annual Report published by the National STD/AIDs Control Programme, Sri Lanka (2018) mentions that Colombo and Gampaha districts are mostly affected with over 2 per 100,000 population. During the recent three-year period (2016-2018) the number of STD affected population has increased at 0.3% compared to the number of affected persons registered in the year 2013/2015 period. The number of new patients with sexually transmitted diseases registered in the Colombo Hospital was around 7,000 in the year 2018 with another 2,000 patients being treated at the Kalubowila Teaching Hospital. According to the same source, Colombo Fort and the peripheral GNDs record a high incidence of crime, prostitution and drug addiction.

[32] https://parasitesandvectors.biomedcentral.com/articles/10.1186/s13071-018-3060-9

[33] A preliminary assessment of sexual transmitted infections (STIs) in Sri Lanka: District-wise overview, BD Madurapperumaa , AAN Nishadb , JS Borgesc , DIK Solangaarachchid , RV Kangathe , SA Hewagef

5.4.14. Accessibility to potable water

It was reported that 89% of the households of Sri Lanka have access to clean water from all the different types of safe water sources. In terms of the regions, 99.5% of the population in the Western Province has access to safe drinking water. By 2016, it was reported that 65% of the population in the Western Province had access to pipe borne water supplied by the NWSDB. By 2019, about 95% of the households in Colombo (Municipal City Limits) had piped water supply. More than 92% of the urban population is reported to have access to drinking water within their premises.[34] Households of almost all the GNDs in the Colombo DSD have the access to piped water connections provided by the NWSDB. In the GNDs of the Wattala DSD, the situation is that although pipe borne water is available in most of the households, the other sources such as shallow wells and tube wells are also found in the households.

It was also observed from the field visits that almost all the households in close proximity to the road network that will be impacted by the excavation of trenches are well connected to pipe borne water. The road widening work and the water distribution improvement projects especially along the Aluth Mawatha had disrupted domestic piped water supply occasionally. Suspension of water distribution, shifting of water meters whenever the houses along the road frontage are impacted had been a concern by the occupants of the houses.

5.4.15. Inflow and outflow of Vehicular Traffic

According to the reports of the RDA, the total vehicle population with valid revenue licenses in Sri Lanka stood at around 3.4 million in 2012 and rose to 49% by 2017 with the total reaching to around 5 million. By now this figure may have reached the level of 6-7 million. The Western Province is the most developed and urbanized region in Sri Lanka.

The total number of vehicles based on the revenue licenses in the Western Province was 1,279,616 in 2012 according to the Motor Traffic Department of the Western Provincial Council.[35]. The report says this has increased by 8.5% annually though there has been a steep decline of new vehicle registration from the year 2019 onwards. A JICA Study Team conducted a traffic screen survey for the Colombo Metropolitan Region (CMR) and the summary of the traffic count results show approximately 350,000 vehicles (based on passenger car units – pcu) enter daily to the CMC area and 140,000 vehicles enter the Fort and Pettah areas[36]. In view of the moratorium on the import of vehicles effective from the year 2020 to date, there is no substantial increase in the vehicle population. Also due to fuel price escalations, there was a low density of vehicular traffic experience in the recent past in the country in general and in Colombo in particular.

According to the CMC, the floating population which in-migrate to the city limits for employment as well as for other commercial activities is as high as 500,000 per day. There is a corresponding number of outgoing and incoming vehicles (trains, public and private buses, cars and other land vehicles) causing heavy traffic blocks in the mornings, day time and every evening. Most of the trunk roads lead to Colombo

[34] Towards sustainable Water & Sanitation Services in Sri Lanka (Independent Evaluation by ADB/ JICA/IEG.

[35] Urban Transport Master Plan, Final Report August 2014, Oriental Consultants Co. Ltd; for JICA

[36] Urban Road System and Traffic Conditions (Chapter 5)

and from there onwards, rail and other public and private transport means are available to major destinations in the country.

Corresponding to the increase of vehicle population, there is a strong demand for the road space which otherwise will lead to more and more congestion on the roads. Colombo city has about seven major entry points which bring the traffic to the city. Over 1.7 million vehicles enter the city through these entry points. Cars constitute 34% of this and 24.5 % is motor bicycles. All major roads are connected to a number of by roads and the vehicle users use these roads to avert traffic along the main roads. Traffic congestion is therefore observed in the morning and evening peak periods at intersections of radial arterial roads, especially around the periphery of CMC and inner cities.

Based on the observations, the intensity of the traffic on an average day between the day time has been considered to be either low , medium or high as shown in the Table 21 below:

Table 21 TRAFFIC INTENSITY AS OBSERVED DURING THE ROAD SURVEY

Name of the Road section	**Specific observation on Traffic Congestion**		
	Low Traffic	**Moderate Traffic**	**High Traffic**
Inside Kerawalapitiya GSS	Low		
CPSTL Terminal Road	Low		
Road upto Kerawalapitiya road	Low		
Kerawalapitiya Road			High
Hendala Road			High
Alwis Town Mawatha	.		High
ASP Liyanage Mawatha			High
Wattala Hekitta Road	N/R	N/R	N/R
New Negombo Road		Medium	
Mattakuliya Center Road		Medium	
Aluth Mawatha			High
Srimath Ramanathan Mawatha		Medium	
St. Anthony's Mawatha		Medium	
N.H.M Abdul Cadre Mawatha - Sea Beach Road		Medium	
Sir Baron Jayathileka Mawatha			High
Janadipathi Mawatha		Medium	
Galle Buck Road	Low		

Chaitya Road up to Port Sub on	Low		

Source : Field notes on road survey

As shown in the above table, the traffic along Kerawalapitiya Road, Herndala Wattala Road etc. and Aluth Mawatha (the section which is yet to be widened) is heavy during the day time. There is already a de-routing of vehicular traffic through the main Mattakuliya road which by-passes this section of Aluth Mawatha and connect the same road. It appears that in spite of this arrangement still both on-coming and outgoing traffic make this section heavily congested during day time. However, this impact will not be significant as the work of the pipe laying will be scheduled during night hours.

The road which runs parallel to the Colombo Harbor from the point of entry to the Sea Beach Road (including Srimath Ramanathan Mawatha, St. Anthony's Mawatha and the N.H.M Abdul Cadre Mawatha) and up to Aluth Mawatha are heavily congested with vehicular traffic and the road commuters. A heavy vehicular traffic can be seen during the week days. The traffic flow from several directions converges into Colombo Fort. The artillery roads carrying such traffic are the Galle Road, High-level road, and Baseline Road. Much of the outward traffic pass through the Abdul Cadre Mawatha (Sea Beach Road towards the 1st Cross Street, 2nd Cross Street and the Main Road, Mattakuliya, and then to old Negombo Road (Aluth Mawatha).

5.4.16. Description of the roads affected by the project

According to the RDA, roads managed by the RDA (Other than Expressways / E Class Roads) fall into A, AB and B categories. The A and AB type roads are those with a carriage way width of 6.2 m (20 feet) and a shoulder width of 1.8 m (6 feet). The 'C' class roads should have 5.6 m wide carriageway and 1.8 m wide shoulder width. The carriageway width of the 'D' class roads may vary and can be either 5.6 or 3.7 m. The 'C' class roads are mostly managed by Provincial Road Authority (PRDA) and the 'D' and 'E' class roads are maintained, and managed by respective local authorities. The carriageway of the 'E' class roads is mostly 3.7 m wide. E class roads are supposed to be gravel roads, but they are now either concrete laid/asphalt laid and there are hardly any gravel roads found within the project area. However, most of the E class roads do not have the required shoulder.

The roads along which the underground transmission cable will be laid is being aligned across several of the GNDs of both the Colombo DS Division and the Wattala DS Division. The road network that will be used for the laying of 15.6 km UG/TL cable is managed by the Colombo CMC, Wattala Pradeshiya Sabha, the RDA and the PRDA. (See Table 22 below)

TABLE 22 DETAILS OF THE ROAD SECTIONS BY LENGTH AND MANAGEMENT AUTHROTY

Road Section	Road Type	Road Maintained by	Length (km)	Status/condition of the Road
Inside Kerawalapitiya GSS	Not Known	CEB	**0.10**	Gravel laid and compacted consists of a minimum two lanes for incoming and outgoing traffic

Access Road from Kerawalapitiya GSS to CPSTL Muthurajawela Terminal Road	Not Known	RDA (Maintenance Unit)	**0.43**	Asphalt laid, and consists of a minimum four lanes for incoming and outgoing traffic
CPSTL Muthurajawela Terminal Road	B	RDA (Negombo Office)	**1.95**	Asphalt laid, and consists of a minimum two lanes for one way traffic; intersections equipped with roundabout.
Kerawalapitiya Road	B	PRDA	**2.60**	Asphalt laid, and consists of a minimum two lanes for incoming and outgoing traffic
Hendala Road	B	RDA (Negombo Office)	**0.26**	Asphalt laid, and consists of a minimum two lanes for incoming and outgoing traffic
Alwis Town Mawatha	C	Wattala Pradeshiya Sabha	**1.10**	Asphalt laid, and consists of a minimum two lanes for incoming and outgoing traffic
ASP Liyanage Mawatha	C	Wattala Pradeshiya Sabha	**0.95**	Asphalt laid, and consists of a minimum two lanes for incoming and outgoing traffic
Hekitta Road	B	RDA (Negombo Office)	**0.84**	Asphalt laid, and consists of a minimum two lanes for incoming and outgoing traffic
Aluth Mawatha (As identified below)		CMC		
● Old Negombo Road	AA	CMC	0.55	Asphalt laid, and consists of a minimum four lanes for incoming and outgoing traffic
● Mattakuliya Center Road	AA	CMC	0.70	Asphalt laid, and consists of a minimum four lanes for incoming and outgoing traffic; and a center median intersection equipped with Traffic Signals
● Aluth Mawatha	AA	CMC	1.85	Tarred and consists of a minimum two lanes for incoming and outgoing traffic.
Srimath Ramanathan Mawatha	AC	CMC	**1.00**	Asphalt laid, and consists of a minimum four lanes for incoming and outgoing traffic intersections equipped with Traffic Signals
St. Anthony's Mawatha	AC	CMC	**0.30**	Asphalt laid, and consists of a minimum four lanes for incoming and outgoing traffic intersections equipped with roundabouts
N.H.M Abdul Cadre Mawatha - Sea Beach Road	AC	CMC	**1.10**	Asphalt laid, and consists of a minimum four lanes for incoming and outgoing traffic
Sir Baron Jayathileka Mawatha	AA	CMC	**0.63**	Asphalt laid, and consists of a minimum two lanes for incoming and

				outgoing traffic intersections equipped with roundabout
Janadipathi Mawatha	AA	CMC	**0.21**	Asphalt laid, and consists of a minimum two lanes for incoming and outgoing traffic; intersection either equipped with roundabouts
Galle Buck Road / Upper Chatham street	Not Known	CMC	**0.25**	Asphalt laid, and consists of a minimum two lanes for incoming and outgoing traffic
Chaitya Road up to Port Sub	Not Known	SLPA	**0.20**	Asphalt laid, and consists of a minimum two lanes for incoming and outgoing traffic

(Source - Field Notes and RDA defined road type classifications)

5.4.17. Road survey and observations:

The consultants surveyed the road sections to assess the road conditions as well as the type of by-roads connecting to the main road sections. The roadside structures including kiosks, shops, other service providers and dwellings were also observed. The roads cut across several intersections including small towns and major townships such as townships in Pettah and Fort. The trench will take to the Left Hand Side (LHS) of the Road in some sections, to the Right Hand Side (RHS) on several other sections and center median especially along the Mattakkuliya Center Road depending on the road profile. Approximately the stretch of the trench taking to its LHS is 9.37 Km, 3.1 Km to the RHS and 2.55 Km to the Center Median.

Generally, the vehicular traffic on all the above roads is heavy and traffic intensity varies depending on the quality of the roads and the roads' connectivity to other artillery roads. Heavy traffic and congestion can be seen on most of the main roads leading to Colombo (Pettah and Fort) through Aluth Mawatha and Janadipathi Mawatha. The traffic consists of passenger buses and cars and the goods laden vehicles, trailers and the container laden trucks as well as CPSTL fuel transporting bowsers.

Roads other than the CPSTL Terminal Road and the roads closer to the Kerawalapitiya Highway Intersection, have houses, kiosks, commercial entities (such as Banks), private hospitals, public and private schools, churches and Kovils (Hindu temples) located beside the roads, most of which have their main access to the road-frontage. Parapet walls, roller doors, and signages also can be seen on the the road corridors.

Road sections are also extensively used for the laying of service utility pipes. Telecommunication lines, water supply and distribution lines have been found underneath during the excavation of the trial pits. The Hekitta road and the CMC roads of Colombo DSD have already been congested with water supply and distribution lines, underground transmission cables of the CEB, sewerage lines and telecommunication lines.

The road sides are used for the parking of three-wheelers and for other purposes such as for merchandising. For example, the road pavements along the Sea Beach Road up to Pettah are used by the traders to park their vehicles. They have extended their merchandising area into the pavement in some cases. (However

this situation prevails only during the daytime). Pavements of some of the roads are well constructed but some do not have adequate service lines or pavement spaces. Several stream crossings (small Oya), the Kelani River crossing and several other small canal crossings, bridges and culverts could be observed along the route alignment.

5.5. Electric and Magnetic Fields (Non-ionising Radiation)

Electric and magnetic fields (EMF) are invisible lines of force emitted by and surrounding any electrical device (e.g. power lines and electrical equipment). Electric fields are produced by voltage and increase in strength as the voltage increases. The electric fields produced by the Project are prevented by shielding included in the cable construction.

Magnetic fields result from the flow of electric current and increase in strength as the current increases. Magnetic fields pass through most materials and are difficult to shield but decrease rapidly with distance.

The leading international body establishing standards for safe exposure limits to EMFs is the International Commission on Non-ionizing Radiation Protection (ICNIRP). The relevant current ICNIRP Guidelines established for the protection of humans exposed to electric and magnetic fields from power cables – which emit fields in the low-frequency range of the electromagnetic spectrum - are the ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz – 100 kHz) (2010)[37].

According to the ICNIRP, scientific data supports as few effects in people as possible. These are limited to the perception of surface electrical charge, the direct stimulation of nerve and muscle tissue, and the induction of retinal phosphates. Scientific evidence of other potential health effects is considered by ICNIRP to either demonstrate no indication of adverse health effects, or to be too weak to form the basis of the guidelines[38]. The 2010 ICNIRP guideline sets a reference level for general public exposure of 200 μT to avoid any of the scientifically supported health effects.

The power cables for the Project will be buried at a depth of 1.5m and the maximum magnetic field level will be experienced directly above the cable. Whilst the precise range of magnetic field strengths the Project would generate have not been modelled, in-field measurements of magnetic field strength from equivalent 220kV AC cables at a range of power loads (as magnetic field strength increases with electric current) have been carried out across the world. These have recorded magnetic field strengths (directly above cables) to be within the ICNIRP reference level for safe public exposure, with recorded field strengths a fraction of the reference levels. A study by EirGrid in 2014[39] of the magnetic field strengths of 220Kv underground cables on the Irish electricity grid recorded a maximum (at full load) of 26.01 μT, 13.01 % the 2010 ICNIRP guideline reference of 200 μT.

Potential health effects of EMF have therefore been scoped out of further assessment in this ESIA.

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[37] Available at: https://www.icnirp.org/cms/upload/publications/ICNIRPLFgdl.pdf

[38] refer to ICNIRP Fact Sheet on the Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz – 100 Khz) Published in Health Phys 99(6): 818-836; 2010 available at: https://www.icnirp.org/cms/upload/publications/ICNIRPFactSheetLF.pdf

[39] EirGrid Evidence Based Environmental Studies - Study 1: EMF. Literature review of electromagnetic fields (EMF) and human health, and an evidence base of EMF measurements from the Irish Transmission System (2014). Also available at: https://cms.eirgrid.ie/sites/default/files/publications/EirGrid-Evidence-Based-Environmental-Study-1-EMF.pdf

6. Consultation with Stakeholders

6.1. Key Stakeholders and their future involvement

The project requires stakeholder consultations to obtain their views, and suggestions for the power transmission project and to share project related information. Several key stakeholders were identified. Their interest in the project and how they will be further involved has been discussed in Table 23.

TABLE 23 KEY STAKEHOLDERS, THEIR STAKES & THE FUTURE INVOLVEMENT OF THEM IN RELATION TO THE PROJECT

Name of the stakeholder	Interest in the project	Strategy of involving them in the project
Ministry of Power	Responsible for the formulation of National Policy on power generation and supply. Cabinet approval should be sought for the project through the MOP	Should be consulted during all stages of the project cycle management.
CEB	CEB is directly responsible for the project implementation. It has the overall responsibility for design, planning, implementation and monitoring.	Establish the PMU and engage the E&S officer/s. Responsible towards all other stakeholders for information sharing and receiving required approvals. Responsible for selection and engagement of E&S staff by the civil contractor.
AIIB	As the project financier, AIIB will ensure proper disbursement of funds, timely completion of the project and ensure compliance with ESF policy	Need to be engaged through consultations on the preparation of the ESIA/ESMP, its implementation and continuous monitoring. To be engaged throughout the project construction stage by reporting of the progress on ESMP implementation through submission of progress reports.
Civil Contractor/s & the workers	Responsible for all civil works and compliance with E&S requirements as per the ESMP.	Should be engaged through the procurement process by binding the contractor to implement required E&S mitigation actions during construction phase. Should be held responsible for preparing supplemental management plans such as the traffic management plan and waste management planet. Contractor is expected to undertake community awareness programs prior to the commencement of civil works through their E&S staff. Contractor/s are also responsible for

		labor team management, maintaining occupational and health standards, timely completion of civil works, payment of compensation for damages, restoration of damaged properties etc.
Local authorities namely CMC & Wattala Pradeshiya Sabah	To ensure that road sections falling within their jurisdiction are not adversely affected by the project activities.	During the project planning stage these local authorities should be engaged in obtaining approvals (drainage permit) prior to the excavation work on the roads. Local authorities also should be consulted on matters relating to waste disposal and traffic management.
RDA / PRDA	To ensure that road sections falling within their jurisdiction are not adversely affected by the project activities.	During the project planning stage, RDA/PRDA should be engaged in obtaining approvals priori to excavation work on the roads.
Utility providers namely NWSDB, SLT, Dialogue	To ensure that their respective utility services are not adversely disrupted by the project activities.	They should be engaged by consulting them during the excavation of trial pits followed by the excavation of the trenches for laying the transmission cable. This is to ensure that their utility service lines are not disrupted during excavations, and for the expeditious restoration of the services in the case of such services are disrupted.
Divisional Secretaries of Colombo and Wattala DSDs	The road sections cross several GNDs of the Colombo and Wattala DSD. DSs have to be aware of the project and they need to keep the District Coordinating Committee informed of those development activities.	Should be engaged through information sharing, their involvement and support for the Grievance Management Committee, and to direct the Grama Niladharis to extend their support for community level coordination and community awareness raising programs.
Grama Niladharis of the project affected GNDs	GNs serve as the representatives of the DS when making decisions about property damages , felling trees and sharing information of the project with the public.	Need to share project construction schedule with the GNs through the DSs for public awareness programs. They need to be involved during community consultations and during the preparation of ESIA.
Sri Lanka Police Dept.	To ensure that project activities do not adversely affect the traffic movements and the public safety.	Need to share the traffic management plans (prepared by the contractor) with the respective police stations while soliciting their support for traffic management.

Residents beside the roads who will be directly impacted	To ensure that they are not adversely affected by construction related impacts such as dust, noise, vibration, access difficulties and disruptions to their utility services.	Should be engaged during the crack survey and during public awareness meetings and information sharing. Should be provided with a mechanism to get their feedback on designs, construction methods, and grievance reporting.
Business entities beside the roads who will be directly impacted	To ensure that they are not adversely affected by construction related impacts such as dust, noise, vibration, access difficulties and disruptions to their utility services.	Should be engaged during the crack survey and during public awareness meetings and information sharing. Should be provided with a mechanism to get their feedback on designs, construction methods, and grievance reporting.
Civil Society Organizations	To ensure that the developer complies with required CEA regulations during construction stage.	Should be engaged during public awareness meetings.
Pedestrians, and vehicle users,	To ensure that they are not inconvenienced by project activities.	To prevent any inconveniences, they should be informed of the traffic plans, show the directions to the de-toured lanes with sign boards and safety measures needed. Their grievances should be addressed by the contractor.
Sri Lanka Ports Authority	Only if the route alignment is planned through the SLPA premises	If the CEB decides to reroute the pipe laying path through the SLPA, it is necessary to obtain approval from the SLPA. They should be engaged in discussions before such a decision is taken.

6.2. Consultation with the stakeholders:

During the preparation of the ESIA, key stakeholders were consulted at the early preparation stage of the report and at its subsequent revision stage port. The first round of consultation took place during 2021 whereas the recent consultations were carried out in early 2024. During the second stage of consultations, the Divisional secretaries, relevant Gram Niladharis and the officials of the NWS&DB and CMC were consulted. A summary of stakeholder discussions is provided in Table 24. Additional photographs are provided in Annex 12.13 (Fig 52 to Fig 65)

TABLE 24 DISCUSSION POINTS IN SUMMERY

Meeting Participants and the dates	Key points discussed
Consultation with the officials of the AIIB – 3 virtual meetings. Consultations with the AIIB official took place during February 2024. The need for updating of the ESIA report was discussed.	➢ Consultants' views on the observations made during the inventory and the progress of the ESIA ➢ Stakeholder Consultation (the need for meeting with the utility providers) ➢ Social issues focusing on the ongoing road widening work along Aluth Mawatha ➢ Clarifications on how to deal with Associated Facilities; ➢ Clarifications on how to deal with Alternative Analysis; ➢ Timelines for the submission of drafts of the ESIA; ➢ Impacts of construction work on the road side dwellings and how to deal with such situations ➢ Stand on the need for a Resettlement Plan ➢ Arrangements made for reviewing of the document (appointment and introduction of the reviewer) ➢ Need for updating of the ESIA report based on the comments by the AIIB E&S Experts.
Meeting with the CMC- Eng. R.A.M.C. Ranasinghe (Deputy Director Engineering (CRMU) on 02.03.2021 (See Annex 12.13 for photos)	All the roads to be impacted by the project within Colombo DS Division are the roads maintained by the CMC. Presently, the road parallel to the Colombo Harbor (including Srimath Ramanathan Mawatha, St. Anthony's Mawatha and N.H.M Abdul Cadre Mawatha - Sea Beach Road) is heavily congested with vehicular traffic and due to the large commuter population. CMC is constructing the road with culverts and the pavement. The St Anthony's church is a historically and culturally important place for Roman Catholics as well as for Buddhists and Hindus who come there to make vows. Clipping the cables to the beams of the proposed Port Access Elevated Highway Project is a more technically and economically feasible option which can be explored in consultation with the RDA. Such an intervention would save construction time and avoid adverse impacts such as high noise, dust, vibration and inconveniences caused to the traffic and road commuters, etc. associated with trenching works. Furthermore, it will be easier for the CEB to attend to repairs and maintenance works if the cables are clipped to the elevated highway. With reference to construction and demolition wastes, Contractor should be given the sole responsibility to manage it in a responsible manner. The CEB must ask for a Spoil Disposal

Meeting Participants and the dates	Key points discussed
	Plan and ensure that disposal sites are not located within or close to environmentally sensitive areas and ensure that the Contractor has obtained necessary approvals to dispose excavated and demolished material to a particular site/s. Safety is a very crucial issue and the Contractor under the supervision of the CEB must ensure that all works are done in a safe manner (without creating unsafe conditions for workers, and road commuters, etc.). The safety measures adopted by most local Contractors are very unsatisfactory.
Meeting with the CMC- Eng. Ms. Nirmalee Perera and Eng. Mr. KDT Kuruppu of CRMU held on the 4th April 2024 . (See Annex 11 for photos)	Recalled that there had been a previous meeting on the same and mentioned that the CRMU is well aware of the CEB proposed cable laying project. CRMU requested for the trial pit details from the CEB and also asked the CEB to submit a fresh application for drainage clearance. The CRMU officers are of the view that in view of the considerable space that is needed for underground cabling, the CEB to ensure that CEB cable laying be on one particular side so that other development activities can be accommodated with ease. Since some of the sections of Aluth Mawatha will be improvised by the RDA, CRMU asked the CEB to coordinate with the RDA to lay the pipes before RDA completes the road work. CEB is also to consult with other CMC divisions such as the waste management division and the traffic division and prepare an excavation plan in consultation with them. For that matter CRMU recommended that there could be a meeting convened by the Deputy Municipal Commissioner, Engineering immediately before the start of the project's excavation work at which all the relevant representative officials of the CMC can take part. CRMU also recommended that the utility services such as the Water Board be informed well before the excavation work. Regarding road reinstatement of the roads after the pipe laying, the CRMU Engineers said that the reinstatement work by the Contractor should be carefully monitored and that specifications should be adhered to. In the case that the contractor is unable to achieve the required standards, a separate contractor be assigned to do the reinstatement work.
Meeting with the Divisional Secretary (Mrs. P.D.T.C Rajika) and Grama Niladharis of Wattala DS Division - See Annex 11 for photos)	DS requested CEB to make a written submission through her which could be presented to the District Development Council (DDC) Meeting prior to the implementation of the project. She also agreed to arrange the CEB officials and the consultants to meet up with the relevant GNs.

Meeting Participants and the dates	Key points discussed
GNs who were present at the meeting: ● Mr. Pradeep (0772107966) ● Mr. H R S Fonseka (0724376954) ● Mr. V I Kumarage (0775377922) ● Mrs. Indika Wimalaweera (0715866221) ● Mr. P S M Disanayake (712782107) ● Mr. Sameera (0771360170) ● Mr. Ranjith Chandrasekara (071874076)	The DS has no objection to the project. However, as the traffic is very heavy along the roads in question, construction work should be expedited on a staggered basis. The DS inquired whether the roads need to be closed. CEB officials explained that the work will be carried out during the night time and thus, the need for road closure will not arise. The meeting with the GNS was held on the 10th of March 2021 at the auditorium of the DS office. 07 GNs were present together with the DS and the GN (Administration). GNs were presented with the roads on a map and they verified the number of GNDs that cut across the TL. GND officers are optimistic of the project since the construction works would be done during the night time and the following morning upon placing of ABC material, a steel sheet would be laid over this material to allow traffic flow. - GND officers suggested that Contractors must take full responsibility for safe transport and disposal of the excavated material. - Kalu Ela is not connected to the Hamilton Canal. It facilitates drainage of rain water and is a recipient of untreated sewage and untreated industrial effluents from various factories. - Kalu Ela does not cause floods to the ASP Liyanage Mawatha during the rainy seasons, except for the low-lying culvert areas. - There are no sites or areas that are of archaeological, historical or cultural importance (places / sites protected by the Department of Archaeology) within the proposed routes (in the immediate vicinity).
Meeting held on the 3rd April 2024 with the Divisional Secretary of Wattala DSD (Mrs. P.D.T.C Rajika), the Assistant Divisional Secretary (Ms. H I Sandamali, Mr. ADP Ranjith (Admin GN) and following Grama Niladhari officers of Wattala DS Division - See Annex 11 for photos) : ● Mr. APN Fernando (GN Hekitta) ● Mr LSD Perera (GN Hendala South & North)	The GNs who were present at the previous meeting held in the year 2021 recalled the project and said that the traffic along those roads have been tremendously increased in the morning hours. They wanted a clear excavation schedule just prior to the commencement of excavation work in order to keep the community members informed of the possible difficulties. The GNs requested an allowance to be paid for them to arrange community awareness work.

Meeting Participants and the dates	Key points discussed
• Mr. H R S Fonseka (GN Balagala) • Mrs. Indika Wimalaweera (GN Kerawalapitiya) • Mr. DSMD Dasanayake (GN Nayakanda North) • Mr. T G K Silva (GN Kerawalapitiya North)	
Meeting with the Superintendent of Works Mr. Themal Rajapaksa– Wattala Pradeshiya Sabha – 19.02.2021 (See Annex 11 for photos)	The Roads at Kerawalapitiya have been vested with the RDA for improvement. There is no objection for the cutting of trenches along the roads maintained by the Wattala Pradeshiya Sabha.
Meeting with RDA Executive Engineer (Eng. Ishara Fernando) & Eng. Nashadi Jayatilleka, Negombo (Contact Nos 0718264394 & 0711335537) (See Annex 11 for photos)	Only two road sections of the underground transmission route will be under the RDA, Negombo Office. Those sections are Hekitta Road and Hendala Road. The road section covering the Kerawalapitiya intersection is maintained by the Road Maintenance Unit of RDA head office. Formal request in writing should be made to obtain the necessary approval from the RDA. Nevertheless, there is no objection by RDA for this development. The roads are falling under RDA road Classification of category 'B' and they are 7 m wide roads with 2 lanes. The required compliances by the contractor during construction and during road reinstatement will be incorporated into the agreement. Some of the conditions will be that: • Night time illumination; • Traffic Diversion Plan • Material storage plan (which should indicate that material will not be stored alongside the carriage way) • Depth & Shoring • Road reinstatement which will be monitored by RDA Technical officer; RDA Engineers mentioned that underground pipes will be laid in the future along Hekitta Road both for water and Gas distribution. No other developments work is proposed for other RDA managed roads such as Hendala Road..
Meeting (on the 8th April 2024) with the Divisional Secretary (Colombo DS Divisions) Mr. Sandaruwan and the Administration Grama Niladhari, (Mr Wijerathna, the GNs	The DS informed that there should be strong community awareness needed in view of the large number of residents living very close to the road sections. There will be 09 GN divisions in total, where the GNs should actively participate just before the excavation work is undertaken.

Meeting Participants and the dates	Key points discussed
of Fort, Aluth Mawatha, Kotahena West.	They should be given a schedule of excavation enabling them to hold meeting. It was also noted that a large number of government institutions are located in this area and that such government institutions should be made aware of the excavation work. GNs requested stipend for their involvement to carry out community awareness programs.
Meeting with Assistant DS Colombo DS Division (2021) – (See Annex 11 for photos)	Residents on either side of the main road in this GN Divisions have been impacted by various development projects in the last 05 years. There is hardly any space underneath the main roads now as several pipelines and utility services are already laid, the recent been the water supply pipe lines laid by the NWSDB.
Engineer (Mr.) Randima Sachitra of the Mattakkuliya Area Engineer's office of the NWS&DB 3rd April 2024	• They had completed laying of 1,200, 1,100,,1,000 and 900 Diameter water supply pipes along Aluth Mawatha • Will shift the pipes to the edge of the road when the on-going demolition work by the RDA will be completed. • Their maintenance staff will be available throughout the day and night if any urgent maintenance work will be necessary. • All operational and maintenance work covering the areas of Colombo 12, 13,14 and 15 (part) is carried out through this office.

6.3. Meeting with representatives of the residents and vendors:

A community consultation meeting was held at Wattala DS Office chaired by the Divisional Secretary and was attended by the relevant Grama Niladharis, representatives from the residents of several of the roads namely Kerawalapitiya Road, ASP Liyanage Mawatha and Alwis Town Mawatha. The meeting was attended by the engineers of the CEB as well and the ESIA consultants. At the outset, the engineers explained the proposed project and showed maps indicating the cable laying route. The participants appreciated that CEB had arranged this meeting to inform them about the project.

Following concerns were raised by the participants:

All the community representatives expressed ignorance of the project and said that they had no previous knowledge that power transmission cables being laid underneath the ground except the fact that they had witnessed road development work and water pipe laying projects previously. Therefore they said that they were unable to think of any impacts of such projects. (However, among the participants there was one civil engineer who was well versed with the road excavation work for pipe laying works. He contributed to the discussion with several comments and concerns)

In view of the canal flowing on the left side of the ASP Liyanage Mawatha, the residents noted that the trench excavation could result in extensive water seepage that has to be dewatered. They were of the view that any dewatering could affect the close-by structures as they are already built on the reclaimed peat soils. The residents suggested that it was best not to excavate a trench but to lay the cables underneath the canal bed or along the gabion wall on the edge of the canal. Alternatively, since there was already some plans to construct a jogging track along the canal edge in the future, it was best to lay the pipes underneath the jogging track.

One of the residents suggested that a few samples of soils to be tested through NBRO, along this stretch before excavation in view of the possibility that the excavation could lead to land subsidence / erosion as the soil is considered to be peat and that the soil is fragile on the sides of the canal.

It was also mentioned that the canal was overflowing at several points during the rainy season and that by 4.00 pm onwards there could be always high tide. Contractors should be well aware of these tidal behaviors.

Excavation work if coincides with school time could lead to a heavy traffic congestion along ASP Liyanage Mawatha due to the road side parking of the more than 3,000 vehicles that drop and pick students to and from the Lyceum International School in the morning and in the afternoon.

They also warned that there is a water service line already laid on the same side of the road (ASP Liyanage Mawatha) and that if excavation work damaged it, the community members could be affected seriously.

With regard to the crack survey, the residents opined that the suggestions to pay compensation for any affected structures had not been practically possible as the civil contractors had never complied with such requirements before. Therefore, it was suggested that such houses shall be insured enabling the house occupants to make any claims from the insurance company. According to them all structures within 10 m from the ROW of the cable should be insured.

As far as Kerawalapitiya Road was concerned, the residents said that work could be undertaken but such work should be carried out as quickly as possible in view of the heavy traffic along this road. Especially, the Contractor should be advised to make temporary access arrangements to the houses which are located on the road frontage enabling them to move their vehicles in and out. Similar previous work had caused immense difficulty, according to them, as some households had to be confined into the houses due to the failure by the contractor to arrange such temporary access.

Residents along Hendala Road mentioned that they were well aware of how the contractor behaves during road construction work, based on the ongoing work on the Hekitta Road. They said that the contractors do not pay any attention to the environment or mindful about the residents at all. When the road work was on going, water services were disrupted for several days and no alternative arrangements were made to provide water services to the residents. There was no payment of compensation to affected houses or structures along the Hekitta road and some of the kiosks and small retail shops were kept closed for several days due to the construction work.

For grievance redress, the residents suggested that active members from among the residents should be included in the committees which look into the grievances. They also wanted further meetings with the contractor just before the excavation work takes place.

Responding to the above concerns, the CEB engineers and the ESIA Consultant explained that the Contractor will be specifically advised to comply with the relevant laws and best construction practices. As far as the soil tests are concerned, the CEB Engineers said that such tests will be carried out at the time when the trial pits are excavated. CEB engineers also mentioned that since work is expected to be carried

out in the night hours, traffic related issues can be avoided. Excavation along the ASP Liyanage Mawatha will be undertaken with more care in view of the canal and its residential surroundings. The Social Consultant also carried out several consultation meetings with residents living along Aluth Mawatha. Following are the major concerns raised by the respondents (Table 25) .

TABLE 25 DISCUSSION POINT IN SUMMERY WITH SHOP OWNERS AND HOUSE OCCUPANTS

Shop Owner: P S Ranjith	The proposed cable laying project is a government project and we cannot stop that. However, the excavation work of the road and the pipe laying should be carried out soon. As you see, the ongoing drainage improvement project had caused so much of difficulty to us as some of the work is partially completed. There are pits which were not reinstated. Some of the materials are kept on the way side and customers get injured very often. Your contractors should be asked not to repeat those mistakes. Also, this section of the road is narrow and that vehicles ply both directions. Any excavation in the middle can cause disruptions to the vehicle movement. The residents living on the sides of the road have small children in their families. They verify often cross the road and their safety should be ensured by closing the trenches temporarily until the road is reinstated. I do not need to close the shop as the work on the road does not affect me.
Fish stall owner- Anthony Camillus	I operate only from morning till evening, and I have no issue with this construction work as the work will be carried out only in the late evening till dawn. There are about three fish stalls along this stretch, all of them are closed by evening.
Lottery ticket vendor- S P Maria Pilomina (Ms.)	I will be able to shift this stall to another place, if work is going on in this section. I sell lottery tickets between 6.30 am 3.00 pm. And my target is to sell about 300 tickets a day. I have no issue with the road construction work. I do not want to cover my stall with polythene sheet since it will cause visibility problems.
Owner of the plastic waste collecting center_ - S P T P Silva	I need to transport my daily collected plastic wastes from this stall to the yard in my lorry. If the road is excavated, I need a suitable temporary arrangement with an iron plate laid on the trench to move my vehicle. Sometimes the road widening work will also be started very soon. In that case both sides of the road will be widened to align with the rest of the Aluth Mawatha. This section is narrow and any work on this section can cause traffic congestion.
Three wheeler operators S Jeevan (QU 6178) W Amila (HN 7733) Balachandran (ABR 5913)	This is called Aluth Mawatha RB Watta Turning Junction Three Wheel Park. We have at least 15 three wheelers parked here. There are two other parks beyond this point along Aluth Mawatha. Some of the three wheelers operate during the night hours. There are several cross roads/lanes in the area and we are travelling along those roads very often. If the road is going to be excavated to lay pipes, it is good if the work is completed soon. If the contractors cannot restore the road let them put some temporary iron sheets over the trenches for us to turn to the lanes and by roads. During the construction work we can park inside the lane, if the road side will be busy with construction vehicles. We may not lose income but after a long period of time, we start running only now and therefore, please allow us to do our job.

6.4. Informal Discussions with the road side vendors

During the revisits to the roads for observation there had been several informal discussions with road side vendors. The discussions were centered around how they could be able to survive during the road construction period. Following (table 26) presents some of their views:

TABLE 26 VIEWS OF THE ROAD SIDE VENDORS DURING INFORMAL DISCUSSIONS

Name/contact no. and occupation	Comments made by them
Vegetable vendor having his vegetable stalls using the unpaved corridor of Aluthmawatha	Although we have a large vegetable stall, we can move this if there is construction work. Large number of people gather here to buy fresh vegetable at cheaper price. We have not got any approval from the RDA or the CMC for this stall. But if you give us notice of two to three days we can shift. We request you to allows resume our business as early as possible. o
Coconut vendor (male) selling young coconut along Chatahm Street using a cart.	We are selling coconut (young coconut and King Coconut) by being on the road side at Rs. 200/- to 250/- a nut . Since there is strong urge for the consumers due to hot temperature, there is a big demand. We can shift this cart from place to place and we have no issue if there will be road construction. .
Leaf vegetable (Kankun) seller along Kerawalapitiya Road.	This is my permanent place. But still I can move if you want me to move. I sell this at Rs. 80/- a bunch. I have only 40-50 bunches a day. In the morning I can sell around 30 . But in the afternoon there is less sales. I cover the leaves with wet gunny bag during the day time. If there is no dust I have no issue. Since I have no any other place to
Lottery sellers having his stall along Aluthmawatha	We have lost daily income significantly as the price of a lottery is now doubled and that people are reluctant to buy lotteries. A lottery which was sold at Rs. 20/- a ticket is now being sold at Rs. 40/-. We can shift the stall temporarily to other location.
The women vendor selling Jak located near the canal crossing along Aluth Mawatha.,	Told that the kilo of Jak fruit (matured) has to be now sold at Rs. 300/- or 350 a kilo whereas the price was previously only Rs. 50-75/-. The outcome of this price escalation has been that when the consumers do not have enough money in hand, they opt not to buy Jak and opt to have cheaper vegetables. There is no disturb to our work if there is any construction work as I can move from one place to the other. But I prefer to stay here as my known customers come to me.
Fruit vendor selling several types of fruits (Papaya/banana) on the road side along Aluth Mawatha using a mobile van	I have to finish this fruit stock within two to three days otherwise I will lose my money. Before the fruits overripe I have to sell. But I have no problem you use the road for construction. I can move to any other place. Fruits are expensive specially Papaya now a days as there is a shortage. We sell papaya at 29/- per 100 grams.

7. Environmental and Social Risks and Impacts

This chapter provides a comprehensive appraisal of the project's impacts on the existing environment and socioeconomic conditions. A detailed method statement explaining the impact assessment is provided in Annex 11.4.

7.1. Positive Impacts

In the long-term, the project will overall contribute to enhancing the reliability of power supply and meeting the growing demand for electricity from planned development activities in the Colombo Port City and the peripheral areas of Colombo . The project will also provide employment opportunities to several skilled and unskilled workers during its construction period, particularly for those from local communities which can contribute to enhance their household incomes. . The social and environmental risks and impacts that are likely to arise during the construction phase can be mitigated through application of best construction practices and implementation of environmental and social mitigation measures. There are no adverse irreversible risks or impacts.

7.2. Negative risks & impacts

The project area falls within several road sections which are densely populated with the presence of a large number of residential and business units on either side of the roads. These sections of the roads are also congested with heavy traffic especially during week days. Due to the laying of the UG/TL along the road network, there could be significant but reversible adverse social, health, safety and occupational risks and impacts as well as on the physical environment.

7.2.1. Environmental and social impacts during the pre-construction phase

7.2.1.1. Excavation of trial pits

The contractor is required obtaining dredging permits from the CMC for any excavation of trial pits and is also obliged to inform the other public utility providers of the time schedule for excavations. During the excavation of the trial pits there is the probability that noise could impact on the residents and others living closer to the roads and, dust could pollute the air as well as the residential and business places. Dewatering can cause visual pollution and the spoils if not disposed can cause health and traffic impacts. There will also be impacts on the traffic if detours are arranged to avoid any interferences with trial pits excavations. Excavation for trial pits also can disrupt the other service lines. The impact will be temporary, and reversible and is not severe.

7.2.1.2. Disruptions to access path

Access to residential dwellings, commercial establishments and other public institutions can be temporarily disrupted during trial pit excavation work causing inconveniences to the residents, business operators and the public

7.2.1.3. Improper use of temporary land obtained for construction activities

If the land leased/rented by the contractor to store construction materials is not properly managed, and contractual obligations are violated, such situations may lead to conflicts between the contractor and the land owner/s. Moreover, improper storage can cause blocking of drainage paths leading to siltation, erosion and adverse impacts on the neighboring lands. Incidences of theft and vandalism too may occur if proper security arrangements for stock yards are not provided

7.2.1.4. Mismanagement of labor camps and facilities .

If the temporary labor camps and their associated facilities set up for the contractor's labor teams are not properly managed, it can cause environmental issues such as disposal of waste water and solid waste, mosquito breeding, spread of diseases, and conflicts between the contractor staff and the host communities.

7.2.1.5. Lack of community awareness:

If the communities living around the project area e.g. residents, business operators, public authorities, custodians of religious institutions etc. are not adequately informed of the potential impacts of the project, they can raise objections to the project especially when their accesses are disrupted, , and they are inconvenienced by dust and noise emissions and vibration during project construction phase. Disruptions to access will increase the risks to households during emergency situations such as taking their sick family members for medical care.

7.2.2. Environmental and social Impacts during the Construction Phase

7.2.2.1. Air pollution due to dust

Generally, there are 2 key environmental aspects that will cause air quality deterioration during construction works.

1. Fugitive dust emissions
2. Emission of gaseous pollutants from the exhaust of vehicles and machinery servicing the construction activities[40];

However, no significant dust emissions are expected from areas proposed for HDD works.

The, fugitive dust emissions are generally anticipated from areas proposed for open cut trenching works (where trial pits would be done too) due to the following activities and the impacts will be high during daytime.

- Demolition of road surfaces
- Trench excavation activities
- Transportation of removed asphalts and spoils from work areas

[40]The gaseous pollutants emissions are SO_2, NOx, CO, hydrocarbons, etc.

- Spills and emissions from fill and bedding material and dust emitting construction material (such as ABC material) delivered by uncovered or improperly covered tippers
- Backfilling operations using fill and bedding material and ABC material
- Uncovered spoil (excavated material) heaps[41] and removal / transportation of spoil by uncovered or improperly covered vehicles
- Uncovered construction material heaps such as metal aggregates and ABC material[42]

Such fugitive dust emissions are largely SPM (particles having size up to 100 µm) as well as PM_{10} (particulates having an aerodynamic diameter of < 10µm) more than $PM_{2.5}$ (which are mostly anthropogenic in source such as vehicular pollution and industrial chemical emissions, likely to remain in the atmosphere for longer distances from their source and have a more damaging impact on health). SPM and PM_{10} have large settling velocities and comprises of mostly natural and organic particles due to disintegration of soil or mechanical processes such as grinding) (Becket et al., 1998; Sternberg et al., 2010).

Vehicles traveling at high speed would further escalate dust settled on the road. During the past, dust had been a major issue in many of the project sites (example, Hekitta Road and certain stretches of the Aluth Mawatha) due to the high traffic and past projects undertaken by the RDA and the NWSDB. It is noted that most of the RDA and NWSDB projects are now completed[43], except that some existing distribution lines in the Aluth Mawatha will be relocated or shifted by the NWSDB once RDA has started demolish the remaining buildings for subsequent road expansion works (further demolition of some existing structures for subsequent expansion of the remaining sections of the Aluth Mawatha is expected to be carried out by the RDA.

Therefore, the cumulative impacts of PM_{10} with $PM_{2.5}$ (largely from the heavy vehicular traffic) and uncontrolled dust emissions (together with some high noise and vibration too) from the construction works will drastically burden the surrounding community if source correction methods are not well implemented. It is noted that the sensitive recipients listed in Table 23 (though not located close to the project site within 5 m, but depending on the prevailing wind conditions) will be at risk from high dust exposure if works are done during daytime (provided source correction methods taken are inadequate during the dry weather conditions and other planned projects are also occurring at the same time). Dust levels (especially the SPM and PM_{10}) may get elevated (PM_{10} levels) and may exceed the CEA stipulated limits as discussed in Chapter 5 of this report.

[41] Sandy material (63-2000 µm in size) are less air-borne, whereas clay or other fine material (particles < 63 µm) could generate more dust during hot, drier / less humid and windy conditions. In material such as clay upon exposure to sunlight a water deficit develops near the surfaces and volume reduces causing shrinkage and subsequent development of cracks and fissures. This in turn produces firm, air-borne particles.

[42] Uncovered spoil heaps (if not removed) and construction material can also pose a nuisance to pedestrians in addition to acting as sources of dust during hot dry weather conditions.

[43] As per the discussions had with Eng. P.V. Sachithra Randima (Area Engineer of the NWSDB – Mattakkuliya on 11.05.2024).

7.2.2.2. Impacts of dust emissions on the residents / small-time vendors and other Public receptors

Dust pollution impacts could be significant / high (though sporadic in nature) when the works are carried out on public holidays (during drier, hot and windy seasons). A list of public receptors is provided in Table 27. They are religious places, which can be impacted due to dust as these places become crowded during weekends and evenings. There are also festive seasons such as annual church feast at which people congregate. Besides those close by residents and those who are engaged in small scale business activities, three wheeler drivers and passersby can be exposed to high dust levels (especially when exposed to long durations) if stockpiles of aggregates and spoils are stockpiled in the road side after excavation work.

Prolong exposure to dust can cause asthma and other respiratory problems (elderly persons and those already suffering from respiratory problems would be at higher risk of getting respiratory problems). PM_{10} (< 10 µm aerodynamic diameter) can pass through to the upper respiratory system (respirable), but the finer / smaller particles less than 2.5 µm could reach more deeper in the respiratory system.

Also, deposition of dust on nearby properties (e.g. clothes, furniture, vehicles) depending on particle size, wind speeds, direction and obstacles (to intercept / trap and absorb the particulates) can cause a public nuisance too. Smaller the particles (lower the settling velocities) can travel further.

Dust generated during the night time[44] (10 pm to 6 am the following day) works (which will be very frequently done in most sections of the 15.6 km trace due to the heavy traffic during daytime, to avoid inconvenience to road commuters and occurrence of residence areas), will be less due to the following reasons.

- Night times in general are relatively cooler compared with day time and hence residence time of particles will be less during relatively cooler periods with high humidity due to washout (Becket et al., 1998; Sternberg et al., 2010)
- Moisture / dew deposition on surfaces would lead to less dust emissions (traveling less distances) during demolition, excavation and backfilling works.
- It is expected that many nearby residents have closed their doors and windows during the night time working hours, hence dust impacting the health of the people and depositing inside houses, etc. is not very high.

TABLE 27 SENSITIVE RECEPTORS THAT MAY BE EXPOSED TO DUST

Road Section	Trenching Method	Probable Alignment	Sensitive recipient
Chaitya Road up to Port Sub	Open Cut	Middle of the Carriageway	Sambhodhi Chaitya
Sir Baron Jayathileka Mawatha	Open Cut	RHS of the carriage way	Sri Bodiraja Buddhist Temple
St. Anthony's Mawatha	Open Cut	LHS of the carriage way	St Anthony's Church (a culturally and historically important church for Roman Catholics of Sri Lanka and people from other religions such as Buddhism and

[44] CEB confirmed that the work will be carried out along 15.6 km of the stretch during night times and not the only areas affected by heavy traffic.

			Hinduism. It is located opposite to the exit / entry point of K.B. Christy Perera Mawatha;(6.94674 N & 79.85669 E)
Srimath Ramanathan Mawatha,	Open Cut	LHS Left hand side	Kali Amma and Siva Kovils (6.94744 N & 79.85658 E) & Foreshore Police Station
Aluth Mawatha	Open cut	Right hand side (RHS)	Buddhist Temple on Left hand side (LHS) Sampath Bank branch office on RHS (6.96637 N & 79.87121E)
			Seylan Bank branch office on RHS (6.96365 N & 79.86845E)
			Jesus Lives Church
			St. James Church (Church of Mother Expectation) LHS (6.96568 N & 79.87044 E)
			Global Kids Pre-School on LHS opposite to AFC Leasing/Susila TVS/Alliance Finance
			Cambridge School of Colombo on LHS opposite the parapet wall of the Colombo Port
			Christ Church Mutwal (6.95308 N & 79.86079 E) on LHS (first Anglican Church in Sri Lanka founded in 1852)
Mattakkuliya Center Road	Open Cut	LHS of the carriage way	No. 93 Pre School (Pure Little Hearts) Opposite to the road is Cargills Food City (6.96568 N 79.87044 E)
Hekitta Road	Open Cut	Middle of the Carriageway	Hindu Kovil (No impact as work is completed
A.S.P. Liyanage Mawatha	Open Cut	Middle of the Carriageway	Lyceum International School (6.98583 N and 79.8869 E)
Alwis Town Mawatha	Open Cut	Middle of the Carriageway	No significant number of public receptors
Hendala Road	Open Cut	Middle of the Carriageway	MOH office Sampath Bank Wattala Pradeshiya Sabha Office
Kerawalapitiya Road	Open Cut	Middle of the Carriageway	St. Joseph Primary School with St. Joseph Church (7.01055N and79.88665E) & Vidyaloka Maha Vidyalaya (7.00587N and 79.88661E)

7.2.2.3. Impacts of construction noise

Construction works generate high noise (though not continuous) – a direct, but a short-term impact. Excavation of trenches will require removal of asphalt, using breaker machines and backhoes that will generate high noise levels. Loading and unloading of materials, spoils, and pipes can generate noise. Table 29 presents the noise level generated by construction machinery used for different purposes.

The noise levels will well exceed 75 dB (A) and 50 dB(A), which is the maximum allowable limit during daytime (6 am to 9 pm) and night time (9 pm to 6 am the following day) respectively for construction works (i.e., at the boundaries of the land in which the noise source is located) as per the National Environmental (Noise Control) Regulations No. 01 of 1996 under the National Environmental Act No. 47 of 1980 (as amended) enacted by the Central Environmental Authority (CEA).

Noise levels would also exceed 63 dB(A), which is the maximum allowable limit during daytime (defined from 6 am to 6 pm) and 50 dB(A) (maximum allowable limit during night time; i.e., from 6 pm to 6 am the following day) for Urban and Municipal Council areas (i.e., within the boundaries of the noise source) as per the National Environmental (Noise Control) Regulations No. 01 of 1996. Noise levels will also exceed 55dB(A), which is the maximum allowable limit during daytime (defined from 6 am to 6 pm) and 45 dB(A) (maximum allowable limit during night time; i.e., from 6 pm to 6 am the following day) for rural residential areas / Pradeshiya Sabah areas (i.e., within the boundaries of the noise source) as per the same Regulations.

Although, noise attenuation is expected with distance from the generating source/s, machinery, etc. they are not under continuous operation, recipients that are closer to the noise source/s will be at high risk from noise induced impacts. High noise and vibration will be an issue if not controlled (despite undertaking the works during night time). It has to be noted that during the planned working (night) times, there is little or no vehicular traffic, hence construction noise > traffic noise (no masking of construction noise by traffic noise, which is generally expected during daytime).

For example, at A.S.P. Liyanage Mawatha, Kerawalapitiya Road, Alwis Town Mawatha there are more residential units (compared with commercial establishments) with their parapet walls and gates / entrances located very close to the road. Similarly, at the narrow section of Aluth Mawatha, there are more houses (appears to be houses of low-income households compared with the ones at A.S.P. Liyanage Mawatha) with their entrances and walls located by the side of the road.

This can cause disturbances to the neighboring community. Since much of the work will be carried out during night time, there could be disturbances to sleep and can lead to agitations by the residents, if noise is not controlled. Noise levels will exceed the CEA stipulated limit of 50 dB(A) for night time construction works; see Table 28).

NBRO report has already shown that existing residual noise levels at night time are higher than 50 dB(A) (CEA stipulated limit for night time construction works), while suggesting to use low noise activities during night time (see Annex 12.7). Since night time works are largely planned due to heavy vehicle traffic during daytime and to avoid inconvenience to road users, serious consideration needs to be given to noise source suppression measures during night time (to be discussed in Chapter 8 of this report).

TABLE 28 NOISE LEVELS EMITTED BY CONSTRUCTION MACHINERY

Machinery and Equipment-	Purpose of the machinery/equipment	Noise Levels in dB(A)
Breaker machines (70 kg – electric powered)	Required for demolition of structures	88-98
Backhoes	Backhoes may be needed for the land clearing and excavation works, to lay HDPE pipes and for backfilling	85-112 (variable depending on engine size)

Dump Trucks (Tippers) and ready mixed concrete trucks	Dump trucks: For delivery of fill material and other construction material, labor gangs and equipment such as emergency generators and poker vibrators. Also for removal / transportation of spoil Ready mixed concrete trucks / pump mixers to deliver concrete required for the protective layer and Fluidized Thermal Backfill (Grade 10) material	Variable in the range of 83-93, depending on the type / engine specifications
Boom Trucks	Required to deliver HDPE pipes	
Compactors (rollers)	2-ton rollers will be used	75-105
Poker vibrators	For effective consolidation of poured ready mixed concrete -	70-113
Compressors	-	85-109
Emergency generators	-	75-83
Submersible water pump - (diesel) 4-inch diameter	These items will be used for dewatering of excavated trenches if rainwater is accumulated during the rainy periods	68-71

(Source: Nathanson, **2008)**

7.2.2.4. Impacts of Vibration

There are no rock blasting activities using explosives, when cutting open trenches due to absence of rocky outcrops in the project sites and hence HDD works will be undertaken where necessary. HDD works also do not generate significant vibration.

However, excavation of the trenches will involve the removal of thick tarred (asphalt) surface of the roads which need to be cut using heavy machinery (asphalt cutter). Further when compacting the trenches with soils, vibrators will be used. Construction vehicles such as tippers and ready mixed concrete trucks[45] and certain machinery such as backhoes (required for areas proposed to have open trenching methods for cable laying) and 2-ton rollers will generate some significant vibration (a direct, short-term impact due to the construction works) which will attenuate with distance.

Along Aluth Mawatha, there is a stretch of the road on its right, which consists of Kabok surface. This could be demolished only during the road widening stage and not under the construction activities of this project.

[45]Such vehicles could generate peak particle velocities (PPV) of 1.93 mm/sec at a distance of 24.6 ft (7.5 m) (USEPA unpublished data)

Vibration can cause cracks on the parapet walls, dwelling structures and there is the possibility that dwellers complain of such cracks as a result of construction work, if they are not detected well in advance. Nearest structures including parapet walls of households and commercial properties will be at risk of vibration induced cracks / damages (but depending on the type / condition of the structures and the nearby soil types – ground-borne vibration is high where the soil profile contains more sand or clay compared with lateritic soil) and even cause discomfort to persons living in the immediate vicinity largely due to operation of backhoes (for excavation and backfilling works) and rollers (for compaction).

Inconvenience to occupants in buildings is of concern, especially in residential areas (during night-time). For example, in Kerawalapitiya Road, Alwis Town Mawatha, A.S.P. Liyanage Mawatha and Aluth Mawatha, the parapet walls of households and commercial properties with their gates / entrances are located very close to the road. The impacts of vibration on the existing structures are a possibility in case where the roads are narrow and that trench and the distance to the closest structure is very close.

Traffic induced vibration is less due to little or no vehicular traffic during the working period of 10 pm to 6 am the following day.

7.2.2.5. Impacts of construction and demolition (CD) and waste disposal

As a result of the construction activities, spoils generated could lead to surface water contamination, if stockpiles of spoils will not be transported immediately. A significant quantity of spoil is expected from the excavation of the trenches which will be temporarily stockpiled very close to the roadsides.

The general spoil is essentially a soft inert material, but it will have some hard-inert material such as concrete and asphalt (bitumen) pieces generated from the scraping of the road surfaces. Spoil excavated from the Kerawalapitiya area may contain significant amounts of peat since the Kerawalapitiya Park was formerly a part of the Muthurajawela marsh that was reclaimed by the SLLDC to establish this Industrial Park.

- Total stretch requiring open trenching works (from inside Kerawalapitiya GSS to Chaitya Road) = 13.95 km x 1000 = 13,950 m.
- Total stretch requiring open trenching works (avoiding the route sections from Sir Baron Jayathileka Mawatha to Chaitya Road) = 13.82 km x 1000 =13,820 m.

Kerawalapitiya area (CPSTL Muthurajawela Terminal Road to inside Kerawalapitiya GSS route) contains more peat[46] since this was a part of the Muthurajawela which is now reclaimed by the SLLDC to operate the Kerawalapitiya Industrial Zone (EML Consultants, 2017). The road stretch from CPSTL Muthurajawela Terminal Road to Kerawalapitiya GSS is 2.46 km long. Therefore, the total quantity of peat rich spoil from CPSTL Muthurajawela Terminal Road to inside Kerawalapitiya GSS route (with a 10% safety factor) can be around 6819.12 tons: (1400 x 2460 x 1.2 x 1.5 x 1.1)/1000 =.[47]

[46]Confirmed by RDA Engineers (Eng. Ishara Fernando and Eng. Nashadi Jayatilake) too from the RDA Negombo Office on 10.03.2021

[47]According to University of Moratuwa, the bulk density of freshly cut, moist soil is around 1500-1900 kg/m^3, but depending on soil type it is around 1800 kg/m^3, 1600 kg/m^3 and ≤ 1400 kg/m^3 for laterite, clay and peat, respectively (Dr. Udeni Nawagamuwa pers. comm.).

Note that the above estimate is an approximate estimate and the total quantity of spoil generated from the entire project cannot be estimated since soil profile details of the different unit sections are not available with the CEB and the RDA[48] at present (soil conditions can be ascertained during the trial pits).

However, indiscriminate disposal of peat rich spoil to freshwater bodies such as nearby canals[49] (see Fig. 15) by irresponsible contractors will make the waters acidic within the range of pH 3-5. This is because peat contains humic acids and due to abiotic oxidation of leached out Fe^{2+} (from Fe oxide bearing minerals especially under anoxic conditions) and hydrolysis of the Fe^{3+}. This acidity imparted can be injurious to the aquatic biota particularly during the driest seasons when flow is low coupled with high evaporation / evapotranspiration.

In addition, spoil is also generated from HDD works, but is a slurry material.

Non-inert wastes

Non-inert material generated largely from excavation areas and HDD proposed areas will include the following.

- Plastic wastes: Example,
    - polythene packaging material made of polystyrene foam generated when cables are removed from packages and are to be about to be laid
    - polyvinyl chloride (PVC) such as cut pieces of pipes that may get generated when attending to repairs of damaged potable water supply lines of households, etc. during trial pit excavations and/or open trenching phases
    - soiled or damaged/faded barricade tapes
    - damaged cones and water barricades used for enclosure of the working sites
- Wood wastes; example damaged warning signage boards used as a part of proactive safety hazard management works
- Metal wastes items; examples
    - cut pieces of electrical wires
    - reinforcements
    - rivet nails and nails
    - damaged warning signage boards used as a part of proactive safety hazard management works
- Rubber wastes (for example, this will include some PPE wastes such as damaged gum boots and rubber gloves)
- Cardboard and paper (example, packaging wastes)

[48] As per the discussions had with the RDA Engineers (Eng. Ishara Fernando and Eng. NashadiJayatilake) from the RDA Negombo Office on 10.03.2021

[49] Examples are the various canals located within and towards the west of the Kerawalapitiya Industrial Park (linking the Dutch Canal), Wali Oya and Kalu Ela

- Defective or damaged PPE (this will include dust masks and goggles – such wastes will comprise plastics, rubber and fabric material mixed)

Hard inert wastes

Some rejected concrete may get generated as hard inert material where the open trenches are proposed.

Indiscriminate dumping of municipal wastes including paper, left over lunch packets, etc. polythene material present in lunch packets will cause problems to the waste collection processes implemented by local authorities. Moreover, smell and visual pollution attracting vermin will be evident as a result of indiscriminate dumping. Absence of small resting spaces for the labor teams to relax and have meals (example. Garden umbrella with a few chairs) and appropriate bins including a proper collection system by the main Contractor will often contribute to this issue.

Hazardous wastes

The following hazardous wastes could get generated from a typical unit section (largely from places where open trenches are to be excavated).

- E-wastes (e.g., damaged or malfunctioning blinking lights which were to warn motorists of excavations and constructions going ahead or by the side of these items and damaged or malfunctioning baton polls used for traffic control)
- Waste oil generated from repairing and maintenance of construction equipment and machinery (this will also include oil contaminated material such as cloth used for spill curtailment / wiping and filters removed from machinery)
- Metal and plastic that contained flammable liquids and VOCs (e.g. Paint and adhesive cans)
- Any other contaminated material such as PPE and paint brushes.

7.2.2.6. Impacts of dewatering and disposal of slurries on canals / natural drainage paths

Under normal circumstances HDD generates spoil as a slurry material which is a bentonite-water or polymer-water sediment-laden material. However this impact will not arise as the areas needing HDD have already been drilled when the cable laying work under the 1st circuit was completed.

If sediment-laden water and spoil slurries will be released to the road allowing it to flow into the drains, it will cause visual pollution (creating slippery and muddy conditions) or direct to nearby drains or natural drainage paths which may include small canals (thus leading to further heavy siltation).

Therefore, disposal of highly turbid slurries and sediment-laden rainwater accumulated within the trenches to nearby canals will further contribute to turbidity and subsequent sedimentation (the canals become highly turbid/muddy during rainy periods due to heavy load of eroded material entering from various point and non-point sources).

Also drilling in an area that may have toxic pollutants such as heavy metals may cause desorption and subsequent contamination of the slurry; disposal of this slurry to nearby canals could contribute to some metal loads.

As mentioned earlier, the soil quality in the Muthurajawela area (Kerawalapitiya Estate) contains more peat. Indiscriminate disposal of peat rich spoil to freshwater bodies or canals encountered within the project route or elsewhere by irresponsible contractors will make the waters acidic (which will be further injurious to the aquatic biota).

The path of the ROW can cause erosion during the rainy periods into the excavation causing seepage into the ducts supporting cable. During excavation possibility that the heavy equipment used for digging can damage the underground utility structures and in turn can cause significant disruptions to people and have monetary impact on businesses and society in general.

The canal at Aluth Mawatha and Wali Oya seems to have a little or no aquatic life. The adverse impacts to aquatic biota especially benthic fauna (including sessile species) due to disposal of slurries from HDD works and dewatering of sediment-laden water accumulated within the trenches will be highest in waterways such as Wali Oya and Kalu Ela during the driest seasons when these canals are almost stagnant with less flow. Significant quantities of flocculated material (high TSS levels) such as clay (unlike sand which are discrete material settling rapidly) settling slowly will produce a smothering effect especially on sessile aquatic species. However, these impacts are localized and short-term / temporary (confined during the disposal stage only).

There is no adverse impact on Kelani River at Mattakuliya Bridge since a spare duct has been already placed underneath the river bed and nearby areas using HDD under a previous project. Therefore, the cables will be simply pulled through the spare ducts (to prevent possible damages to the cables). This can be done by referring to the exact maps indicating where the ducts are and by deploying experienced personnel who will use polywater as a lubricant to ease the friction between the HDPE pipes and the cables. Furthermore, the pulling capacity of the cables will be maintained such that the pulling tension of the cables will be less than the maximum pulling capacity.

FIGURE 13 STATUS OF THE WATER QUALITY OF THE CANALS RUNNING ACROSS THE AFFECTED ROADS

:

7.2.2.7. Construction impacts on the road side dwellings

As mentioned earlier, households living closer to the roads chosen for the laying of UG/TL, especially in the sections of the Kerawalapitiya Road, Hendala Road, Alwis Town Mawatha ASP Liyanage Mawatha and the narrow section of Aluth Mawtha will continuously be affected during the project's construction period. Such households will be affected by construction noise, dust emissions, and obstructions to their access paths.

Table 29 summarizes the total number of structures located along the different road sections where the trenches will be excavated for the laying of transmission cables. The types of the structures located on the specific side of the road are listed in Annex 12.10.

Table 29 NUMBER OF ROAD SIDE STRUCTURES AFFECTED BY THE CONSTRUCTION IMPACTS

Bridges/ Culverts	By-roads, Intersections/ Roundabouts	Houses with open entrances	Other Shops/ Kiosks Buildings	Religious places/ Statues	Parapet walls & gates	Vehicle & Three Wheel Parks	Schools / Hospitals/ Police
14	70	64	159	09	85	12	09

(Source: Road Survey)

7.2.2.8. Construction impacts on the road side vendors and those running small kiosks:

A large number of households especially those living along the Aluth Mawatha, Kerawalapitiya road etc. operate small retail outlets from their houses to sell snacks, bakery products, fish etc. Most of the small kiosks along the roads within CMC area also carry out their business operations such as food supplies during the night hours. The construction work may impinge on the daily incomes from these livelihoods if the entrances to these commercial activities are obstructed or that open trenches are not filled on the following mornings. Additionally, though there are three wheeler operators, lottery sellers and other small vendors such as those selling vegetables who occupy the road sides for their trading activities, construction work will not adversely affect their livelihoods as they do not conduct their businesses during the night time. Also, some of them are mobile vendors who do not have a permanent location for their trading activities but move from one place to the other.

7.2.2.9. Impacts on the road vehicular traffic

Vehicular traffic on the roads varies during morning hours, afternoon and night times. Heavy traffic and congestion can be seen during the peak hours of the day during week days on the most of the main CMC roads such as Sir Baron Jayathileka Mawatha, Sea Street, St Anthony's Road, Aluth Mawatha, and the roads such as ASP Liyanage Mawtha & Kerawalapitiya Road. Since the trenches will be excavated along these road sections, there will be considerable impact on the traffic. Vehicular movements can be slowed down in most cases.

However this will not cause significant impacts as most of the work will be carried out during night time. Although it is expected that the trenches that are excavated will be laid with pipes and refilled by morning hours, there is a possibility that due to certain reasons (rain etc.) excavated trenches can be left unattended by morning hours and that may cause aggravating traffic problems.

The vehicular traffic will further be aggravated as most of the road-shoulders are occupied by the shop owners to park their vehicles and/or display their merchandise. Any construction work along such sections of the roads can aggravate the traffic unless traffic is not properly managed. Since construction work is planned during night hours, traffic will only be a problem if temporary reinstatement of the roads to suit normal traffic could not be arranged by morning hours. Table 30 which is reproduced below shows the level of traffic congestion in the respective roads and ranked them as High, Moderate and Low.)

TABLE 30 OBSERVABLE TRAFFIC INTENSITY OF THE ROADS AFFECTED BY THE CONSTRUCTION WORK

Name of the road section	Specific observation on traffic congestion		
	Low Traffic	**Moderate Traffic**	**High Traffic**
Inside Kerawalapitiya GSS	Low		
CPSTL Terminal Road	Low		
Road upto Kerawalapitiya road	Low		
Kerawalapitiya Road			High
Hendala Road			High
Alwis Town Mawatha	.		High
ASP Liyanage Mawatha			High
Wattala Hekitta Road	N/R	N/R	N/R
New Negombo Road		Medium	
Mattakuliya Center Road		Medium	
Aluth Mawatha			High
Srimath Ramanathan Mawatha		Medium	
St. Anthony's Mawatha		Medium	
N.H.M Abdul Cadre Mawatha - Sea Beach Road		Medium	
Sir Baron Jayathileka Mawatha			High
Janadipathi Mawatha		Medium	
Galle Buck Road	Low		
Chaitya Road up to Port Sub on	Low		

7.2.2.10. Hazards to Road commuters/pedestrians and motorists

Excavated open trenches that are not adequately covered/barricaded or uncovered and having no appropriate clear luminous or illuminated signages (e.g., "Safety First", "Construction Site Ahead", "Men at Work Ahead", "Danger – Deep Excavations Ahead" and "Road becoming narrow ahead") with workable blinking lights will be hazardous to the safety of the public especially during the night time or when visibility becomes low during heavy rainy periods. Pedestrian/ motorists falling into the excavations can lead to serious accidents or fatalities. Small children will be at risk of drowning if filled with water.

7.2.2.11. Disruptions to utility services

The trench excavation work may encounter other buried pipes which are used for telecommunication, water distribution and sewage disposal (in some sections of the road). Although the CEB plans to excavate the Trial pits to assess the areas and ensure that the route is free from such buried service lines, it is likely that buried pipes could be encountered underneath most part of the existing roads. In such situations, temporary closure of the service lines will be necessary during the construction phase.

Temporary closure of water and telecommunication services will cause inconveniences and disturbances to the people living along the road sides.

7.2.2.12. Impacts on the CMC waste collection work

The waste collection works in the wards located along Aluth Mawatha area is carried out by the CMC during night hours (from 6.00 pm to 12.00 mid night)[50]. Due to road excavation work, there is a possibility that waste collection vehicles will be obstructed along the main road. This will be temporary but, but if collection of wastes is disrupted, it will cause irritation among the residents.

7.2.3. Occupational safety & health Impacts (OSH) of the workers

7.2.3.1. Hazards to Construction Workers

Workers employed for the open trenches will be at high risk from falls and the following hazards:

- Workers falling into the excavations leading to accidents or serious injury
- Instant burial of the workers in deeper trenches (planned depth is 1.5 m; ≥1.25 m) where the soil profiles are characterized with weak soils such as sand or sand-gravel mixed soil profiles; risk is also aggravated when there is seepage in such soil profiles (unless well shored)
- Machinery falling to excavations when working too close to the trench;
- Electrical hazards leading to electrocution and burns (underground live cables or overhead electric lines; machinery operators are at risk from exposure to overhead cables) unless these are identified well in advance of the construction works and isolated accordingly or where appropriate Lockout/Tagout (LOTO) Safety Procedures followed with the help of CEB)
- Fire and explosion hazard due to exposure to flammable and / or explosive gases such as CH_4 (example, in the CPSTL Muthurajawela Terminal Road to inside Kerawalapitiya GSS where there are marshy lands)

[50] According to Mr. B Sunil of CMC , in charge of Ward (Aluth Mawatha)

- Exposure to toxic gases leading to unconsciousness and even death (example H_2S gas from leaked sewer pipes or in areas/routes such as CPSTL Muthurajawela Terminal Road to inside Kerawalapitiya GSS where there are marshy areas. H_2S can lead to desensitization of olfactory cells and at high levels cause asphyxiation).
- Damaged, tampered machinery (e.g., ones in which the protective guards are removed) could lead to serious injuries such as cuts, bruises and even loss of fingers.
- Also, construction material or spoil stacked too close to the sides of the trench can lead to soil or material collapse that will cause loss of life or serious injury.

Additionally, the risk of workers (deployed at HDD sites and open trenches during night hours) meeting with road/vehicular traffic accidents is high especially due to high speeding vehicles or when visibility becomes low to motorists during night time or as a result of heavy rains.

Environmental, social and safety impacts that can occur during the construction work of the particular road sections can be summarized in the following table:

TABLE 31 LIKELY IMPACTS OF THE ROAD BY EACH SECTION

Name of the Road section / Length and the side for the trench	Specific observations and likely impacts
Inside Kerawalapitiya GSS Length 0.10 km; RHS of the Road to be used for cable laying	This section of the road only serves as the access to GSS. (Fig 16 & 17). Excavation work will not have any significant environmental or social impacts.
Access Road from Kerawalapitiya GSS to CPSTL Terminal Road Length 0.43km; LHS of the Road to be used for cable laying	This road terminates at the main road. There are no houses or traffic, and there will be no interferences to construction work. Left side is the boundary fence for Yagadanavi Power Plant. One culvert is located immediate adjacent to the GSS boundary fence and another in the middle section of the road. Thereafter a plot of land on the right hand side is allocated for CEB work site. There is no other development work on either side of the road. *Sobadanavi* power plant is also being constructed at the right side of the road.
Road upto Kerawalapitiya road from CPSTL Terminal Road Length 1.95 Km; RHS of the Road to be used for cable laying	Asphalt laid road and can accommodate vehicle parking along its service lane. Fig 18. The road is a dual carriageway (about 13 m width 9 m carriageway and 3 m wide service lanes). Several large scale warehouses are located on the left side. No intense traffic other than trucks used for the transporting of goods from the ware houses. During the early hours of the day, there are bowsers carrying fuel from the CPSTL stores. As the road enters the express way exit road, more vehicular traffic is visible. But still trenches can be excavated with limited impact on the traffic. No residential houses are located on either

	side of the road. No major construction impacts are envisaged, except dust during trench excavation.
Kerawalapitiya Road Length 2.6 Km; LHS of the Road to be used for cable laying	Asphalt laid road with some narrow sections. The width of the widest sections is about 7 m. No service lane is available. Road leads upto Hendala Junction. Culvert crossing is located over Wali-Oya at GPS Coordinates 7.01468N & 79.88719E. (Fig. 21). There are about 10 residential houses on either side of the road with open access to the road, and another 27 roller doors / steel gates and / or parapet walls which are located on the edge of the road. 17 small kiosks are found on either side of the road along the full stretch. At least 26 byroads / lanes connect the main road. A grown-up Mango tree is located on the left-hand side of the Kerawalapitiya Road opposite to a boutique (7.01381 N and 79.88693E). Three separate statues and several churches,02 three-wheeler parks and 02 schools are located on the road side. In view of these receptors located on the sides of the road, there could be significant construction impacts envisaged on these structures in the form of vibration, noise, disturbances to the residents, safety of the children/pedestrians and the traffic.
Hendala Road Length 0.26 Km; LHS of the Road to be used for cable laying	This is an asphalt laid main road which is fairly wide and leads to Wattala. However, the project uses only a small stretch of not more than 260 m until it turns towards its left to the Alwis Town Mawatha. The road section is in the populace town area with significantly high traffic. The MOH office and Wattala Pradeshiya Sabha Office are located on the road side together with 3 commercial centers and a row of about 12 small kiosks. There is also one three wheeler park. The road is managed by PRDA. Anticipated construction impacts would be the public inconveniences to the pedestrian and the vehicle users, and the dust emissions. Since this is a busy location, impacts on the occupational safety of the workers is also high. However, since excavation will take place during night time, no significant traffic impacts are envisaged.
Alwis Town Mawatha Length 1.10 Km; LHS of the Road to be used for cable laying	This is an asphalted road maintained by Wattala Pradeshiya Sabha . The width of the road is is around 6 m. . About 08 by-roads/lanes connect the main road. Either side of the road has a number of houses mostly covered by parapet walls and / or roller doors. At least 10 roller doors/parapet walls were observed. Around 03 small kiosks and one three wheel park was observed. All of these houses and kiosks have their front access directed to the road frontage. Since there is no road shoulder and that there is fairly heavy traffic in the mornings and evenings, there can be potential impacts in the form of noise, vibration, disturbances to the residents and to the traffic during the construction stage.
ASP Liyanage Mawatha Length 0.95 Km;	This is a road laid with concrete for some sections and the rest is asphalted and maintained by Wattala Pradeshiya Sabha . This width of

RHS of the Road to be used for cable laying	the road is about 6 m. A canal (Kalu Ela) is meandering on both sides of the road and connects to the Kelani River. The road gets flooded at the low lying section during heavy rains. The left bank of the canal is naturally protected with a row of trees. The right side of the road is a residential area where a private school (Lyceum International School (6.98583 N & 79.8869 E), and around 06 houses occupied by middle income earning families are located. The roller doors of these houses are located on the edge of the road. The road has less traffic. But according to the residents, bout 3,000 vehicles flock into the road at starting and closing times of the school. But this traffic congestion can be avoided if the work is carried out during night times and week-ends. Excavation of this section of the road may require dewatering and this area being in the low lying area it can cause hydrogeological impacts. (Fig 22 &23). Towards the southern end of the road, there is one vegetable vendor having his stall on the road side on its left side. No relocation will be necessary as the trench will be on the RHS
Wattala/ Hekitta Road 0.84 km; LHS of the Road to be used for cable laying	The road has already been improvised with new asphalt layer by the RDA. The road is about 7m wide. CEB had been asked to lay the HDPE pipes for the cable laying work before completion of road development work. Accordingly, CEB had laid HDPE pipes along this stretch. The cable laying work will now be carried out by CEB when the project will be implemented. There will not be significant traffic related issues to arise during the cable laying stage.
Old Negombo Road Length 0.55 Km; LHS Road to be used for cable laying	This is a CMC Road and the section starts from the end point of Hekitta road from where it will turn to the right, closer to Mattakuliya bridge. This section of the road crosses the Kelani river crossing at Mattakuliya. The road is fairly wide (about 13 m.) and consists of two main bridge crossings. During the laying of the previous cable under the first circuit, spare ducts had been installed along concreted by-road which is accessing up to Sri Gangathilaka Purana Viharaya on the left side of the main road. No construction related impacts can be envisaged as pipes have already been laid to cover this section.
Mattakuliya Center Road and part of Aluth Mawatha Length 0.70 Km; Center Median of the Road to be used for cable laying	This is a well-constructed section (CMC Road which is improvised by the RDA) of Aluth Mawatha. The Section of the road is having a median to separate two carriage ways each of which has two lines for vehicular traffic and a hard shoulder as well as a soft shoulder. The width of the road is around 13 m. (Fig 35). On either side of the road there are commercial buildings occupied by a private bank and the Cargill's Food City and three residential dwellings covered with parapet walls. There are two by roads, and one leading to a pre- school. the first intersection ends at Pagnanada Mawatha. Since the proposed excavation will be along to the median of the road, no significant impacts are anticipated. The traffic can be detoured to one line during construction.

Aluth Mawatha 1.85 Km; Center Median of the Road to be used for cable laying	This section of the road extended from the point of the end of Mattakkuliya Center Road to the point of College Street. (This is a land mark). Part of the road from Mattakuliya side has been widened to a duel carriageway. A remaining section of 1.85 km stretch of the Aluth Mawatha is described under three sections in view of its current development activities. The first sections of Aluth Mawatha (700 m) ends up at the intersection meeting the Lower St. Andrews by-road. Road expansion work can be observed along this section of Aluth Mawatha. Road widening work had been contracted to the RDA by the CMC. There are 10 houses with either open entrance or covered with parapet walls located beside the road. Parapet walls in dilapidated condition are at a risk of collapsing, e.g. the long-dilapidated wall at Aluth Mawatha just after passing the inter-section of the Madampitiya by-road and the inventory list). In addition, there are about 10 kiosks and shopping centers beside the road. Vegetable vendors, lottery sellers have occupied some areas of the land which has been cleared for the road expansion. The next intersection (about 850 m) starts from the Lower St Andrews by road to upper St Andrews by road. This section is narrow (7m) and both sides are crowded with small kiosks and houses. About 46 small residential units with their open entrance to the road side, and another 33 small kiosks having their entrance to the road frontage can be seen on either side of the road. There are two bridge crossings, and two three wheeler parks. Currently this section obstructs the oncoming traffic, and a traffic detorur has been arranged. Residents on road frontage say that they have been informed to vacate the area surveyed for the acquisition of land required for road widening. Road development work along this section has not commenced yet. CMC has already laid side drains along this section of the road. CMC will widen this road section to keep pace with the rest of the road. Traffic is fairly intense during week days. There is an indication that several utility services such as water, sewer and telecommunication lines have been laid underneath as their man holes are visible on the road surface. Due to excavation along this road the traffic and the pedestrian movements can be affected including the CMC waste collection which is taking place at night time. (Fig 34 to 39) Final stretch of the road commences from Upper St Andrews Road to College Street (300 m). This section of the road is wide with four lanes (Carriage ways are not marked or no center median established) and with a hard shoulder. RHS is the boundary of the SLPA. LHS has about

	04 commercial buildings. A church is also located on the left side of the road. This section of the road can accommodate peak traffic conveniently. The trench will be cut either on the middle of the carriage way. (Fig 44-45). No major impacts can be envisaged.
Srimath Ramanathan Mawatha Length 1.00 Km; LHS of the Road to be used for cable laying	The width of this road section (CMC Road) is about 13m. The road has two lanes, with wide shoulders. (Fig 46) for pedestrians. SLPA parapet wall is located on the right side. Left side has about 9 buildings used for commercial purposes and two Hindu temples and a church . There is an intersection manned by color lights immediately after which the Foreshore police station is located. There are no residential houses. The section of the road is busy with traffic, moving from Hettiyawatta as well as from Pettah and Fort areas. During excavation work, traffic congestion, and dust emissions can be expected. Since the police station is working round the clock, night work can have noise impacts on the duty officers attached to this police station.
St. Anthony's Mawatha Length 0.30 Km; LHS of the Road to be used for cable laying	This is also an extension of the road from Ramanathan Mawatha but with four lanes and a center median. The road is asphalted with wide shoulders. On the right side, is the St Anthony's church and on the left side is the intersection leading to Christy Perera Mawatha. Road has on its center a barricade and it separates on coming and outgoing traffic . A row of shops with around 12 units mostly selling floral decorations, is located on the left hand side. Parking of vehicles is prohibited along this area due to the security provided to the church. This is a short section (about 500 m) of the road which accommodates on coming and outgoing traffic from Fort and Pettah. Fig 47 The construction work will not have any significant impacts to the road users, but the floral shops can be affected by dust emissions.
N.H.M Abdul Cadre Mawatha - Sea Beach Road Length 1.10 Km; LHS of the Road to be used for cable laying	This is asphalt laid road with two lanes (CMC Road). The left section of the road side is the parapet wall of the SLPA and the right section has a row of shops with around 20 units. Large commercial buildings include the Gold market (Former Fish market). The road also has several by lanes such as the 1st and 2nd cross streets and a by lane to enter the main road and the wholesale and retail shops in Pettah. The shoulder of the road is used by the shop owners for parking of vehicles. The road is full of traffic during the peak hours of the day. In view of the volume of traffic and the occupancy of sides of the road by the shop keepers for their vehicles, the construction impacts to them will be that of the temporary access difficulties, dust and the traffic congestions.
Sir Baron Jayathileka Mawatha Length 0.68 Km;	This section of the road (CMC Road) is the busiest of all the road sections in view of it being located in the center of traffic which converge from all sides of the Colombo Fort. The section has a bridge crossing in front of the Customs Office. A temple as well as a vehicle

LHS of the Road to be used for cable laying	parking yard and a row of shops is located along this section. In that, there are about 10 small shops upto the point of the 1st intersection at the YMCA building and thereafter before the second intersection, there is the Times building. The anticipated construction impacts are that of the dust, noise and the possible traffic congestion. In view of the presence of the bridge crossing, occupational safety of the workers would be at stake in view of confined space to work .
Janadipathi Mawatha Length 0.21 Km; LHS Side of the Road to be used for cable laying	This stretch is about 0.5km and a one-way paved road. A number of buildings constructed during colonial era including that of the Lloyds, the Cargills Building, Times Building and the General Post Office building are located on both sides of the street. The section of the road provides access to the Ministry of Foreign Affairs premises and the President's House. Perceived impacts are the possible traffic congestion due to flow of traffic that will be directed to a single lane. Possibility of carrying out civil work during night should be carefully explored.
Galle Buck Road / Upper Chatham street Length 0.25 Km; LHS of the road to be used for cable laying	This is a CMC Road section and the distance between the two roads is about 400 m. The section turn to its right through a private passage from the light house clock tower in the upper Chatham Street to Chaitya Road. There is no traffic on this road. The naval headquarters are located along this section. Security impacts are high as the area is very close to the presidents ghouse, Central bank, Defense Ministry etc. . Approval of the Ministry of Defense will be needed to work along the route as the areas falls under the high security zone. Possibility of carrying out civil work during night should be carefully explored. Other potential E&S impacts are the dust, construction noise and vibration.
Chaitya Road up to Port Substation Length 0.20 Km**;** RHS of the Road to be used for cable laying	The road section belongs to the SLPA. Distance between the SLPA premises and the GSS is about 100 m. The road is paved with soft shoulders and has a dual carriageway.. Cable will have to be laid across the road close to the GSS. Perceived E&S impacts would be the possible due to traffic congestion, dust and construction noise.

7.2.4. Risks on Public Safety

7.2.4.1. Impacts of labor influx

There will be an influx of construction workers to the project area as not all labor requirements can be found from the local communities. It is also anticipated that contractor's labor teams will predominantly be male workers. The contractor may require providing accommodation for such labor teams coming from outside. Labor influx can cause several adverse impacts. They may

include additional demand/pressures on local resources and utility services, alcohol and drug use and misbehaviors, sexual harassment and abuse of young girls and women in local communities, increase of prostitution and conflicts with host communities.

7.2.4.2. Child labour and Forced labour

Though the likelihood of deploying child labor or forced labor for construction work is rather low, there could be instances of engaging child labor and bonded labor in construction work. This can arise especially due to the demand for employment from poor and vulnerable families living in the project area

7.2.5. Chance Find

If any person discovers a physical cultural resource, such as (but not limited to) archaeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the Contractor shall ensure that the following steps are taken:

a. Stop all works in the vicinity of the find, until a solution is found for the preservation of these artifacts, or advice from the relevant authorities is obtained;
b. Immediately notify the Contractor's Engineer. The Engineer shall seek direction from Sri Lanka's Department of Archaeology and inform the project's Environmental Officer (EO) to follow the Chance Find Procedures set forth;
c. Record details in Incident Report and take photos of the find;
d. Delineate the discovered site or area; secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible authorities take over;
e. The archaeologists from the Department of Archaeology will evaluate and determine the value and importance of the find. Based on this assessment the appropriate strategy can be implemented. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage such as aesthetic, historic, scientific or research, social and economic values of the find;
f. Sites of minor significance (such as isolated or unclear features, and isolated finds) should be recorded immediately by the archaeologist, thus causing a minimum disruption to the work schedule of the Contractor. The results of all archaeological work must be reported to the Department of Archaeology once completed;
g. In case of significant find the Agency/Ministry (Agency for Protection of National Heritage or Archaeological Research Centre, hereinafter referred to as Heritage team) should be informed immediately and in writing within 7 days from the find (ref. law on heritage protection in Sri Lanka).
h. The onsite archaeologist provides the Heritage team with photos, other information as relevant for identification and assessment of the significance of heritage items;
i. The Ministry in charge, must investigate the fact within 2 weeks from the date of notification and provide response in writing;
j. Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;

k. Construction works could resume only after permission is granted from the responsible authorities;
l. In case of no response received within the 2 weeks period mentioned above, this is considered as authorization to proceed with suspended construction works.

8. Environmental and Social Management Plan

This Environmental and Social Management Plan (ESMP) presented in this chapter provides a set of measures to avoid and mitigate the adverse risks and impacts which are likely to arise from the implementation of the UG/TL project from Kerawalapitiya GSS to Port City GSS. The ESMP will be part of the contractor's bidding documents, (CEB to append the ESMP into the biding documents for ease of reference) and the contractor to be commissioned by the project will have the singular responsibility for the implementation of the ESMP. The contractor while implementing the ESMP needs to make appropriate references to AIIB and GIIP standards including WBG EHS guidelines (General and Electrical Power & Distribution). Moreover, the contractor is required to prepare his/her own ESMP guided by the generic ESMP presented below and after a full assessment of the ground situations. The costs for ESMP implementation should be included in the contractor's budget. The implementation of the contractor's ESMP will be closely monitored by the CEB's PMU.

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8.1. Environmental and Social Management Plan (ESMP)

No.	Risks and Impacts	Mitigation Measures	Responsibility		Source of funding
			Implementation	Monitoring	
PRE-CONSTRUCTION PHASE					
1.	Accidental damages to utility services during trial pit excavations	Obtain CMC approval (Drainage license) prior to excavation	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Inform the utility service providers such as the CMC, Sri Lanka Telecom, NWS&DB and the nearby residents of the time schedule of the trial pit excavation.	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Immediately inform the service providers of any accidental damages to the utility services	**Contractor**	**Project Engineer**	
		Restore any damages to special layers reinforcing the laying of utility pipes introduced by utility providers	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Reimburse all the costs incurred by the utility providers for restoration of the damaged service lines.	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Restore the excavated areas to their previous condition.	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
2.	Noise and dust generated during trial pit excavations	Install noise reduction devices such as exhaust silencers to vehicles	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Use well-maintained machinery, equipment and vehicles that do not cause irritating noise	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Spray the trial pit area with water prior to the commencement of the works and continue to spray water during the trials	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
3.	Risks- of accidents during trial pit excavations	Install barricade tapes, appropriate signages, proper lighting and place signalmen in the areas to be excavated for trial pits.	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
4.	Damages to nearby structures due to vibration	Conduct a pre-crack survey of all permanent structures located within 10 m of the boundaries of the project site with the consent of their occupants.	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**

No.	Risks and Impacts	Mitigation Measures	Responsibility		Source of funding
			Implementation	Monitoring	
		Submit a copy of the pre-crack survey to the project engineer for filing purpose	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Prepare a plan to restore any damages to structures or to pay compensation for the restoration of damaged structures	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
5.	Felling of wayside trees	Obtain prior permission from the tree owners/authorities	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Adopt all safety measures during the felling of trees	**Contractor**	**Project Engineer**	
		Remove the felled trees immediately without causing disturbances to traffic movements and ensure the safety of commuters .	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
6.	Haphazard use of land temporarily leased/rented for stockpiling, labor camps, vehicle parking etc.	Ensure that all land leased/rented for temporary use have a legal agreement where obligations of the parties are clearly stipulated and legally binding.	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Deploy security personnel to safeguard the property at the stores and accommodation units	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
		Establish proper channels to dispose waste water and solid waste generated in labor camps, stock yards etc.	**Contractor**	**Project Engineer**	**Engineer's Budget (PMU)**
7.	Lack of public awareness	Conduct awareness meetings with the community members involving the respective GNs and the DS officials prior to construction work to inform the construction plans, time schedule and the potential impacts.	**Contractor**	**ES officers of PMU**	**Engineer's Budget (PMU)**
		Conduct public safety awareness programs for residents, vendors, trishaw drivers etc. occupying places beside the roads.	**Contractor**	**ES officers of PMU**	**Engineer's Budget (PMU)**
		Provide incentive payment for the GNs for conducting community awareness programs	**Contractor**	**ES officers of PMU**	**Engineer's Budget (PMU)**
		Consult the road side vendors and plan for their temporary relocation if a need arises during construction	**Contractor**	**ES officers of PMU**	**Contractor's Budget**

No.	Risks and Impacts	Mitigation Measures	Responsibility		Source of funding
			Implementation	Monitoring	
CONSTRUCTION PHASE					
8.	Dust emissions	Implement a dust suppression program (regular and frequent road watering, using sprinkling water bowser, erecting dust barriers etc.)	**Contractor**	**Project Engineer**	**Contractors Budget g**
		Conduct air quality (dust) monitoring for PM_{10}, $PM_{2.5}$ based on public complaints or daily on stretches where there is heavy traffic, and residential dwellings and commercial establishments in compliance with the National Environmental (Ambient Air Quality standards).	**Contractor**	**Project Engineer**	**Contractor's Budget**
		Provide guidelines and instructions to the drivers of all vehicles transporting spoils, bedding and fill material and construction material that such vehicles should have secured doors / platforms and that material transported should be well covered. with heavy tarpaulin sheets.	**Contractor**	**Project Engineer**	
9.	Construction noise generation and vibration	Maintain the noise level at below 50 dB as per the noise control regulations.	**Contractor**	**Project Engineer**	
		Obtain special approval from CEA for night time work through the Project Management Unit (PMU);		**PMU**	
		Conduct regular noise and vibration monitoring at the nearest sensitive receptor when equipment causing vibrations, noise are used / when complaints are received.	**Contractor**	**Project Engineer**	**PMU Monitoring Budget**
		(Where necessary), install temporary noise barriers near households located extremely close to excavation areas	**Contractor**	**Project Engineer**	**Contractor's Budget**
		Use less noise generating electrical and battery-operated equipment whenever possible.	**Contractor**	**Project Engineer**	**Contractor's Budget**
		Provide guidelines to the labour teams to use machinery with minimum noise. (Strict labour supervision shall be undertaken in this respect)	**Contractor (Health and safety Officer)**	**Project Engineer**	
		Pay adequate compensation to the affected parties for the restoration of vibration induced damages to the structures..	**Contractor**	**PMU E&S officers**	**Contractor's Budget**
		Maintain a Public Grievances Register that is easily accessible to the public to report grievances related to construction impacts.	**Contractor**	**PMU E&S officers**	

No.	Risks and Impacts	Mitigation Measures	Responsibility		Source of funding
			Implementation	Monitoring	
10	Construction and demolition (CD) wastes and waste oil	Prepare and implement a proper Waste Management Plan in compliance with CEA's waste management regulations for disposal and management of solid wastes, hazardous wastes etc.	**Contractor**	**PMU Environmental Officer**	**Contractor's Budget**
		Maintain a registry (i.e., a system to document the disposal of CD waste, copies of the Environmental Protection Licenses (EPL) issued to those recyclers, the Contractor is to deal with, etc.)	**Contractor**	**Project Engineer**	**No additional cost will be involved**
		Obtain prior approval from the relevant Local Authority and CEA for the disposal of wastes to designated sites.	**Contractor**	**Project Engineer**	
	Safe storage of oil and management of waste oil	Vehicle yard shall have safe oil storage facility. Waste oil will be stored until they are safely disposed through licensed collectors. CEA approval will be received to if such approval are required.	**Contractor**	**Project Engineer**	**No additional cost will be involved**
11	Pollution of canals and other surface water sources	Construct silt traps or silt fences made of gunny bags or geotextiles to allow sediment-laden waters accumulated within the cut trenches to drain into the waterways/line drains ;	**Contractor**	**Project Engineer**	**Contractor's Budget**
		Remove all the temporary soil dumps from the construction sites as soon as possible and prevent them from being exposed to rain	**Contractor**	**Project Engineer**	**Contractor's Budget**
		Avoid drainage paths being directed to waterways and irrigation canals to avoid siltation	**Contractor**	**Project Engineer**	**Contractor's Budget**
		To prevent any silt running into the water ways Monitor the performance of the batching plants, asphalt plants and crusher plants, etc. (if they are specifically operated for this project) under the supervision of the CEB and as per the relevant EPLs (separate EPL shall be obtained from the CEA).	**Contractor**	**PMU**	**PMU Monitoring Budget**
		Equip the HDD machinery with centrifuge decanters so that solids separated could be removed (as a fill material)	**Contractor**	**PMU**	**Contractor's Budget**
12	Access disturbances to road side dwellings	Backfill all open trenches and reinstate the roads on the same day. (In the event the open trenches are to remain, close the open trench area using soft barricades or movable	**Contractor**	**Project Engineer**	**Contractor's Budget**

No.	Risks and Impacts	Mitigation Measures	Responsibility		Source of funding
			Implementation	Monitoring	
		hard barricades with placement of appropriate clear / visible signage at all sides of the trench enabling the house occupants to take note of).			
		Provide temporary alternate access to pedestrians, motorists, residences, business premises and other public places if the open trenches could obstruct their accessibility.	**Contractor**	**Project Engineer**	**Contractor's Budget**
13	Traffic congestion	Carry out the construction work 10.00 pm to 6 am the following day leaving out the peak traffic times and on the week days. (Work during the weekends and public holidays as far as possible).	**Contractor**	**Project Engineer**	**Contractor's Budget**
		Develop and implement a traffic management plan (TMP) in collaboration with the relevant authorities such as the traffic police and the local authorities.	**Contractor**	**Project Engineer**	**Contractor's Budget**
		Any trenches shall be enclosed overnight to prevent pedestrians or vehicles falling into them. (Motorists shall be provided with necessary information and instructions well in advance)	**Contractor**	**Project Engineer**	**Contractor's Budget**
14	Disruptions to livelihoods of the road side vendors	Close all open trenches covered with at least iron sheets by day time to enable the road side vendors to resume days work	**Contractor**	**Project Engineer**	**Contractor's Budget**
		Avoid storing of construction materials such as pipes, cables on the roadsides causing disturbances to the road side vendors and ensure the safety of the vendors and trishaw operators.	**Contractor**	**PMU**	**Contractor's Budget**
		Assist the small scale vendors, three wheel owners etc. to temporarily shift to alternative places in the event that Local Authorities restrict such temporary relocation.	**Contractor**	**PMU**	**Contractor's Budget**
		Pay fair compensation if the road side vendors and trishaw operators forgo their daily incomes due to displacement	**Contractor /PMU**	**PMU**	**Contractor's Budget**
		Provide any assistance to the road side vendors and trishaw operators etc. if they will be unable to find alternative locations to conduct their businesses, if the reinstatement work is prolonged.	**Contractor /PMU**	**PMU**	**Contractor's Budget**

No.	Risks and Impacts	Mitigation Measures	Responsibility		Source of funding
			Implementation	Monitoring	
		Ensure providing alternate accesses to the business ventures if their accesses are temporarily disturbed due to open trenches;	**Contractor /PMU**	**PMU**	**Contractor's Budget**
15	Occupational Health and Safety Risks to Workers	Implement a Health and Safety Plan. and to comply with the AIIB's Environmental and Social Framework and country labour regulations.	**Contractor**	**PMU**	**Contractor's Budget**
		Institute a Grievance Redress Mechanism for the workers and ensure that workers grievances are addressed promptly and efficiently.	**Contractor**	**PMU**	**Contractor's Budget**
		Provide all necessary safety appliances / PPE such as safety goggles, helmets, safety belts, ear plugs, dust masks, luminous jackets, ear plugs etc. as appropriate to workers & the staff conducting night work.	**Contractor**	**PMU**	**Contractor's Budget**
		Display clear signages (in all 3 languages) such as "Safety First", "Construction Site Ahead", "Men at Work Ahead" and "Danger – Deep Excavations Ahead" about 10-15 ft. ahead of all 4 sides of the barricaded, open trenched and HDD areas.	**Contractor**	**PMU**	**Contractor's Budget**
		Conduct basic onsite safety trainings for all construction workers prior to the commencement of the work.	**Contractor**	**PMU**	**Contractor's Budget**
16	Risks of accidents	Maintain the General Register (as prescribed in Factories (No. 1) Regulations 1960 and Section 92 of the Factories Ordinance) to record all site specific accidents;	**Contractor**	**PMU**	**Contractor's Budget**
		Implement an Emergency Preparedness or Public Safety Plan including a method for accident reporting as per the labour regulations. (All types of accidents including near misses should be recorded in a Log Book and reported to CEB.)	**Contractor**	**PMU**	**Contractor's Budget**
		Barricade the excavation areas with movable hard barricades or safety nets well entangled (fixed) into GI pipes such that they could be moved when needed and that no outside parties could approach the working area;	**Contractor**	**PMU**	**Contractor's Budget**
		Install blinking lights on all sides of the barricaded construction area and properly illuminate them so that	**Contractor**	**PMU**	**Contractor's Budget**

No.	Risks and Impacts	Mitigation Measures	Responsibility		Source of funding
			Implementation	Monitoring	
		those areas are visible to pedestrians and motorists approaching from both / opposite ends of a unit section			
		Obtain a Third-party insurance to compensate any damages, injuries caused to the public or laborers during the construction period.	**Contractor**	**PMU**	**Contractor's Budget**
17	Improper management of labour camps, material stockpiling yards etc.	Locate and establish the labour camps, vehicle parking areas and the material stock piling yards away from settlements and other sensitive areas with proper waste management systems, including that of the disposal of waste water and solid waste.	**Contractor**	**PMU**	**Contractor's Budget**
18	Influx of labor	Recruit local labor as much as possible for manual/unskilled work to reduce influx of labor and the necessity for labor camps.	**Contractor**	**PMU**	**Contractor's Budget**
19	Use of Child Labour	Ensure that children below the age of 14 years are not engaged for any type of work	**Contractor**	**PMU**	**Contractor's Budget**
20	Management of construction labour	Contractor to adopt a HR policy and code of conduct with strictly adherence to necessary labour regulations that prohibit workers below the age of 18 years and 15 years, be engaged in nonhazardous work.	**Contractor**	**PMU**	**Contractor's Budget**
		Code of Conduct should be handed over to all the employees of the contractor in their local languages, and ensure that they are read and signed by the respective employees. Code of Conduct should also be displayed in suitable places such as in labor camps and contractor's site office.	**Contractor**	**PMU**	**Contractor's Budget**
21	Use of forced labour or trafficked labour	Ensure that no forced labour, bonded or trafficked labour (prisoners for example) is deployed for construction work	**Contractor**	**PMU**	**Contractor's Budget**
22	Gender based violence, sexual exploitation and	Provide the sanitary facilities in sites and labour camps in consideration of suitable locations, safe access, and convenience for female users	**Contractor /PMU**	**PMU**	**Contractor's Budget**

No.	Risks and Impacts	Mitigation Measures	Responsibility		Source of funding
			Implementation	Monitoring	
	abuse and sexual harassment	Adopt a zero tolerance policy against Gender based violence, sexual exploitation and abuse and sexual harassment	**Contractor /PMU**	**PMU**	**Contractor's Budget**
		Establish a suitable mechanism Institutional to monitor and prevent the sexual harassment and sexual exploitation of the workers and general public. (A confidential reporting mechanism for sexual harassment shall be incorporated in to the Grievance Redress Mechanism of Workers)	**Contractor /PMU**	**PMU**	**Contractor's Budget**
		Inform the workers about the service providers supporting the victims of GBV e.g. 'Mithuru Piyasa' centers (Centre established by Ministry of Health in main hospitals to support survivors of GBV) and closest police stations.	**Contractor /PMU**	**PMU**	**Contractor's Budget**
		Provide all workers with the Code of Conduct and monitor that all workers comply with the standards prescribed.			
		Introduce appropriate measures for the safety of female workers if they are engaged in tight time work.			
		Conduct awareness raising programs for workers on HIV and other sexually transmitted diseases	**Contractor /PMU**	**PMU**	**Contractor's Budget**
	Gender discrimination	Ensure equal opportunity in the requirement of project staff including contractor's labor force. The salary/ wages and other payments and benefits due on service provided to the project should not be classified on the Gender basis.	**Contractor /PMU**	**PMU**	**Contractor's Budget**
		Provide gender sensitive training and capacity development for the office staff and the workers.	**Contractor /PMU**	**PMU**	**Contractor's Budget**
23	Chance Finds	A Chance Find Procedure to be adopted and implemented with the participation of relevant stakeholders. (As per section 7.2.5)		**PMU**	**Contractor's Budget**
POST CONSTRUCTION PHASE					
24	Decommissioning of the material stock piling yards, other stores etc.	Restore the land temporarily rented/leased to their original status before they are handed over to the owners	**Contractor /PMU**	**PMU**	**Contractor's Budget**

No.	Risks and Impacts	Mitigation Measures	Responsibility		Source of funding
			Implementation	Monitoring	
		Demolish all structures as per the requirements of the agreements and the materials should be properly disposed before handing over.	**Contractor /PMU**	**PMU**	**Contractor's Budget**
25	Disposal of spoils after road reinstatement	Spoil material shall be immediately removed and taken to the Contractor's spoil yard for subsequent proper disposal (without any stacking at the construction site);	**Contractor**	**PMU**	**Contractor's Budget**

8.2. Environmental and social monitoring and reporting requirements;

The Monitoring Plan presented below outlines the key areas of the ESMP to be monitored during the pre-construction and the construction stages of the project.

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8.2.1. Environmental and Social Monitoring Plan

Monitoring Plan						
Aspect	**Parameter**	**Method**	**Stage**	**Frequency**	**Responsibility**	**Location**
Noise level	Day and Night time LAeq/dB(A) Levels	Portable noise meter (range 0-120 dB(A))	Pre-construction	Baseline measurement	CEB	Sensitive locations
			Construction – Regular monitoring	When public complaints are received	Contractor / CEB	
Air quality	SO_2, NO_2, CO, PM_{10}, SPM	Spectrometric method; High volume sampling and Gravimetric analysis	Pre-construction	Once (Baseline measurement)	Contractor / CEB	Sensitive locations as per list.
			Construction /Regular Monitoring	Based on Public Complaints	Contractor / CEB	
Surface Water Quality	EC, TSS, DO, BOD, COD, pH, Oil and grease,	Use external water quality monitoring specialist (NBRO)	Pre-construction	Baseline measurement	Contractor / CEB	Nearest water sources /canals streams
			Construction	Based on Public Complaints	Contractor / CEB	
Community Grievances	Number of grievances/complaints handled by the Grievance Committee and type of grievances; Type and amount of compensation provided or	Review of grievance log and records of the grievance redress process	Construction –	Once a month during construction period	PMU	Locations established for grievance committee operations

Monitoring Plan						
Aspect	**Parameter**	**Method**	**Stage**	**Frequency**	**Responsibility**	**Location**
	Type of solutions provided for grievances reported					
Vibration	Dilapidation (crack) surveys	Recording of cracks, signs of any movement, water seepages, spalling concrete and other building defects based on engineering observations	Pre-Construction	Once	Contractor	All permanent structures within 10 m of the boundaries of the project excavation route to be conducted
	Vibration measurements	Through a third party such as NBRO	Construction - during the clearing of road surfaces, excavation, compaction and backfilling phases	When complaints are received	Contractor	All sensitive locations and houses
Occupational Safety & Health	Provision of PPE -dust masks (having N95 certification) and safety glasses or goggles (ANSI Z87.1 certified material) for all workers at site and all other	As per the health and Safety Management Plan. Tool box talk sessions	Construction -Regularly	Regularly – On a daily basis	Contractor (OHS Officer)	All construction sites

Monitoring Plan						
Aspect	**Parameter**	**Method**	**Stage**	**Frequency**	**Responsibility**	**Location**
	safety measures at construction sites					
Reporting incidences of accidents	Work related accidents/ site related public accidents	Records maintained as per the Health & Safety Management Plan	Construction	Once in every month	Contractor (OHS Officer)	All construction sites / labor camps
Contractor's Labor Management Procedure	Benefits and facilities provided for labor teams Engagement of child labor/forced labor Female labor Payment as per statutory requirements Code of Conduct issued for labor teams Incidences of GBV, SEA and SH reported Worker registration and age certification Conditions of labor camps and facilities provided Establishment of Workers' GRM	Records maintained at work sites/labor camps and observation visits	During construction	Monthly/Quarterly	PMU	All construction sites / labor camps

8.3. Institutional arrangement for ESMP implementation and monitoring

The Project Management Unit (PMU) will have the overall responsibility for overseeing the effective and efficient implementation of the ESMP by the contractor. There PMU is established under the Additional General Manager (Projects). The PMU is managed by a Project Director (PD) who reports directly to the Additional General Manager (Projects). The Project Director is assisted by a Project Manager (Cable), an Engineer who is in charge of planning, monitoring and coordination of all project related activities and a Project Accountant. Additionally, two Design Engineers and an Environmental Officer work in parallel with the Project Director and report to the DGM (TD&E).

The Environment Unit established by CEB under the Transmission Design and Environment Branch (TD&EB) is the focal point for the environmental and social safeguards related activities of CEB. The Environment Unit is headed by a Senior Engineer who would provide guidance to the project staff and the contractors to adopt the environmental good practices and social safeguard measures to be implemented under the project. The Unit will also be supported by an Occupational Health and Safety (OHS) Engineer whose major function will be to assist CEB Environmental Unit as well as the PMU and the Contractor's environmental health and safety officer to ensure that occupational safety and health aspects of the ESMP are implemented and closely monitored. .

Additionally, the Environmental Unit will perform the following functions.

- Provide oversight the PMU to monitor the implementation of the ESMP during pre-construction, construction and operational phases of the project Liaise with the Ministry of Power, Central Environmental Authority (CEA), and other relevant state agencies to obtain mandatory clearances and seek their help to solve the environment and social related risks and impacts of the project implementation.
- Advice PMU on measures to be followed in mitigating adverse environmental and social risks and impacts
- Provide training and awareness for project staff on environmental and social issues related to the project. Ensure the implementation of the environment and social policy guidelines and ESMP at the construction sites in compliance with the Environmental and Social Policy of the AIIB and the local environmental legislation.
- Advising and coordinating the activities of the field offices towards effective environment and social management and monitoring.

Submission of periodical progress monitoring reports and coordinate with the AIIB for monitoring related issues Make the contractor staff aware of the environmental and social risks and impacts related to power transmission projects to ensure the elective implementation of the ESMP

8.4. Roles and responsibilities of the Contractor:

Bulk of the responsibility in implementing the ESMP lies with the civil contractor. The nature of the project is such that occupational safety and health impacts are greater than the environmental impacts..

Therefore the contractor can engage a qualified Environmental Health & Safety Engineer / Environmental Health & Safety Officer who will be in charge of the ESMP implementation .

Following responsibilities are assigned to the Contractor's Safety Engineer/ Officer:

- Carry out safety awareness programs for the community members;
- Conduct safety meetings (tool box) for the workers
- Ensure that workers receive appropriate PPE during the construction work
- Implement the OHS plan
- Implement the Traffic Management Plan
- Serve as the focal point on the part of the contractor to convene the Grievance Committee and to represent at the GC meetings convened by the PMU and the DS.
- Prepare environmental monitoring reports and to submit same to the PMU
- Work in close coordination with the Environmental Officer / Engineer of the PMU

8.4.1. Role of the Project Management Unit (PMU) in ESMP implementation

- Provide overall guidance to the contractor's E & S staff to implement the measures as prescribed in the ESMP; In this connection the environmental engineer and the Occupational health and safety Engineer of the PMU will prepare overall guidelines, reporting formats and conduct regular monitoring meetings;
- Provide leadership in monitoring the grievance handling process at field level
- Address community concerns and oversee the issues related to payment of any compensation
- Timely submission of Environmental Monitoring Reports to AIIB through TD&EB and regular monitoring of the implementation of the ESMP
- Facilitate consultation with key stakeholders including representatives from the following agencies to resolve any field level issues
    - Central Environmental Authority
    - Colombo Municipal Council
    - Road Development Authority,
    - Provincial Road Development Authority
    - National Institute of Occupational Safety and Health (NIOSH) / Labor Department
    - Colombo Municipal Council
    - Wattala Pradeshiya Sabah
    - National Water Supply & Drainage Board
    - Sri Lanka Ports Authority
    - Sri Lanka Navy
    - Urban Development Authority
    - Department of Archaeology
    - Colombo Divisional Secretariat Division

- Wattala Divisional Secretariat Division
- Sri Lanka Land Development Corporation
- Grama Niladhari officers
- Police (Colombo, Wattala and Kerawalapitiya)

8.5. Capacity Development and Training

Training and capacity development of the PMU staff, the contractor's staff and the workers are important for the effective implementation of the ESMP. Both the PMU and the Contractor are responsible for conducting the relevant training and capacity development programs prior to the commencement of civil works as well as during the construction work. PMU and the Contractor will use either their in-house expertise or hire the external resource persons/experts to conduct the required training programs. The mandatory trainings are listed in the Table 32.

TABLE 32 CAPACITY BUILDING TRAINING BUDGET

Training programs	Target Group	Frequency of training[51]	Responsible Agency / Person
Environmental and social safeguards with special reference to AIIB ESF and mandatory approvals	PMU staff & Contractor's E&S staff	Prior to the commencement of construction work	PMU
Environmental quality monitoring and reporting (Vibration, Noise, Water Quality) – Purchase of equipment for on-site Environmental . Quality Monitoring	PMU Staff & Contractor's E&S staff	Prior to the commencement of construction work	PMU
Supervision and monitoring of the implementation of the ESMP	PMU staff & Contractor's E&S staff	Prior to the commencement of construction work	PMU
Occupational health and safety management ● The use of personal protective equipment (PPE) ● Provision of First Aid Kit ● Working at below ground level ● Traffic management ● Proper collection, storage & disposal of hazardous wastes & nonhazardous wastes	PMU staff (OHS Engineer), Contractor's staff and workers	Prior to the commencement of construction work & during construction	Contractor

[51] Trainings should be repeated if any change of personnel occurs

● Fire Safety Training			
Public awareness and sensitization	PMU staff & Contractor's E&S staff	During construction	PMU and Contractor
Awareness on Grievance handling procedures & meetings	PMU staff & Contractor's E&S staff other stakeholders (GNS)	Prior to the commencement of construction work and during construction	PMU
Documentation and reporting procedures	PMU staff & Contractor's E&S staff	Prior to the commencement of construction work	PMU

8.6. ESMP Implementation Cost (estimated)

An indicative budget of LKR 108 million (US $ 360,000) is proposed for the implementation of the ESMP. The budget constitutes the cost to be incurred by the Contractor and the cost to be incurred by the PMU. Assuming that the project implementation cost is US $ 61 million, this ESMP budget is around 0.60 %. Initially the estimated ESMP budget was prepared while benchmarking the previous projects done prior to the Covid 19 outbreak. Thereafter there had been a significant price escalation of construction materials commodities and the salaries due to sudden exchange rate increase and other recently introduced fiscal policies such as VAT by the government. The ESMP is now considered a BOQ item in the bidding document and the bidders have been referred to the bid document concerning the ESIA Therefore consultant considers that this is not an excessive budget. (Table 33)

Table 33 **ESMP Implementation Budget**

	ESMP related activities to be implemented by PMU			**DETAILS**			
No	**Activity**	**Details**	**Estimated Figure**	**No**	**Period**	**Rate**	**Total**
1	Air quality (dust) monitoring –	(Minimum every 3 months/ or on receiving complaints during the construction phase and one time during the baseline – Based on the rates determined by the NBRO.	7,500.00				
		Baseline air quality monitoring		1		1500	1500
		Quarterly monitoring visit reports		5		1000	6000
		Sub Total					**7500**
2	Water quality monitoring	Based on the rates determined by the NBRO.	3,000.00				
		Water quality samples drwan from Batching plant and waterways close to other dewatering sites		6		500	3000
3	Noise & vibration monitoring	Based on the rates determined by the NBRO.	3,000.00				
		At least 06 sitesclose to excavation areas		6		500	3000
4	Survey of utility locations	Team deployed by the PIU for Route Survey	10,000.00			Lump sum	10,000
5	Community awareness programs	Pre project community awareness (disclose of project construction schedule and public awareness)	5,000.00				
		Cost for materials and snacks for meeting members		11		Lump sum	4450
		Stipend for GNs		11		50	550
		Sub Total					**5000**

6	Grievance handling	Cost will be incurred as per the GC convened by the PIU and the DS (as per decisions taken by PMU and PUSCL)	50,000.00				
		Awareness materials and Allowances to GC members attending to meetings				Lumpsum	2500
		Technical evaluations/legal consultations				Lumpsum	8,000
		Travel and transport				Lumpsum	4,500
		Provision for corrective actions (e.g. compensation for loss of livelihoods)				Lumpsum	35,000
		Sub Total					**50000**
7	PMU, Capacity development & trainings	Operations of the PMU	**38,500.00**				
		PMU Site Environmental Engineer (Salaries & other Emoluments)		1	18	800	14,400
		PMU/EU OHS Engineer		1	18	800	14,400
		PMU other secretarial assistance		1	18	500	9,000
		Communication,				Lumpsum	700
8	Monitoring (internal & external	External Consultant	18,000.00				
		Monitoring visits by external consultants		2		2500	5,000
		Monitoring reports (internal)		6		1,000	6000
		Review Meetings (AIIB)		2		1,000	2000
		Sub-Total	**135,000.00**				
	ESMP related activities to be implemented by Contractor			**DETAILS**			
No	**Activity**	**Details**	**Estimated Figure**	**No**	**Period**	**Rate**	**Total**
1	Deployment of EHS officers	Assumed that there will be two (02) Safety officers deployed by the contractor	60,000.00	2	18	800	28,800
		Transport, communication other facilities, office equipment ; worker camps		2	18	400	14,400
		Upkeep of worker camps, security and materials torgae areas			18	Lump sum	16,800
		Sub Total					**60,000**
2	Crack surveys	To be paid to the consultants deployed by the Contractor	5,000.00	1		lump sum	5000

3	Community awareness programs	Public awareness Programs conducted per each GN Division and production of social marketing materials	10,000.00	14	each to have 50-60 participants	500	7000
		Repeat programs and materials		14	each to have 50-60 participants	Lump sum	3000
		Sub Total					**10,000**
4	Restoration of utility services and road reinstatements	Cost to be borne for reconnecting water supply distribution lines , telecommunication lines etc. as per the rates determined by the utility providers	20,000.00			Lump sum	20,000
5	Implementation of Occupational safety & health and public safety plan	Cost to be incurred for the public safety measures such as Cover materials, temporary accesses	40,000.00				
		1. PPE for the workers				Lump sum	8,000
		2. Safety Notices & Danger and warning signs				Lump sum	4,000
		3 Worker Sensitization				Lump sum	2,000
		4. First Aid Boxes				Lump sum	500
		5. Emergency support mechanism (Back up vehicles)				Lump sum	10,000
		6.Drinking water for workers				Lumpsum	4,000
		7.Fencing/ enclosures of the excavation areas				Lump sum	3,000
		8.Steel plates / Trench temporary convers				Lump sum	6,000
		9. Public sensitization on HIV, labour influx etc.				Lump sum	2,500
		Sub Total					**40,000**
6	Implementation of Waste Management Plan	Cost to be incurred for Daily construction waste collection storage and safe disposal	13,000.00				
		Waste Bins , hoardings and notice boards				Lump sum	5000
		Disposal of solid and liquid wastes (including scheduled wastes) through licensed collectors				Lump sum	5000
		Worker orientation and training (In house)		6	50	500	3000
		Sub Total					**13,000**

6	Implementation of Traffic Management Plan	Cost to be incurred for the implementation of the Traffic Management Plan approved by the Traffic Authorities / Colombo Municipal Council	15,200.00				
		Hoarding Cones, for road diversions and public notices				Lump sum	4000
		Flagmen		2	18	200	7200
		Traffic monitoring meetings		2X4		500	4000
		Sub Total					**15200**
7	Compensation for construction related damages	As per the decisions taken at the Grievance Committees (Contractor level)	55,000.00				
		Grievance Committee Meetings (Allowances for members appointed by the contractor's GC)		52X 06-8		5	2000
		Cost for Site Visits				lump sum	2500
		Awareness materials and meetings				Lumpsum	2500
		Provision for corrective actions (e.g. damages to any cracks of the houses, clear access roads, provide temporary noise barriers, settlement ponds etc)				lump sum	40000
		Sub Total					**55,000**
8	Capacity development trainings	Contractor's allocation for continuous training of the new staff/workers	10,000.00				
		Orientation to workers on the ESMP implementation (in house) 1/2 a day training with external resource persons		6	50	50	1500
		Technical training through external safety experts on safety compliances		6	50	50	1500
		Payment to external resource persons		6		250	1500
		Materials , repeat orientations					5500
		Sub Total					**10,000**
Sub-Total			**225,000.00**				
Total			**360,000.00**				

(US S (1) = LKR 300)

8.7. Information Disclosure and Consultation

According to Section 64 of the ESF, AIIB requires environmental and social information disclosed by the client. The PMU will ensure that copies of the ESIA conducted for this project as well as the ESMP are made accessible to any stakeholders either in the form of hard copies or electronically. The referenced documents will be posted on CEB's website https://www.ceb.lk and AIIB's https://www.aiib.org/en/projects/details/2020/proposed/Sri-Lanka-Kerawalapitiya-Port-2nd Transmission-Line-Project.html#:

Project related information will be shared with all stakeholders during consultative sessions. Community awareness programs will be conducted jointly by the PMU and the Contractor to inform the scope of the project, procedure of construction activities, possible disturbances to utilities, anticipated impacts and mitigation measures. Also, printed material such as posters, leaflets containing the project details, its anticipated impacts, implementation procedures and time frames and grievance redress procedures etc. will be distributed among all parties who would be potentially affected by the project. Such information will also be posted on public places.

9. Grievance Redress Mechanism (GRM)

This section describes avenues for any affected community member to lodge a complaint or express a grievance against the project, its staff or contractors as part of the project's implementation. It also describes the procedures, roles and responsibilities for addressing grievances and resolving disputes.

There will be community grievances arising from the construction activities. Particularly the house occupants living very close to the cable laying area will be inconvenienced. There is a possibility that most of the home occupants may be disturbed due to construction night time construction impacts such as noise and vibration. Utility services may be disrupted. Cracks can occur on the structures and accessibility can be disrupted. Therefore instituting a proper Grievance Redress Mechanism will be essential. This mechanism will remain active throughout the life cycle of the project. Following procedures will be adopted:

- The civil, contractor shall take adequate care to minimize grievances through careful designs and good construction management. However grievance/complaints may occur. Therefore adequate time and opportunity will be provided for any aggrieved party to make a complaint seeking redress.
- All grievances/complaints will be received, duly recorded and resolved in a transparent manner within a specific time period;
- CEB will ensure that a grievance redress mechanism will be instituted in such a manner that grievances are resolved first at the site office level where possible and/ or failing which at the PMU level. Any grievances which will not be resolved at the site or at the PMU level will be resolved at the Divisional Secretariat level.
- CEB will ensure that a focal point and a grievance committee will serve at each of the above levels to resolve the grievances;

- Adequate awareness will be raised about the grievance handling procedure among the communities enabling the community members to seek redress from the GRM;

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Initial level (site level) to resolve complaints / grievances:

Any aggrieved parties can report their grievances and complaints directly to the civil contractor either verbally (in person, or via telephone or SMS) or in writing. Furthermore, a complaint box will be placed at the construction site to lodge any grievances or complaints from the affected parties. All compliants received either through verbal means or through any other means will be recoded in the Grievance Register. The information that will be recorded are:

- Reference Number
- Data of the complaint
- Name of the complainant/s
- Gender
- National Identity Card number
- Address
- Summery of the complaint
- Signature of the complainant/s

A site level Grievance Committee (GC) will constitute:

- The contractor's representative (Site OHS Officer) (serve as the Focal Point) ,
- PMU Representative (Environmental Engineer),
- A member from a civil society organization (CSO) or the Religious Leader
- A female representative from the CSO will also be included with a view to ensuring adequate women representation in the GC.

The main function of the committee would be arbitration and negotiation based on transparent and fair hearing of the cases of the parties in dispute between community members and the Project contractor/developer.

. Procedure entailed in addressing the grievances at the site level will be that:

- The site OHS officer shall convene the Grievance Committee (GC) after having carefully studied the grievances in question. Once the Focal Point is convinced that the Grievance / Compliant is bona fide and need deliberations he will take following action: ,
- The affected party and the other members will be invited to the GC after determining a suitable date and time for the GC. The date and time of the GC meeting should be informed to the aggrieved party and the GC members in advance.
- The venue for the meeting can be that of the contractor's office or any other place mutually accepted to all parties.
- Sufficient information should be provided for the members to have a clear idea of the grievance ;
- During the course of the hearing if there is any necessity for a site visit, this should be arranged;

- The GC member during the investigation shall consult any other stakeholders (Public agencies /private institutions, individuals etc.) and carefully assess the severity of the problem.
- The grievance committee with majority consent will determine a corrective action in consultation with the aggrieved person.
- The decision should be conveyed to the Site Manager and the aggrieved party should be informed of the redress:
- All proceedings of the GC to take place in a language preferred by the aggrieved party.
- The focal point will also maintain a data base of all the cases deliberated, resolved and referred to higher authorities;
- The Focal point will also submit a quarterly report to the project management.

Within a period of 07 days from the time of the 1st meeting of the GC the grievance should be resolved and parties to be informed.

If the grievance cannot be resolved in one sitting, a repeat sitting should be arranged without delay to continue the investigations.

If the aggrieved party is not convinced or that he/she is not contended with the solution offered, he/she can have the access to the second level.

The second level (PMU level) to resolve complaints/ grievances:.

The purpose is to resolve any issues not adequately addressed to the acceptable level by parties at the site level. Such grievances will be referred to the PMU level Grievance Committee.

The GC at te PMU level will constitute:

- The Site Environmental Engineer (EE) to represent the Project Manager
- The Civil Contractor (OHS Officer) or his/her representative
- A representative from the Civil Society Organizations (CSO).
- A female representative from the CSO
- Any other member as required to be nominated by the aggrieved party;

The PMU will engage the Site Environmental Engineer (EE) as the lead / Focal Point to convene the GC meeting.

The PMU Focal Point will receive the unresolved grievances, the copies of the GC proceedings and other details such as the contact details of the complainant, date that the complaint was received, nature of the grievance, agreed corrective actions and the date these were effected and the final outcome.

Once the Focal Point receives such information the GC should be convened after informing the participants well in advance. All members of the GC should be provided with the information about the grievance in question.

Additional information to support the complaint should be received from further site visits.

The proposed corrective action and the timeframe in which it is to be implemented will be discussed with the complainant and an agreement should be arrived at.

Grievances reported should be resolved within 14 days from the time of the receipt of the grievance.

Third Level (Divisional Secretariat level) to resolve complaints/grievances:

There are circulars delegating powers to the Divisional Secretaries by the Public Utilities Commission of Sri Lanka (PUSCL) to institute Grievance Committee to resolve any public complaints particularly with regard to paying compensation related to land acquisition and any other damages to crops and structures. When affected person/s is/are not satisfied with decision taken at both of the above levels, the affected party can access to the Grievance Committee convened by the DS which is guided by the PUCSL circulars. The Grievance Committee (GC) will be headed by the DS or a Representative of the DS. Other members would be:

(a) The Complainant
(b) A family member of the complainant (if needed)
(c) The Gram Niladhari of the GND where the grievance is originated
(d) The Project Manager or his/her nominee (EE)
(e) A female representative as nominated by the CSO
(f) Representative of a CSO or a religious Leader
(g) Representative of the Contractor
(h) Any other technical officer/s to represent relevant agencies can be co-opted.

The GC should be convened at the DS office every one month. The PIU will coordinate with the DS office in convening the GC meetings. The number of grievances that will be taken up and the previous correspondence with regard to same will be shared with the relevant officer of the DS office.

The affected party and the members of the GC should be informed by a letter issued by the DS to taker part in the GC well in advance.

All materials pertaining to the GC proceedings of the particular compliant/ grievance has to be catrefully deliberated and parties should arrive at a fair decision. If necessary site visits can be made. Grama Niladhari the local government officials, technical officers shall play a critical role.

Effort should be made to resolve the grievance at least within a reasonable time period preferably not more than two weeks after it is referred to the GC. If the investigations will take more time, the complainant should be informed accordingly. GC will deal promptly with any issue relating to compensation for damaged property or livelihood

The decisions of the GC will be conveyed to aggrieved party in writing. Three copies of the decisions will be provided: one for the aggrieved party, second copy for the Project office and the third copy for the Divisional Secretary.

If the GC is unable to find a fair solution to the relevant compliant or if any legal issue is involved or complaint is not within the mandate of GC the affected party will be informed accordingly allowing

him/her time to seek redress from the formal court of law or other institutions such as the Community Mediation Boards (Samatha Mandalaya) and/or the Human Rights Commission.

10. Conclusion and Recommendation

The ESIA team concludes that the project is of vital importance to the economic development of the country in terms of its ability to improve operational efficiency, quality and reliability of supply of electricity to the Colombo Region. With the project providing reliable power supply it can boost economic development which is now coupled with the ambitious investments plans initiated by the GOSL in the development of Colombo Port City as a regional financial hub as well as other investments sought by the UDA in the peripheral areas. During the process of the ESIA, the team of consultant found that the underground transmission line is aligned along several of the busy highways when it is laid from Kerawalapitiya through Colombo port Grid Substation. Either side of several sections of the road is crowded with residential units, commercial centers including schools and religious places and road side vendors. The pathway crosses several culverts and bridges.

Overall, the major environmental, social and health and safety impacts will be associated with the construction period. Among the adverse impacts are those arising from the construction activities such as the dust, noise and vibration during trench excavation and transport of spoils. Since the construction work is planned for night time, noise and vibration could have severe impacts on the residents living close to the roads. Vibration during excavation and demolition processes can cause damages to the structures such as parapet walls, housing units etc. located very close to the roads. Possible traffic congestion, access difficulties to the road side houses and other business entities and possible disturbances to utility services due to trench excavation are other significant impacts. Stockpiling of construction materials as well as accumulation of spoils will also impact on the traffic and the residents as well as the road side vendors. Demolition of road surfaces could generate a significant volume of wastes. These negative impacts are reversible with good construction practices.

Consultations had been conducted with key stakeholders including the residents living along some of the road sections. The key stakeholders including the Divisional Secretaries recommended that the construction work should be completed soon and road sections which will be excavated should be restored at the earliest. An ESMP has been prepared as part of the ESIA incorporating proposed mitigation measures. It is recommended that the ESMP be implemented enabling the CEB to adopt best engineering and environmental practices during construction.

Overall the benefits of the project will be far outweighing any negative and adverse impacts. All the negative and adverse impacts are of temporary nature. As the project falls in category ‘B’ as per the AIIB ESP guidelines, and that under the NEA, the project does not fall within the category of prescribed projects, no detailed EIA study is required to be submitted to the CEA for approval.

It is therefore recommended that the project be approved for funding.

11. References

i. Detailed Feasibility Report (DFR) for Construction of Second 220kV Underground Circuit from Kerawalapitiya GSS to Colombo port GSS, Draft Final Report, prepared by Tokyo Electric Power Services Co. Ltd., May 2019

ii. Construction Method Statements for excavation of Trial Pits and open trenching works, including Hydraulic Direct Drilling methods (HDD),

iii. Route Details initially identified by the CEB

iv. Typical Trench Design and the specification details of the UG/TL identified for the project.

v. Beckett, K.P., Free-Smith, P.H. and Taylor, G. (1998). Urban woodlands: their role in reducing the effects of particulate pollution. Environmental Pollution, 99, 347-360.

vi. Sternberg, T., Viles, H., Catherides, A. and Edwards, M. (2010). Dust particulate absorption by ivy (*Hedera helix* L) on historic walls in urban environments. Science of the Total Environment, 409, 162-168.

vii. Ilepereuma, O.A. (2000). Environmental pollution in Sri Lanka: a review. Journal of the National Science Foundation of Sri Lanka, 28, 301-325.

viii. EML Consultants (2017). Initial Environmental Examination (IEE) Report of the Proposed Waste to Energy Project at Muthurajawela. EML Consultants and KCTH Lanka Jang (Pvt) Ltd, Sri Lanka.

ix. Road Development Authority (2018). Initial Examination Report - SRI: SASEC Port Access Elevated Highway. Road Development Authority, Sri Lanka and the Asian Development Bank

x. IEE Report for SRI: SASEC Port Access Elevated Highway. Road Development Authority of Sri Lanka and Asian Development Bank; RDA 2018

xi. Nathanson, J.A. (2008). Basic Environmental Technology – Water Supply, Waste Management and Pollution Control. Prentice Hall, USA.

xii. Long term Generation Expansion Plan (Draft Report) 2020-2039, CEB, May 2019 and 2022-2041 of Oct 2021

xiii. Report on the monitoring of Ambient Particulate Matter (PM10 and PM2.5) levels for proposed underground cable project from Kerawalapitiya Grid Sub Station to Colombo Port Switching Station, by NBRO dated May 2021.

xiv. Resource profile (Sampath Pethikada) prepared for the Year 2019 & 2022 by Wattala DS Division and Colombo DS Division.

xv. Western Province Bio Diversity profile and Conservation Action Plan by the Ministry of Environment & natural Resources

xvi. Environmental and Social Framework – 2016; AIIB down loaded from https://www.aiib.org/en/policies-strategies/framework-agreements/environmental-social-framework.html

xvii. National Energy Policy ;http://rmaenergy.lk/wp-content/uploads/2021/09/National-Energy-Policy-2019-English.pdf

xviii. Report on Implementation of 2nd 220kV Underground cable from Kerawalapitiya GSS to Colombo Port GSS

12. Annexes

12.1. Terms of Reference (TOR) and Recommended Format For the ESIA

1. INTRODUCTION / BACKGROUND INFORMATION

(Present a brief introduction about the proposed project that includes the location, size and scope of the subproject including project area of influence and locations of associated ancillary facilities. Also present a map showing the location of the project and vicinity.)

2. OBJECTIVES

This Terms of Reference outlines the requirements for consultancy service for the preparation of an Environmental and Social Impact Assessment (ESIA) report of the proposed subproject (Name of project). The aim of the ESIA is to identify environmental and social impacts and corresponding mitigation measures of the project. The ESIA shall be prepared as a tool in understanding the environmental and social consequences to facilitate the protection, restoration, and enhancement of the environment.

Specifically, the ESIA for the proposed subproject will be carried out with the following objectives:

F. Document existing environmental and social baseline information in the project area and surrounding areas;
G. Outline project activities that will be undertaken during implementation of the subproject;
H. Conduct project public consultations and document the disclosure activities undertaken;
I. Identify adverse environmental and social impacts of the project and propose mitigation measures to address such impacts;
J. Outline an Environmental and Social Management Plan (ESMP) with clearly defined institutional structure that will oversee the implementation of the ESMP; and
K. Conduct due diligence of resettlement sites, where applicable, and formulate a Resettlement Action Plan (RAP) for displaced persons.

3. SCOPE OF THE ESIA STUDY

The consultant will study and prepare the following aspects for inclusion in the ESIA:

A. Description of the proposed project. Provide a brief description of the relevant components of the project including maps at appropriate scale. The project description should include information on location, general layout, size, capacity, implementation activities, schedule, staffing and support, facilities and services, operation and maintenance activities, and associated ancillary facilities.
B. Description of the Environment and Social Condition. Present the baseline data on the relevant environmental and social characteristics of the project area of influence. Include information on the following:
    - Physical environment: Geology, soils, climate and meteorology, ambient air quality, noise, surface water quality, hydrology and flooding, existing sources of water pollution.
    - Biological environment: Terrestrial and aquatic flora and fauna, rare or endangered species, sensitive habitats, including parks or natural reserves, species with potential to become nuisances, vectors.
    - Socio-cultural environment: Present and projected population, land use, planned development activities, community structure, employment, distribution of income, goods and services, public health, cultural properties, economy, traffic, education, health.
C. Legislative and Regulatory Considerations Relative to the Project: Describe the pertinent regulations and standards governing environmental quality, health and safety, protection of sensitive areas, siting, land use control, etc. at national, regional and local levels.
D. Analyze alternatives/project options and provide advice on the most appropriate option taking into account environment and social issues;
E. Determination of the Potential, Cumulative and Induced Impacts of the Proposed project: In this analysis, distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts. Identify impact which are unavoidable or irreversible. Wherever possible, describe impacts quantitatively, in terms of environmental and social costs and benefits.
F. Development of Management Plan to Mitigate Negative Impacts: Recommend feasible and cost-effective measures to prevent or reduce significant adverse impacts to acceptable levels. Estimate the impacts and costs of these measures, and of the institutional and training requirements to implement the measures. Consider compensation to affected parties for impacts, which cannot be mitigated. Prepare a management plan including proposed work programs, budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.
G. Identification of Institutional Needs to Implement Environmental and Social Assessment Recommendations: Review the authority and capability of institutions at local, regional, and national levels and recommend steps to strengthen capabilities in the management and monitoring of the ESMP.
H. Development of a Monitoring Plan: Prepare a detailed plan to monitor the implementation of mitigation measures to address the impacts of the proposed subproject during construction and operation. Include in the plan an estimate of the costs and a description of other inputs such as training and institutional strengthening programs needed to carry it out.
    (i) Assist in Information Disclosure, Stakeholder Consultation, and Inter-Agency Coordination: Assist CEB in the conduct of stakeholder consultation, information disclosure and inter-agency coordination. Identify stakeholders and interest groups and prepare process documentation summarizing the issues and concerns raised during the consultation meetings. Ensure that the ESIA document is publicly disclosed through the CEB website and that hard copies are readily available at both offices.
I. Assist the CEB in securing the required environmental permits and clearances from the local Sri Lankan authorities.

J. Development of a Resettlement Action Plan (RAP): When necessary, in the case of displaced communities, a resettlement action plan should be incorporated in the ESIA report.

4. RECOMMENDED OUTLINE OF THE ESIA

Introduction: Generally, the Bank requires the Client to adopt an integrated approach to the process of assessment, given the complex interrelationships of environmental and social risks and impacts in both public- and private-sector Projects. However, the Bank recognizes that in some countries the legislation and procedures require separate environmental and social documents, making the preparation of an integrated environmental and social assessment difficult to achieve. This template presents a suggested outline for an ESIA (integrating environmental and social impacts in one assessment report).

(a) Executive Summary

Concisely discusses significant findings and recommended actions. Includes scope and coverage of project, categorization, key environmental and social impacts, consultations conducted, disclosure of documents.

(b) Introduction

Describe objectives, scope, methodology of ESIA study, study timeline, and structure of the report etc.

(c) Policy, Legal and Administrative Framework

- It is also important that this section only covers directly relevant material rather than A. citing applicable policies, laws, regulations, standards, and guidelines without identifying and explaining the specific parts that apply to the project, or B. providing a long list that contains many references of little relevance
- Analyzes the legal and institutional framework for the project within which the environmental and social assessment is carried out. This includes international and national legal framework applicable to the Project.
- Compares the Borrower's existing environmental and social framework and the ESF and identifies the gaps between them.
- This section takes into account in an appropriate manner all issues relevant to the project, including: the country's applicable policy framework, national laws and regulations, and institutional capabilities (including implementation) relating to environment and social issues; variations in country conditions and project context; country environmental or social studies; national environmental or social action plans; and obligations of the country directly applicable to the project under relevant international treaties and agreements;
- Identifies and assesses the environmental and social requirements of any co-financiers.

(d) Project Description

- Concisely describes the proposed project and its geographic, environmental, social, and temporal context, including any offsite investments that may be required (e.g., dedicated pipelines, access roads, power supply, water supply, housing, and raw material and product storage facilities), as well as the project's primary suppliers.
- Through consideration of the details of the project, indicates the need for any plan to meet the requirements of the ESF.
- Includes a map of sufficient detail, showing the project site and the area that may be affected by the project's direct, indirect, and cumulative impacts.

(e) **Associated Facilities.**

- Describe activities that are not included in the description of the Project set out in the agreement governing the Project, but that the Bank determines, following consultation with the Client, are: (a) directly and materially related to the Project; (b) carried out or planned to be carried out, contemporaneously with the Project; and (c) necessary for the Project to be viable and would not be constructed or expanded if the Project did not exist. Identify and assess the potential environmental and social risks and impacts of Associated Facilities and assess level of control or influence of the project sponsor/implementing entity over the associated facility.

(d) Baseline Environmental and Social Data

- The type of baseline environment and social information and level of detail presented have to be relevant to the likely project ES impacts. The information gathered and provided should help to explain the project's potential impacts, covering the range of physical, biological, socioeconomic and cultural resources that will be affected on site and in the project's area of influence. It has to provide a comprehensive picture of the conditions that may be affected by the project or influence the impacts;
- Voluminous material that does not enhance the reader's understanding of the key environmental and social issues should not be included. Where a detailed study is done on a specific issue such as a vegetation survey, it is standard practice for summaries to be provided in the baseline and impact analysis sections and the entire study to be presented in an appendix.
- Based on current information, assesses the scope of the area to be studied and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences.
- Considers current and proposed development activities within the project area but not directly connected to the project.

(e) Evaluation of Environmental and Social Risks and Impacts[52]

- The analysis of project impacts and risks is the technical heart of the assessment process, providing a comprehensive net appraisal of the project's effects on the environment and socioeconomic conditions. Potential impacts and risks have to be evaluated against the applicable laws and regulations of the host country and AIIB's requirements;
- Considers all relevant environmental and social risks and impacts of the project. This will include the environmental and social risks and impacts specifically identified in the ESF, and any other environmental and social risks and impacts arising as a consequence of the specific nature and context of the project.

(f) Mitigation Measures (This section can be a standalone document in the form of an ESMP)

- Identifies mitigation measures and significant residual negative impacts that cannot be mitigated and, to the extent possible, assesses the acceptability of those residual negative impacts.

Content of this Chapter:
(a) mitigation measures;
(b) environmental and social monitoring and reporting requirements;
(c) related institutional or organizational arrangements;
(d) provisions for information disclosure and consultation;
(e) capacity development and training measures;
(f) implementation schedule;
(g) cost estimates; and
(h) performance indicators.

52

This could be presented in the form of an ESMP matrix.

(g) Analysis of Alternatives

- Systematically compares feasible alternatives to the proposed project site, technology, design, and operation—including the "without project" situation—in terms of their potential environmental and social impacts.
- Assesses the alternatives' feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of alternative mitigation measures, and their suitability under local conditions; and the institutional, training, and monitoring requirements for the alternative mitigation measures.
- For each of the alternatives, quantifies the environmental and social impacts to the extent possible, and attaches economic values where feasible.

(h) Public Consultation and Information Disclosure

Stakeholder Analysis Identification. Identify Key Stakeholders.
Consultation Plan. Engagement with stakeholders from preparation to implementation of project.

(i) Resettlement Policy Framework (RPF). The RPF should include a well-defined Entitlement Matrix indicating the types of losses and the compensation / assistance provided against each category of loss. The process of land acquisition (if applicable) to be followed should clearly be mentioned. Provisions for Negotiated Settlement for securing land should be included in this discussion. The alternative approach contemplated in case the negotiation fails must be outlined. In case of land acquisition and related physical and economic displacements, the scope and level of detail of the relevant action plan will be determined. The plan shall be prepared based on social assessment survey and should cover the impacts on the community and other adversely affected groups.

The consultant will have to ensure that the RoW is free from any encumbrances and that the Client has engaged with all the relevant stakeholders including utility providers, mobile vendors, householders and shop owners whose access will be temporarily blocked, and indicating that land is available with the Client for cabling works. All records of communications and consultations will have to be taken from the Client and reflected in the relevant E&S documents.

(j) Institutional Mechanism. An institutional mechanism for the implementation and monitoring of ESMP shall also be formulated in the ESIA and the mechanism should clearly identify the role of all the agencies involved in the Project implementation. The Consultant shall assess the institutional capacity of Client pertaining to the projects. Based on the assessment, the Consultant shall propose appropriate Institutional arrangement for effective environmental management of the Project. A detailed institutional capacity building strategy shall be proposed for the Client, Consultants and contractors.[53]

(k) Grievance Redress Mechanism

- This chapter describes an arrangement for receiving, evaluating and facilitating the resolution of workers and affected people's concerns, complaints, and grievances about the borrower/client's social and environmental performance on a project. A GRM is important for development projects where adverse impacts or risks are ongoing or anticipated.

[53] To propose the necessary institutional setup/strengthening /training and whether hiring of fulltime staff or consultants is required and, if so, whether fulltime or part time etc., and what kind of training is expected.

(l) Conclusion and Recommendations

- This chapter provides the conclusions drawn from the assessment and provides recommendations, limits of study and further plans needed during project implementation.

(m) Appendices

- List of the individuals or organizations that prepared or contributed to the environmental and social assessment.
- References—setting out the written materials both published and unpublished, that have
- been used.
- Record of meetings, consultations and surveys with stakeholders, including those with affected people and other interested parties. The record specifies the means of such stakeholder engagement that were used to obtain the views of affected people and other interested parties.
- Tables presenting the relevant data referred to or summarized in the main text.
- List of associated reports or plan

12.2. Additional scope for the ESIA

Page No.	Section/ Paragraph	Reference	Observations/Suggestions
General Comments: • Ensure that full titles of the abbreviations are used in their first appearance in the text. • Ensure to check the status of the roads that were under improvements during the initial survey (ESIA) and update the relevant sections accordingly. • Update the line route inventories including those presented in Annexures 11.10 and 11.11 with new observations made based on the final design.			
16	1.1– Para.2	Project Overview - CEB's electricity supply and demand data	Update the statistics presented here with more recent data
16-17	1.2 & 1.3	Project Justification and Project Description	Check with CEB whether they have any updates/revisions on project justification and project description after recent power crisis and tariff revisions.
18	1.5	Impact study area included 15.6 km. long route alignment of the UG/TL covering 5 m from either the side of the proposed trench to be excavated. The 15.6 km. route alignment cuts across 06 GN divisions of the Colombo DS divisions and another 05 GN divisions of the Wattala DS division.	Check and verify whether the figures presented here remain the same.
19	1.7	ESIA Methodology – Documents referred to	Check with CEB on the availability of any other reports such as final T/L designs since the preparation of the ESIA, and update the list of references.

Page No.	Section/ Paragraph	Reference	Observations/Suggestions
20	1.7	Although it was planned to have a greater number of small focus group discussions with the community, prevailing health guidelines had prevented having large number of such meetings with the community. (See Section 1.11 on Limitations)	Recommence these planned FGDs and ensure that women are adequately represented in these FGDs (or conduct FGDs exclusively with women) and document their specific concerns and issues related to project implementation and suggestions for mitigating adverse risks and impacts. Include them in the ESMP.
21 &24	1.10 & Figure 4	Implementation arrangements and time frame	Revise the time frames in consultation with CEB.
21	1.11	Limitations of conducting ESIA	Update this paragraph with new consultations undertaken.
23 - 24	Figure 2 &3	Cable route as shown in the Detailed Feasibility Report & Route Alignment	Replace the Maps if new Maps are available with CEB after its final design/trace.
30	Table 1	Section 9: Improvements to Aluth Mawatha	Update this statement in line with the completed improvements to Aluth Mawatha.
30	Table 1	Section 12: Factories Ordinance	Elaborate the provisions under this Ordinance to include workers' rights e.g. work hours, overtime, meal breaks, conditions of employment and the applicable work places (refer sections 125 & 126 of FO)
30	Table 1	Labor related laws and regulations	Additionally, include relevant provisions from the following labor policies and laws. • The National Occupational Safety and Health Policy, 2014 • The Workmen's Compensation Ordinance 1934 and its Amendments Act in 2022 • The Employment of Women, Young Persons and Children Act 1956 and its Amendments Act No.29 of 1973
33	2.2	The ESS 2 (Involuntary Resettlement) will not be applied to the project as there is no land acquisition or resultant compensation payment.	Check and verify whether this statement still remains valid after the final design of the trace.
35-38	3.2, 3.3 & 3.4 & Figures 5 & 6	Key characteristics of the project, major construction components, and cable routing and the route maps	Check against CEB's final design and confirm whether the descriptions provided still remain unchanged. Revise and update the descriptions where necessary.
39-49	3.5 and 3.6	Excavation corridor, construction method statement	Check against CEB's final design and confirm whether the descriptions provided still remain unchanged and specifically on the construction method. Revise and update the descriptions wherever necessary.
50	3.7	Associated Facilities - Therefore, it is concluded that there are no associated facilities for the project to be considered for the ESIA.	Check with CEB whether this statement is still relevant after the final design, vis a vis the LNG plant.

Page No.	Section/ Paragraph	Reference	Observations/Suggestions
50	3.8	Other resources / facilities required / provided	Include that stock yards, labor camps, solid waste disposal areas and vehicle parking areas should be established away from community settlements and other social and environmental sensitive areas and that selected locations should receive prior approval from the respective LAs and the project engineer. Also, separate accommodation and sanitary facilities for male and female workers.
51	4.1	Since some of the roads (such as Hekitta Road, Aluth Mawatha) are under construction	Update the current status of construction work as necessary
51-52	4.2 & Table 3	Route Alternatives	Check against the final design and verify whether there had been any changes to the line route. Additionally, check whether the landscape of the line route has changed since the last survey (ESIA) with new structures been erected.
54	Table 4	Summary Alternative Analysis	Check against the final design.
55-	Chapter 5	Baseline Environmental and Social Data	Update the environmental and social characteristics of the project impact area if necessary. Include a new section on Gender Issues in the project impact area – This can evolve around (i) women's access to education and training (ii) women's access to employment; (iii) access to services such as health and medical care; (iv) women's issues related to energy/electricity; (v) domestic violence, GBV, SEA & SH; (vi) institutions (State & CSOs) that support women's empowerment and grievance redress (e.g. *Mithuru Piyasa* centers established by Health Ministry in hospitals to help victims of GBV). You may use the new consultations to discuss the above issues and also refer to relevant secondary data.
78-79	Table 17	Details of the road sections by length and authority	Update if there are any changes/deviations based on the final design
79 & 80-85	5.6.1 & Table 18	Road survey and observations - The Trench will take to the Left hand Side (LHS) of the Road in some sections and to the Right Hand Side (RHS) on other sections depending on the road profile. There were also a few sections, which CEB was not certain as to which side of the way to have the trenches, in such cases, inventory included all the structures present on both sides. The road survey was made accordingly.	Update this section based on the final design and mention that X km of the T/L traverse to the LHS of the roads, and Y km to the RHS and Z km on the median center. Also, revise Annexures 11.10, 11.11 and 11.12 accordingly. Revise and update the Table 18 as necessary. When doing so, check whether there had been any changes in the previous landscape (observed during the last survey) with new structures been erected/new socioeconomic activities established.

Page No.	Section/ Paragraph	Reference	Observations/Suggestions
86 & 92	Table 19	Key stakeholders & consultations with residents and vendors	Additionally, include women's groups, community organizations e.g. church and temple societies, and vulnerable groups (poor, persons with disabilities, elderly, and women headed households) as stakeholders to be consulted. Focus on their perceived risks and impacts owing to project implementation. And include any specific measures that should be implemented during project construction to address their issues and concerns in the ESMP.
89	Table 20	Summary of consultations with relevant officers	Re-commence consultations with the two DSs, their GNs, Pradeshiya Sabha, CMC and the service providers and update the Table. Focus on approval processes, and the type of support that can be extended by these agencies during project implementation. Include the participation of female officers representing these different agencies and their roles in approval processes, monitoring and extending support to the project. For example, female DSs and GNs who can be proactively engaged in community consultations and information disclosure.
92-93	6.1 Table 21	Summary consultations with residents and vendors	Consult more women vendors, women's groups, low-income households such as those in Aluth Mawatha, vulnerable groups and CSOs. And include any specific measures that should be implemented during project construction to address their issues and concerns in the ESMP.
95	7.2.1	Impacts during the pre-construction phase	Discuss whether the pre-construction phase requires removal of any wayside trees, providing safe and alternate accesses to the public where access would be disrupted due to construction work, temporary diversion of canals and waterways, shifting of public utilities, selection and use of temporary land for construction activities, setting up labor camps and facilities etc. and their potential impacts.
95	7.2.1.1	There will be 22 Trial Pits as shown in Table 22 below	Check against the final design whether the No. trial pits remain the same.
107	7.2.4.2	Construction impacts on the road side vendors and those running small kiosks	Good if an estimate of the No. female vendors likely to be affected by construction work can be provided. New consultations planned can focus more on these potential impacts on livelihoods, especially those operating at night and from 10.00 pm onwards. And include any specific measures that should be implemented to address the issues and concerns of the female vendors in the ESMP.

Page No.	Section/ Paragraph	Reference	Observations/Suggestions
107 - 108	7.2.4.3 & Table 26	Impacts on the road vehicular traffic - At present due to ongoing road improvisation work along a section of Aluth Mawatha (the culvert and asphalt overlay), the narrow section of the road serves as a bottleneck.	Revise this section if road works had been completed. Assess the perceived impacts on traffic specifically during construction time i.e. from 10.00 pm to 6.00 am and not during daytime. Traffic during this nighttime should be comparatively less.
109	7.2.5	Occupational Safety & Health and public Safety Impacts	Suggest to improve this section, and discuss the potential OH&S related issues/impacts separately under; (i) public safety; (ii) accidents; and (iii) safety of the workers.
110	7.2.6	Issues of labor influx	This section can be expanded to include issues of (i) forced labor, (ii) child labor, (iii) labor trafficking, (iv) GBV, SEA & SH, (v) labor camps and facilities (Overcrowding, communicable diseases etc.), and (vi) conflicts with host communities. Also, describe whether the contractors would employ female workers and if not, discuss what the constraints are for engaging women e.g. night time work, excavation work etc. Explore the possibilities of employing one female E&S Officer by the contractor.
110 -	Chapter 8	Environment and Social Management Plan	Suggest re-structuring the ESMP and presenting it in the form of a matrix where mitigation measures are also separated under (i) pre-construction phase; (ii) construction phase and (iii) post-construction phase together with their implementation responsibilities and mitigation costs. This would bring better clarity to the ESMP.
117	8.1.3	Management of Construction Labor	• Include that contractor establishes a GRM for workers to report their grievances and that the workers are made aware of its existence and the reporting procedures. • Mention that contractors should give priority to recruiting local labor as much as possible for manual/unskilled work to reduce influx of labor and the necessity for labor camps. • Also, mention that the Code of Conduct should be handed over to all the employees of the contractor in their local languages, and ensure that they are read and signed by the respective employees. Code of Conduct should also be displayed in suitable places such as in labor camps and contractor's site office.

Page No.	Section/ Paragraph	Reference	Observations/Suggestions
			• Include a new section on 'operation of labor camps' – camp locations away from settlements and other sensitive areas, provision of uncontaminated water for drinking, cooking and washing, proper sewage systems, garbage disposal etc.
117	8.1.4	Occupational Health & Safety of Workers	As mentioned earlier, include the necessity to have a Workers' GRM
119	8.1.7	Public Safety	Include the following; • Providing safe access to houses and common properties • Conducting public safety awareness programs for residents, vendors, trishaw drivers etc. occupying places beside the roads.
122		Environmental and Social Monitoring Plan – section of community grievances	Add another parameter – type of solutions provided for grievances reported (Note that not all grievances end up with compensation. Other type of solutions can be given).
123		Contractors' labor management procedure	Include the following parameters; • Deployment of any child/forced labor • Deployment of female labor • Worker registration and age certification • Code of Conduct issued • Conditions of labor camps and facilities provided • Establishment of Workers' GRM
125	8.5	The Project will establish, maintain, and strengthen, as necessary, an organizational structure that defines roles, responsibilities, and authority to implement the ESMP	Note that it is the responsibility of the Contractor to implement the ESMP. The E&S team of the project's PMU will coordinate, supervise and monitor the ESMP implementation by the contractor. Responsibility of the ES officers of the PMU is to plan and implement measures required for the overall E&S management of the project. Revise the two paragraphs to reflect this distinction between the ES team of the PMU and the contractor.
126	8.6	Roles and responsibilities for implementing the ESMP	• Please note the above comment. The responsibility of the Environmental Officers/Engineers assigned to the TD&EB and project's PMU is the overall E&S Management of the project and not ESMP implementation. Revise the title and the contents accordingly. • Not necessary to include personal names. • Check and verify whether the institutional arrangements described here remain the same.

Page No.	Section/ Paragraph	Reference	Observations/Suggestions
			• Also, check the level of engagement of the female officers/engineers in the TD&EB, PMU and E&S team. Explore the possibilities of including/increasing the female officers.
129	8.7	Capacity Development and Training	• Identify, assess and include the proportion of females who can be involved in the awareness and training programs representing the contractor's staff, PMU and other stakeholder agencies. • Include the female trainers who can serve as mentors in these training programs. • Also, explore the possibilities of involving the WePower Network in these capacity building programs (a network of professional women in energy and power sector in South Asia) where CEB, LECO, SLSEA are members. https://collaboration.worldbank.org/content/sites/collaboration-for-development/en/groups/the-wepowernetwork.html
132	8.9	Stakeholder consultations that were temporarily halted due to COVID 19 pandemic situation will be resumed prior to the commencement of project implementation and as soon as the pandemic situation is contained	• This statement can be revised with new consultations conducted.
132	8.10	Grievance Redress Mechanism (para.1)	• Please include who will be the focal point for receiving grievances, who will be responsible for resolving grievances (apart from recording the grievances by the E&S officer of the contractor) at the site level, procedure that will be followed, and the time frame for grievance resolution.
133	8.10	Grievance Redress Mechanism (para.2)	• Mention that gender balance will be maintained by appointing female members to the PMU level GRC • Include the procedure to be followed and the time frame for grievance resolution
133	8.10	Grievance Redress Mechanism (para.3) Tier 3 of the GRM	• Include the procedure to be followed by GRC and the exact time frame for grievance resolution.

12.3. ESIA Team (Preparers)

Name	Designation	Work Allocation
LPD Dayananda	Team Leader/ Sociologist	Social Assessment, Report Compilation
R.K.A. Kularatne-	Environmental Health and Safety Specialist	Assessment of environmental quality and health and safety ;
Thilakasiri Piyarathne	GIS specialist	Preparation of Maps

12.4. Impact Assessment Method

Potential impacts were examined as significantly positive or negative, direct or indirect, short-term or long-term, unavoidable/irreversible during the different phases of the project. Impacts assessed also included any potential cumulative pacts of the proposed project and other existing or under construction/ developments or other similar projects in the area. Pre-construction, construction and operation phases were considered for impact identification.

In order to determine if any environmental aspect[54] has demonstrable impact on the environment, the following criteria (based on ISO 14,001 – 2015) criteria were used.

- Extent / scale of impact: can be limited to the project site and to a specific activity and aspect [55]at a particular period, or affect areas beyond the project site. The extent of the impact will be scaled from 1 (local) to 5 (beyond the District).
- Duration: in which the project takes place is also considered in the evaluation of the impact. The periodcanbespecifictotheperiodofcertainactivitiesorcouldberelatedtotheoccupancyperiod oftheprojectdevelopment.Therefore,intermsofduration,theimpactscanbeshort,medium,long termorpermanent.Activitieswithshortdurationwillbeallocated1whilethosewithlongduration given5.
- Size/Magnitude or severity:ofanimpactisderivedfromtheproportionoftheenvironmentalentityaffected, that is, impact can be partial or complete. For example, an impact can destroy a small part of the habitat, ecological process or a small population of a species.

EXTENT		**MAGNITUDE**	
Localized (At localized scale and a few hectares in extent)	**1**	Small and will have no effect on the environmental goods and services (environmental functions)	**0**
Study area (The proposed site and its immediate environs)	**2**	Minor and will not result in an adverse impact on the environmental goods and services	**1**
Regional (Province /District level)	**3**	Low and will cause a slight impact on the on the environmental goods and services	**2**
National (Country)	**4**	Moderate and will result in process continuing but in a modified way	**3**
Transboundary (Regional or Global)	**5**	High (processes are altered to the extent that they temporarily cease)	**4**
		Very high and results in complete destruction of patterns and permanent cessation of the on the environmental goods and services	**5**

[54]Elements of an organizational activity, products or services that can interact with the environment as per ISO 14,001 (2015).

[55]

DURATION			PROBABILITY	
Very short (0 – 1 Year)	**1**		Highly improbable (<20% chance of occurring)	**1**
Short (1 – 5 Years)	**2**		Improbable (20 – 40% chance of occurring)	**2**
Medium term (5 – 15 years)	**3**		Probable (40% - 70% chance of occurring)	**3**
Long term (>15 years)	**4**		Highly probable (>70% - 90% chance of occurring)	**4**
Permanent	**5**		Definite (>90% chance of occurring)	**5**

The E&S risk was calculated as follows.

Consequence (severity of impact) = Extent + Magnitude + Duration

Environmental Risk (Significance of the Impact) = Consequence (severity) x Probability (likelihood or frequency of the impact)

Table below shows the risk analysis matrix. ERA values ≥ 5 and ≥ 20 were considered as medium/moderate impacts (i.e., the impact should have an influence on the decision process to develop in the area) and high E&S impacts (i.e., the impact must have an influence on the decision process to develop in the area), respectively.

E&S Risk analysis matrix

Severity / Probability	Insignificant	Minor / Low	Moderate	Major	Catastrophic
Extremely rare	1	2	3	4	5
Unlikely	2	4	6	8	10
Likely	3	6	9	12	15
Frequent	4	8	12	16	20
Almost certain	5	10	15	20	25

A separate OHS / human health risk assessment (HHRA) was conducted for open trenching works assuming that there is a little or no risk control by the Contractors. In this respect, a five-point scale was to estimate the likelihood and consequence and risks ≥15 are regarded as severe as shown in the table below.

OHS Risk analysis matrix

Severity Probability	**Minor**	**Loss Time Accidents / ill-health**	**Major (> 3 working days absentia)***	**Permanent disability****	**Fatal**
Extremely rare	1	2	3	4	5
Unlikely	2	4	6	8	10
Likely	3	6	9	12	15
Frequent	4	8	12	16	20
Almost certain	5	10	15	20	25

*Accidents / injuries that result in total or partial disablement of the worker for a period > 3 days after the accident – as per the Workmen's Compensation Ordinance No. 19 of 1934 (as amended)

**This includes both permanent partial and permanent total disabilities described in Schedule I of the Workmen's Compensation Ordinance No. 19 of 1934 (as amended)

12.5. Clarification Letter issued by the CEB on Associated Facilities

Office of the DGM (Transmission & Generation Planning)
5th Floor
Ceylon Electricity Board
50, Sir Chittampalam A. Gardiner Mawatha
Colombo 00200

Date: November 3, 2021

Your Ref.:
My Ref.: CE/TP/T66

DGM (Transmission Design & Environment)

ASSOCIATED FACILITY DETAILS FOR PROPOSED UNDERGROUND CABLE PROJECT FROM KERAWALAPITIYA GS TO COLOMBO PORT SS

This refers to your letter dated 2021-10-25 regarding the above matter.

With the cancellation of 2x250 MW Sampoor Coal Power Plant in the year 2016, future power development was shifted to Kerawalapitiya area to develop Liquid Natural Gas, (LNG), combined cycle power plants to meet the shortfall. According to the Long-Term Generation Expansion Plan 2018-2037, two 300 MW Natural Gas power plants are to be connected to the existing Kerawalapitiya 220 kV GIS switching substation by 2023 (Now, the above power plant capacities are increased to 2 x 350MW). Further, transmission network studies carried out by transmission planning unit reveals that the existing single 220kV underground cable circuit from Kerawalapitiya grid substation to Colombo L grid substation is not sufficient to evacuate power from this second 300 MW LNG power plant.

Therefore, in order to evacuate power from proposed second LNG power plant (expected in 2023) at Kerawalapitiya, it is required to construct second, 220 kV underground cable circuit from Kerawalapitiya GIS substation to Colombo L grid substation.

Please find the above technical explanation for the construction of second 220kV underground cable from Kerawalapitiya GIS substation to Colombo L grid substation as for your request.

Eng. M.L. Weerasinghe
Deputy General Manager
(Transmission & Generation Planning)

Transmission Division Tel: (9411) 2390952 Fax: (9411) 2324842 e-mail: dgmtgp@ceb.lk

12.6. NBRO Env. Quality Reports on Ambient Particulate Matters (Dust)

REPORT ON

THE MONITORING OF AMBIENT PARTICULATE MATTER (PM_{10} & $PM_{2.5}$) LEVELS FOR PROPOSED UNDERGROUND CABLE PROJECT FROM KERAWALAPITIYA GRID SUBSTATION TO COLOMBO PORT SWITCHING STATION

(FOR CEYLON ELECTRICITY BOARD.)

(BASELINE STAGE – MAY 2021)

ENVIRONMENTAL STUDIES & SERVICES DIVISION
NATIONAL BUILDING RESEARCH ORGANISATION
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தேசிய பாதுகாப்பு மற்றும் அனர்த்த முகாமைத்துவ இராஜாங்க அமைச்சு
State Ministry of National Security and Disaster Management

ජාතික ගොඩනැගිලි පර්යේෂණ සංවිධානය
தேசிய கட்டிட ஆராய்ச்சி நிறுவனம்
NATIONAL BUILDING RESEARCH ORGANISATION

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ඔබේ අංකය உமது இல. Your Ref
දිනය திகதி Date 17th June 2021

Client: Ceylon Electricity Board,
6th Floor, No 50,
Sir Chitampalam A Gardiner Mawatha,
Colombo 02.

REPORT ON
THE MONITORING OF BASELINE AMBIENT PARTICULATE MATTER (PM_{10} & $PM_{2.5}$) LEVELS FOR PROPOSED UNDERGROUND CABLE PROJECT FROM KERAWALAPITIYA GRID SUBSTATION TO COLOMBO PORT SWITCHING STATION

(FOR CEYLON ELECTRICITY BOARD)

(MAY 2021)

1.0 SCOPE

As per the letter dated 08th April 2021 Eng. K P Kusum Shanthi, Deputy General Manager - Transmission Design and Environment, of Ceylon Electricity Board requested the Environmental Studies and Services Division (ESSD) of National Building Research Organisation (NBRO) to monitor ambient Particulate Matter (PM_{10} & $PM_{2.5}$) levels of the Proposed Underground Cable Project from Kerawalapitiya Grid Substation to Colombo Port Switching Station to access the environmental conditions within the project area before start the construction activities.

In this regard, following officers of the Environmental Studies and Services Division of NBRO carried out particulate Matter (PM_{10} & $PM_{2.5}$) sampling program on 18th – 20th May 2021.

Staff Involved:

Mr. Viran Daniel	*- Technical Assistant*	*- ESSD, NBRO*
Mr. W A Weerasinghe	*- Field Assistant*	*- ESSD, NBRO*
Mr. N Padmakumara	*- Field Assistant*	*- ESSD, NBRO*

Witness: *Mr. K Athukorala – Civil Engineer, Ceylon Electricity Board.*

2.0 DESCRIPTION OF THE MONITORING AREA

Long Term Transmission Expansion Plan proposes 15.7 km, 220 kV underground transmission cable between Kerawalapitiya Grid Substation to Colombo Port Switching Station to strengthen the transmission network in Sri Lanka, passing through urban and residential areas within Wattala Pradeshiya Sabha, Wattala -Mabola urban council and Colombo Municipal Council areas. This monitoring programme is scheduled to monitor baseline ambient air quality levels before start the construction activities.

Cont.....2

3.0 WEATHER CONDITION

Dry weather condition with westerly wind prevailed during the monitoring period.

4.0 MONITORING OF PARTICULATE MATTER (PM_{10} & $PM_{2.5}$) LEVELS

4.1 SELECTION OF MONITORING LOCATIONS:

Seven (07) selected locations identified by the client, for the particulate Matter (PM_{10} & $PM_{2.5}$) monitoring. Location description is given in Table 01.

Table 01: Location description of Particulate Matter (PM_{10} & $PM_{2.5}$) sampling.

Location	GPS Coordinates	Location Description
L1	07° 00' 38.02" N 79° 53' 13.35" E	At the premises of St. Josheph Church, Kerawalapitiya.
L2	07° 00' 19.86" N 79° 53' 10.60" E	At the premises of Vidyaloka Maha Viharaya, Kerawalapitiya.
L3	06° 59' 00.33" N 79° 53' 12.20" E	At a location, close to the entrance of Lyceum International College, Wattala.
L4	06° 57' 35.70" N 79° 51' 52.80" E	At the premises of Sathutu Uyana, Colombo 15, close to the Jesus Lives church.
L5	06° 56' 49.80" N 79° 51' 23.40" E	At the premises of kovil, Ramanathan Mawatha, Colombo 13.
L6	06° 56' 12.49" N 79° 50' 54.69" E	At the Premises of Bodhiraja Viharaya, Colombo 01.
L7	06° 56' 10.95" N 79° 50' 27.78" E	At the Premises of Ceylon Electricity Board power Station, close to Sambodhi Chaithya.

- Refer attached map for further details.

4.2 SAMPLING AND ANALYTICAL CONDITIONS:

Air samples were collected from selected locations as per the methods stipulated in National Ambient Air Quality Standards on 24 hour basis for the analysis of Particulate Matter (PM_{10} & $PM_{2.5}$). The sampling height was about 3 m from the ground level and the sampling rates were 1.0 m^3/min PM_{10} and 16 l/min for $PM_{2.5}$. PM_{10} & $PM_{2.5}$ samples were stored in filter cassettes. Then, they were sent to the NBRO laboratory for the analysis.

The laboratory received samples on 20th May 2021 in satisfactory condition. Samples were analyzed on 24th May 2021 after drying to a constant weight in a desiccator.

Cont.....3

4.3 SAMPLING AND ANALYTICAL METHODOLOGY:

Table 02: Description of the Sampling & Analytical methods used for PM_{10} & $PM_{2.5}$.

Parameter	Testing Method	Minimum Detection Limits	CEA Recommended method	Instrumentation
PM_{10} & $PM_{2.5}$	ASTM D 4096 - 82, 2017 High - Volume Sampling and Gravimetric Analysis	2 $\mu g/m^3$	Hi - volume sampling, and Gravimetric	* High Volume Sampler with size selective sample inlet * SHIMADZU AUW120D Analytical balance

4.4 AMBIENT AIR QUALITY MONITORING RESULTS:

Table 03: Concentration of Particulate Matter (PM_{10} & $PM_{2.5}$) sampling at each location.

location	Date of Sampling	Date of Analysis	Time Average	Concentration ($\mu g/m^3$)	
				PM_{10}	$PM_{2.5}$
L1	18-19/05/2021	24/05/2021	24 hrs	17	09
L2	18-19/05/2021	24/05/2021	24 hrs	18	10
L3	18-19/05/2021	24/05/2021	24 hrs	87	48
L4	19-20/05/2021	24/05/2021	24 hrs	42	23
L5	19-20/05/2021	24/05/2021	24 hrs	20	11
L6	19-20/05/2021	24/05/2021	24 hrs	44	24
L7	19-20/05/2021	24/05/2021	24 hrs	22	12

4.5 AMBIENT AIR QUALITY STANDARDS

Table 04: The National Ambient Air Quality standards stipulated under the Extraordinary Gazette, No. 1562/22, August 15, 2008, by the Central Environmental Authority of Sri Lanka.

Pollutant	Time Average	Concentration ($\mu g/m^3$)
Respirable Particulate Matter (PM_{10})	24 hrs	100
Respirable Particulate Matter ($PM_{2.5}$)	24 hrs	50

Cont.....4

5.0 CONCLUSION

The measured PM_{10} & $PM_{2.5}$ levels at all locations were lower than the Ambient Air Quality Standard levels stipulated by the Ministry of Environment & Natural Resources of Sri Lanka (Extraordinary Gazette No. 1562/22, August 15, 2008).

.....
Coordinating Scientist (Sampling)

Scientist
Air Noise & Vibration Studies Unit
Environmental Studies & Services Division
National Building Research Organisation.

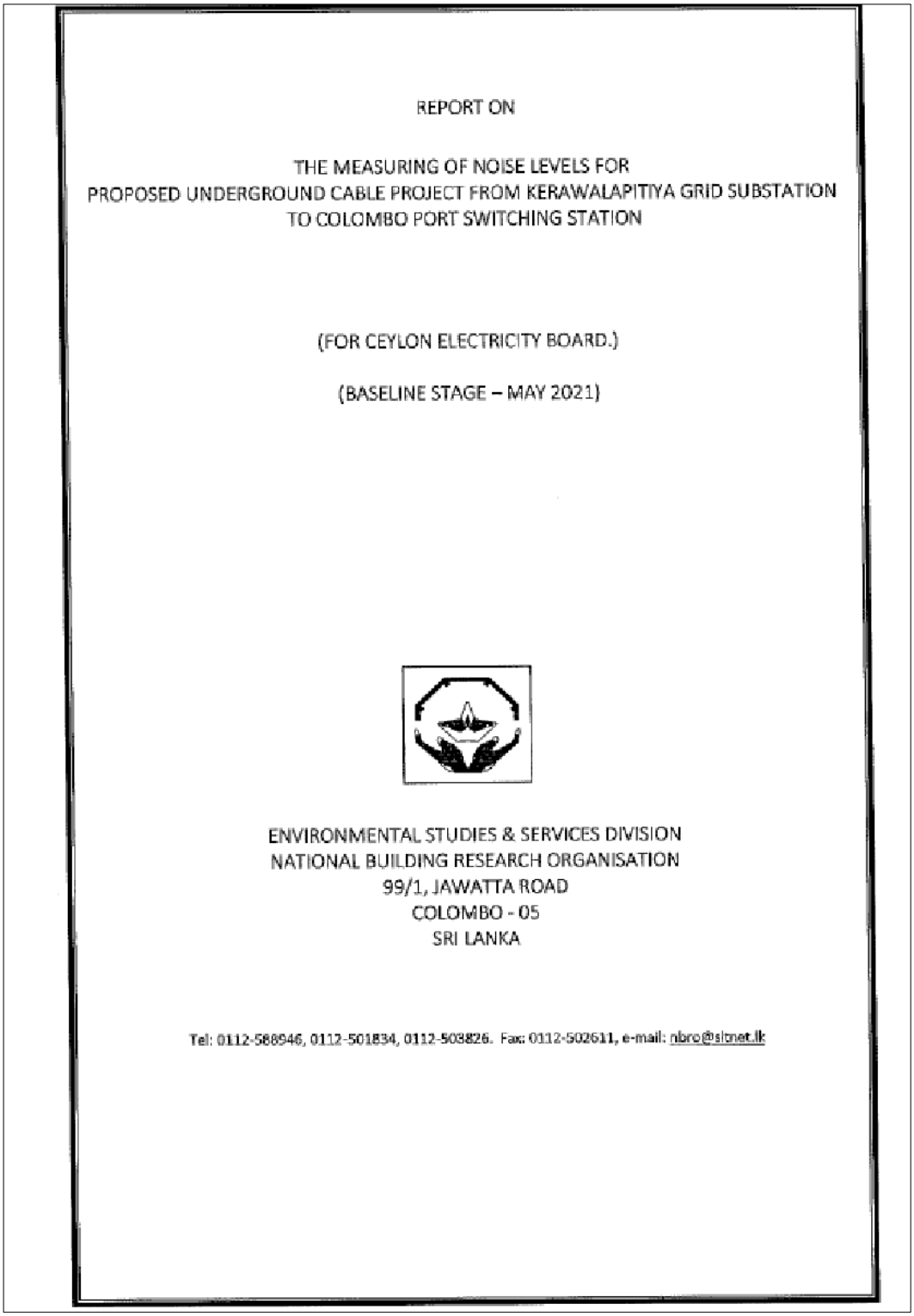
.....
Coordinating Scientist (Analysis)

Scientist
Air Noise & Vibration Studies Unit
Environmental Studies & Services Division
National Building Research Organisation.

Certified by:

.....
H.D.S. Premasiri
Director
Environmental Studies & Services Division
National Building Research Organisation

12.7. NBRO Env. Quality Reports on Noise



REPORT ON

THE MEASURING OF NOISE LEVELS FOR
PROPOSED UNDERGROUND CABLE PROJECT FROM KERAWALAPITIYA GRID SUBSTATION
TO COLOMBO PORT SWITCHING STATION

(FOR CEYLON ELECTRICITY BOARD.)

(BASELINE STAGE – MAY 2021)

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State Ministry of National Security and Disaster Management

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අපගේ අංකය / எமது இல. / Our Ref.: NBRO/AQ/21/124b

ඔබේ අංකය / உமது இல. / Your Ref.:

දිනය / திகதி / Date: 17th June 2021

Client: Ceylon Electricity Board,
6th Floor, No 50,
Sir Chitampalam A Gardiner Mawatha,
Colombo 02

REPORT ON
THE MEASURING OF BASELINE NOISE LEVELS FOR
PROPOSED UNDERGROUND CABLE PROJECT FROM KERAWALAPITIYA GRID SUBSTATION
TO COLOMBO PORT SWITCHING STATION

(FOR CEYLON ELECTRICITY BOARD)

(MAY 2021)

1.0 SCOPE

As per the letter dated 08th April 2021 Eng. K P Kusum Shanthi, Deputy General Manager - Transmission Design and Environment, of Ceylon Electricity Board requested the Environmental Studies and Services Division (ESSD) of National Building Research Organisation (NBRO) to measure the noise levels of the Proposed Underground Cable Project from Kerawalapitiya Grid Substation to Colombo Port Switching Station to access the environmental conditions within the project area before start the construction activities.

In this regard, following officers of the Environmental Studies and Services Division of NBRO carried out noise measuring program on 18th & 19th May 2021.

Staff Involved:

Mr. Viran Daniel	*- Technical Assistant*	*- ESSD, NBRO*
Mr. W A Weerasinghe	*- Field Assistant*	*- ESSD, NBRO*
Mr. N Padmakumara	*- Field Assistant*	*- ESSD, NBRO*

Witness: Mr. K Athukorala – Civil Engineer, Ceylon Electricity Board.

2.0 DESCRIPTION OF THE MONITORING AREA

Long Term Transmission Expansion Plan proposes 15.7 km, 220 kV underground transmission cable between Kerawalapitiya Grid Substation to Colombo Port Switching Station to strengthen the transmission network in Sri Lanka, passing through urban and residential areas within Wattala Pradeshiya Sabha, Wattala -Mabola urban council and Colombo Municipal Council areas. This monitoring programme is scheduled to measure baseline noise levels before start the construction activities.

Cont.....2

3.0 WEATHER CONDITION

Dry weather condition with westerly wind prevailed during the monitoring period.

4.0 NOISE LEVEL MEASUREMENTS

4.1 NOISE MEASURING LOCATIONS:

Seven (07) locations were identified by the client, for the measuring of noise levels. Location description is given in Table 01.

Table 01: Location description of Noise Level Measuring.

Location	GPS Coordinates	Location Description
N1	07° 00′ 38.02″ N 79° 53′ 13.35″ E	At the premises of St. Josheph Church, Kerawalapitiya.
N2	07° 00′ 19.86″ N 79° 53′ 10.60″ E	At the premises of Vidyaloka Maha Viharaya, Kerawalapitiya.
N3	06° 59′ 00.33″ N 79° 53′ 12.20″ E	At a location, close to the entrance of Lyceum International College, Wattala.
N4	06° 57′ 35.70″ N 79° 51′ 52.80″ E	At the premises of Sathutu Uyana, Colombo 15, close to the Jesus Lives church.
N5	06° 56′ 49.80″ N 79° 51′ 23.40″ E	At the premises of kovil, Ramanathan Mawatha, Colombo 13.
N6	06° 56′ 12.49″ N 79° 50′ 54.69″ E	At the Premises of Bodhiraja Viharaya, Colombo 01.
N7	06° 56′ 10.95″ N 79° 50′ 27.78″ E	At the Premises of Ceylon Electricity Board power Station, close to Sambodhi Chaithya.

- Refer attached map for further details.

4.2 MEASURING INSTRUMENTS:

Sound Level meter : RION NL 52
Calibrator : RION NC 74 – IEC 60942 (JIS C 1515), Class 1
Calibration due : December 2021

The sound level meter conforms to the requirements of both IEC 61672-1:2002 class 1 and JIS C 1509-1:2005 class 1.

4.3 METHOD OF MEASUREMENTS:

The sound level measurements were carried out in accordance with the methods laid down in International Organisation for Standardization (ISO) 1996 (part 1,2,3) and BS 4142; 2019, as stipulated in National Environmental Noise Control Regulations stipulated under the Extraordinary Gazette No. 924/12- Thursday, May 23, 1996 by the of Sri Lanka.

Cont...3

The chosen method was the direct method, is that by measuring the equivalent continuous A weighted sound pressure level (Leq,T) was measured for a periods of T(1 hour) with the integrated time of one (1.0) second in the fast selection mode of the meter.

4.4 MEASURING CONDITIONS:

A set of 1-hour continuous time integrated noise levels were taken at Seven (07) selected locations during day time and night time. The height of the noise level meter receiver was about 1.5 m from the ground level for each measurement.

4.5 NOISE MEASURING RESULTS:

Table 02: Noise Levels at each measuring location.

Location	Time	Run time	Measured Residual Noise Level Leq (dB)	Background Noise level L90 dB(A)
N1	Day	1 hour	67	57
	Night	1 hour	65	59
N2	Day	1 hour	72	61
	Night	1 hour	68	64
N3	Day	1 hour	66	57
	Night	1 hour	62	55
N4	Day	1 hour	65	61
	Night	1 hour	67	60
N5	Day	1 hour	74	67
	Night	1 hour	74	69
N6	Day	1 hour	72	69
	Night	1 hour	71	69
N7	Day	1 hour	73	61
	Night	1 hour	66	58

Where;

- Measured Noise Level (Leq) :- The equivalent continuous baseline noise level over the measuring period.
- Background Noise Level (Leq):- The equivalent continuous baseline noise level over the 90% of the measuring period.

4.6 MAXIMUM PERMISSIBLE NOISE LEVELS :

The maximum permissible noise levels stipulated under the Extraordinary Gazette No. 924/12- Thursday, May 23, 1996 of Sri Lanka.

- 75 dB Leq(A) during Day time
- 50 dBLeq(A) during Night time

} During Construction Period

Cont.....4

Locations N1 and N2 are situated within the Wattala Pradeshiya Sabha area which considered as a low noise area according to the noise level regulations stipulated under the Extraordinary Gazette No. 924/12- Thursday, May 23, 1996 of Sri Lanka;

- 55 dB Leq(A) during Day time
- 45 dB Leq(A) during Night time

} During Operation Period

Location N3 is situated within the Wattala-Mabola Urban Council area and Locations N4, N5, N6 & N7 are situated within the Colombo Municipal Council area, which considered as a Medium noise area according to the noise level regulations stipulated under the Extraordinary Gazette No. 924/12- Thursday, May 23, 1996, of Sri Lanka;

- 63 dB Leq(A) during Day time
- 50 dB Leq(A) during Night time

} During Operation Period

5.0 CONCLUSION

Noise levels that generated by vehicles on nearby roads is the main contribution sources to the measured noise levels. Measured noise levels at all locations were within the range of 74-66 dB during day time and 74-62 dB during night time. Accordingly, the existing residual noise level was lowered during day time and was exceeded during night time than the maximum permissible noise level stipulated for the construction activities at all locations. Therefore, night time construction activities should be limited to low noise activities at those locations.

The noise levels of each location should be within the limits, which stipulated for those areas during the operation period of the project as indicated in the above section 4.6.

.....

Coordinating Scientist (Sampling)
Scientist
Air Noise & Vibration Studies Unit
Environmental Studies & Services Division
National Building Research Organisation.

.....

Coordinating Scientist (Analysis)
Scientist
Air Noise & Vibration Studies Unit
Environmental Studies & Services Division
National Building Research Organisation.

Certified by:

.....

H.D.S. Premasiri
Director
Environmental Studies & Services Division
National Building Research Organisation

12.8. NBRO Environmental Quality Reports –Vibration

REPORT ON

THE MEASURING OF VIBRATION LEVELS FOR
PROPOSED UNDERGROUND CABLE PROJECT FROM KERAWALAPITIYA GRID SUBSTATION
TO COLOMBO PORT SWITCHING STATION

(FOR CEYLON ELECTRICITY BOARD.)

(BASELINE STAGE – MAY 2021)

ENVIRONMENTAL STUDIES & SERVICES DIVISION
NATIONAL BUILDING RESEARCH ORGANISATION
99/1, JAWATTA ROAD
COLOMBO - 05
SRI LANKA

Tel: 0112-588946, 0112-501834, 0112-503826. Fax: 0112-502611, e-mail: nbro@sltnet.lk

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தேசிய பாதுகாப்பு மற்றும் அனர்த்த முகாமைத்துவ இராஜாங்க அமைச்சு
State Ministry of National Security and Disaster Management

ජාතික ගොඩනැගිලි පර්යේෂණ සංවිධානය
தேசிய கட்டிட ஆராய்ச்சி நிறுவனம்
NATIONAL BUILDING RESEARCH ORGANISATION

99/1, ජවර්තන පාර, කොළඹ 5. 99/1, ஜவாத்த வீதி, கொழும்பு 5. 99/1, Jawatta Road, Colombo 5.

දුරකථන / தொலைபேசி / Telephone: 011-2588946, 011-2503431, 011-2500354
අධ්‍යක්ෂ ජනරාල් / பணிப்பாளர் நாயகம் / Director General: 011-2506169
ෆැක්ස් / தொலைநகல் / Fax: 011-2502611
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අපගේ අංකය / உமது இல. / Your Ref: NBRO/AQ/21/124c

දිනය / திகதி / Date: 17th June 2021

Client: Ceylon Electricity Board,
6th Floor, No 50,
Sir Chitampalam A Gardiner Mawatha,
Colombo 02.

REPORT ON
THE MEASURING OF BASELINE VIBRATION LEVELS FOR
PROPOSED UNDERGROUND CABLE PROJECT FROM KERAWALAPITIYA GRID SUBSTATION
TO COLOMBO PORT SWITCHING STATION

(FOR CEYLON ELECTRICITY BOARD)

(MAY 2021)

1.0 SCOPE

As per the letter dated 08th April 2021 Eng. K P Kusum Shanthi, Deputy General Manager - Transmission Design and Environment, of Ceylon Electricity Board requested the Environmental Studies and Services Division (ESSD) of National Building Research Organisation (NBRO) to measure the vibration levels of the Proposed Underground Cable Project from Kerawalapitiya Grid Substation to Colombo Port Switching Station to access the environmental conditions within the project area before start the construction activities.

In this regard, following officers of the Environmental Studies and Services Division of NBRO carried out vibration measuring program on 18th & 19th May 2021.

Staff involved:

Mr. Viran Daniel	*- Technical Assistant*	*- ESSD, NBRO*
Mr. W A Weerasinghe	*- Field Assistant*	*- ESSD, NBRO*
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Witness: *Mr. K Athukorala – Civil Engineer, Ceylon Electricity Board*

2.0 DESCRIPTION OF THE MONITORING AREA

Long Term Transmission Expansion Plan proposes 15.7 km, 220 kV underground transmission cable between Kerawalapitiya Grid Substation to Colombo Port Switching Station to strengthen the transmission network in Sri Lanka, passing through urban and residential areas within Wattala Pradeshiya Sabha, Wattala- Mabola Urban Council and Colombo Municipal Council areas. This monitoring programme is scheduled to measure baseline vibration levels before start the construction activities.

Cont.....2

3.0 WEATHER CONDITION

Dry weather condition with westerly wind prevailed during the monitoring period.

4.0 VIBRATION MEASUREMENTS

4.1 VIBRATION MEASURING LOCATIONS:

Seven (07) locations were identified by the client, for the measuring of vibration levels. Selected locations can be categorised as type 3 structure according to the interim vibration levels stipulated by the Central Environmental Authority of Sri Lanka. Location description is given in Table 01.

Table 01: Location description of vibration Level Measuring.

Location	GPS Coordinates	Location Description
V1	07° 00′ 38.02″ N 79° 53′ 13.35″ E	At the premises of St. Josheph Church, Kerawalapitiya.
V2	07° 00′ 19.86″ N 79° 53′ 10.60″ E	At the premises of Vidyaloka Maha Viharaya, Kerawalapitiya.
V3	06° 59′ 00.33″ N 79° 53′ 12.20″ E	At a location, close to the entrance of Lyceum International College, Wattala.
V4	06° 57′ 35.70″ N 79° 51′ 52.80″ E	At the premises of Sathutu Uyana, Colombo 15, close to the Jesus Lives church.
V5	06° 56′ 49.80″ N 79° 51′ 23.40″ E	At the premises of kovil, Ramanathan Mawatha, Colombo 13.
V6	06° 56′ 12.49″ N 79° 50′ 54.69″ E	At the Premises of Bodhiraja Viharaya, Colombo 01.
V7	06° 56′ 10.95″ N 79° 50′ 27.78″ E	At the Premises of Ceylon Electricity Board power Station, close to Sambodhi Chaithya.

- Refer attached map for further details.

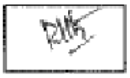
4.2 METHOD OF MEASUREMENTS:

Continuous vibration levels were recorded at selected locations in accordance with the methods laid down in International Organisation for Standardization - ISO - 4966: 1990E, as stipulated in the interim vibration standard stipulated by the Central Environmental Authority of Sri Lanka.

4.3 MEASURING INSTRUMENTS:

Vibration meter	: Micromate ISEE Base unit
Model	: Instantel Part No. 721A2501
Serial No	: UM10585
Calibration due	: December 2021
Minimum Detection Limit	: PPV of 0.07 mm/s

Cont.....3



4.4 MEASURING CONDITIONS:

Continuous 5 minutes vibration levels (peak particulate velocity levels) were recorded at selected locations within the selected area. The recording time of the instrument is 02 sec. at 1024 sps in continuous mode and at geo range of 254 mm/s.

4.5 VIBRATION MEASURING RESULTS:

Table 02: Maximum Vibration levels at each measuring location.

Location No.	Type of vibration	Vibration Axis	Vibration Levels ppv (mm/sec)	Maximum Vibration in ppv (mm/sec)	Frequency Range (Hz)
V1	Continuous / Ground	Transgenic	0.155	0.190	10-50
		Vertical	0.105		
		Longitude	0.103		
V2	Continuous / Ground	Transgenic	0.143	0.187	10-50
		Vertical	0.112		
		Longitude	0.112		
V3	Continuous / Ground	Transgenic	0.158	0.191	10-50
		Vertical	0.110		
		Longitude	0.102		
V4	Continuous / Ground	Transgenic	0.158	0.337	10-50
		Vertical	0.296		
		Longitude	0.206		
V5	Continuous / Ground	Transgenic	0.567	0.653	10-50
		Vertical	0.378		
		Longitude	0.205		
V6	Continuous / Ground	Transgenic	0.087	0.146	10-50
		Vertical	0.118		
		Longitude	0.118		
V7	Continuous / Ground	Transgenic	0.079	0.131	10-50
		Vertical	0.126		
		Longitude	0.110		

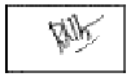
Cont...4

4.6 MAXIMUM PERMISSIBLE VALUES :

Table 03. The interim standard on vibration for the Machinery, Construction Activities and Vehicular Movements stipulated of Sri Lanka for different type of structures summaries below.

Structure Type	Type of Vibration	Frequency of Vibration (Hz)	Vibration in ppv (mm/sec)
Type 1 structures – Multi story buildings of reinforced concrete or structural steel, with filling panels of block work, brick work or precast units not designed to resist earthquakes	Continuous	0 - 10	5.0
		10 - 50	7.5
		Over 50	15.0
	Intermittent	0 - 10	10.0
		10 - 50	15.0
		Over 50	30.0
Type 2 structures – Two-storey domestic houses and buildings constructed of made of reinforced block work, precast units, and reinforced floor & roof construction, or wholly of reinforced concepts or similar, not designed to resist earthquakes.	Continuous	0 - 10	2.0
		10 - 50	4.0
		Over 50	8.0
	Intermittent	0 - 10	4.0
		10 - 50	8.0
		Over 50	16.0
Type 3 structures – Single and two storey houses and buildings made of lighter construction, using lightweight materials such as bricks, cement blocks etc, not designed to resist earthquakes.	Continuous	0 - 10	1.0
		10 - 50	2.0
		Over 50	4.0
	Intermittent	0 - 10	2.0
		10 - 50	4.0
		Over 50	8.0
Type 4 structures – Structures that, because of their sensitivity to vibration, do not correspond to those listed above 1,2 & 3, & declared as archeologically preserved structures by the Department of Archaeology	Continuous	0 - 10	0.25
		10 - 50	0.5
		Over 50	1.0
	Intermittent	0 - 10	0.5
		10 - 50	1.0
		Over 50	2.0

Cont.....5



NBRO/AQ/21/124c

5.0 CONCLUSION

The measured vibration levels at all locations given in table 2, were lower than the vibration levels stipulated for type 3 structures within frequency range of 10-50Hz in the Interim vibration standard stipulated of Sri Lanka.

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Coordinating Scientist (Sampling)

Scientist
Air Noise & Vibration Studies Unit
Environmental Studies & Services Division
National Building Research Organisation.

.....

Coordinating Scientist (Analysis)

Scientist
Air Noise & Vibration Studies Unit
Environmental Studies & Services Division
National Building Research Organisation.

Certified by:

.....

H.D.S. Premasiri
Director
Environmental Studies & Services Division
National Building Research Organisation

12.9. NBRO Environmental Quality Reports – Water Quality

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தேசியகட்டிடஆராய்ச்சிநிறுவனம்
NATIONAL BUILDING RESEARCH ORGANISATION (NBRO)
P.O. Box :99/1, Jawatta Road, Colombo 5, Sri Lanka.
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E-mail : ed_nbro@yahoo.com
Website: www.nbro.gov.lk

ISO/IEC 17025
TL 064-02

TEST REPORT

Report No : NBRO/WQ/21/066
Our Ref : ESD-INV-0130

Issued to:

Deputy General Manager
Transmission Design and Environment
Ceylon Electricity Board
6th floor, No 50
Sir Chittampalam A Gardiner Mawatha
Colombo 02

Issued by:

Environmental Laboratory Services
National Building Research Organisation
99/1, Jawatta Road
Colombo 05.

04th August 2021

The test results reported herein relate to the samples analyzed and subjected to conditions mentioned overleaf.
Report contains 4 pages

The report is issued under the following Terms & Conditions;

These Terms and Conditions apply to all dealings, tests and analytical services offered from the Environmental Studies and Services Division (ESSD) of National Building Research Organisation (NBRO).

CONFIDENTIALITY

NBRO maintains strict confidentiality of all customer information. Reports are provided only to the customer or to those designated by the customer.

Customer must agree not to use the report or data in any manner that may harm the reputation or the service of NBRO.

TEST METHODS

The ESSD of NBRO warrants that the tests are performed in accordance with national, and international standard methods. In the absence/non availability of standard methods, ESSD uses any other published test or follow a validated method developed by other reputed bodies. On request, ESSD may follow customer specified methods as appropriate.

TEST REPORT

The laboratory will provide only the original of the report. Customized reports that differ from the laboratory's normal format may include additional charges.

Conformities to a standard specification may be mentioned as required by the standard specification on request by the customer.

REPRODUCTION OF REPORTS

No report may be reproduced, except in full entirely, without prior written approval from the Director General, NBRO.

RETENTION OF REPORTS

Reports will be archived for a period of 03 years after results have been reported to the customer. The customer can query or requests additional copies of their reports within 01 year except in litigation from the date of first issue, and additional charges apply.

QUERIES ON REPORT

Customer queries on reports will be entertained only up to a period of 01 year from the date of issue of the report.

RETENTION OF SAMPLES

Perishable samples will be destroyed immediately after testing.
Samples will be routinely retained for a period of 10 days after report is issued.

RETURN OF SAMPLE CONTAINERS AND TEST ITEMS

Sample containers and/or test items will be returned to the customer only on a written request by the customer.

LOSS OR DAMAGE

The NBRO will not be responsible for indirect loss/es of his documents, any belongings which might happen under unavoidable circumstances during the period of customer service.

LITIGATION

The customer shall be responsible for all costs associated with documents or testimony in the court of law for the purposes relating to the customer's sample/s. Such costs include but not limited to the hourly charges, transport for persons involved in responding to the court of law.

August 2017

ISO/IEC 17025 TL 064-02

TEST REPORT

1.0 Sample Particulars

Customer: Deputy General Manager Transmission Design and Environment Ceylon Electricity Board 6th floor, No 50 Sir Chittampalam A Gardiner Mawatha Colombo 02	**Test Item:** Surface water samples **Service requested:** Parameter as per the customer's request dated 08/04/2021 **Project** – Baseline Study for Proposed Underground Cable Project from Kerawlapitiya GS to Colombo Port SS
Number of sample: 07	**Quantity of sample:** Each approximately, 1 L plastic bottle for chemical parameter analysis 500 mL for Oil & Grease analysis.
Samples collected by: NBRO – ESSD Laboratory Mr. R R Ruhunuge - Scientist	**Witnessed by:** Ceylon Electricity Board Mr. Kelum Athukorala – Civil Engineer
Date of sampling: 01/07/2021	**Time of sampling:** 09.15 to 11.00 hrs.
Date receipt to the laboratory: 01/07/2021	**Date of analysis:** 01/07/2021 to 19/07/2021

2.0 Sample Identification

Customer's sample reference	Sample description	Laboratory reference
Wali Oya (Downstream) at the location 6.95771 N, 79.86265 E	Sample was taken from the Wali oya canal towards the downstream at the location 6.95771 N, 79.86265 E. Width of the water column was about 5 m. Water was slightly turbid and low in velocity and yellow in color. Water is not used for any purpose.	**W1**
Wali Oya (Upstream) at the location 6.95781 N,79.86254 E	Sample was taken from the Wali oya canal towards the upstream at the location 6.95781 N, 79.86254 E. Width of the water column was about 3 m. Water was slightly turbid and low in velocity and yellow in color. Water is not used for any purpose	**W2**
Middle of the Kalu Ela at the location 6.98266 N, 79.88233 E	Sample was taken from middle of the Kalu Ela near the ASP Liyanage Mawatha at the location 6.98266 N, 79.88233 E. Width of the water column was about 7 m. Water was slightly turbid and medium in velocity and yellow in color. Water is not used for any purpose	**W3**
Kalu Ela(Downstream) at the location 6.9858 N, 79.88673 E	Sample was taken from the Kalu Ela towards the downstream at the location 6.9858 N, 79.88673 E. Width of the water column was about 10 m. Water was slightly turbid and low in velocity and yellow in color. Water is not used for any purpose	**W4**
Kalu Ela(Upstream) at the location 6.98747 N, 79.88781 E	Sample was taken from the Kalu Ela towards the upstream at the location 6.98747 N, 79.88781 E. Width of the water column was about 10 m. Water was slightly turbid and low in velocity and pale yellow in color. Water is not used for any purpose	**W5**
Canal (Downstream) at Aluth Mawatha at the location 7.0148 N, 79.88725 E	Sample was taken from the Canal towards the downstream at the location 7.0148 N, 79.88725 E. Width of the water column was about 5 m. Water was slightly turbid and low in velocity and yellow in color. Water is not used for any purpose	**W6**
Canal (Upstream) at Aluth Mawatha at the location 7.01469 N, 79.88715 E	Sample was taken from the Canal towards the upstream at the location 7.01469N, 79.88715 E. Width of the water column was about 5 m. Water was slightly turbid and low in velocity and yellow in color. Water is not used for any purpose	**W7**

Weather – intermittent showers prevailed during the sampling period

3.0 Test Results

Parameter/Unit	Method	Results						
		W1	W2	W3	W4	W5	W6	W7
*#pH	APHA-4500-H⁺B	6.9	6.8	6.6	6.5	6.5	6.7	6.8
*#Temperature, ^{0}C	APHA-2550 B	30.3	30.3	30.3	30.6	30.9	29.6	29.3
*#Dissolved Oxygen, mg DO/L	APHA-4500 O C	0.5	1.1	1.1	1.1	1.3	0.4	1.0
Biochemical Oxygen Demand at 20°C, BOD_5 mg/L	APHA-5210 B	31	46	6.3	7.3	8.3	14	26
Chemical Oxygen Demand, O_2 mg /L	APHA- 5220 B	62	84	31	30	28	38	53
Total Suspended Solids, mg/L	APHA-2540 D	67	98	10	9	7	8	34
Total Phosphate (as P), mg/L	APHA-4500 P B&D	0.7	0.9	0.3	0.2	<0.2	0.5	0.6
#Nitrate (as N), mg/L	APHA-4500-NH_3 C	6.0	10.5	7.4	6.2	5.3	25.7	33.8
#Oil and Grease, mg/L	APHA-5520 B	<1.4	1.5	<1.4	<1.4	<1.4	<1.4	<1.4

*-measured on site # - Not accredited parameter

"<" denotes that the measurement is less than the minimum detection level measured by the methodology employed.

APHA - Standard Method for the Examination of Water and Wastewater, APHA, AWWA, WEF 2017, 23rd Edition.

Analyzed by : PDC Pathiraja - Technical Officer

.....
Coordinating Scientist (Analysis)
V D W Sumanasekara

Checked by: .....
Senior Scientist
S A M S Dissanayake

Certified by: .....
H D S Premasiri
Director/Environmental Studies and Services Division

12.10. Inventory of structures along the 15.6 km of the route alignment during 2024

Inside Kerawalapitiya GSS (7.00998 N & 79.87514E)

Road fairly wide with no adjacent structures – Road (100 m) leading to the GSS, Culvert located very close to Grid Sub Station Kerawalapitiya:

Structures on the RHS

- Material storage and new site of ELS Construction Pvt Ltd (7.01031N & 79.87515E)

  (Contractor for Construction of Tower Line from Kerawalapitiya Grid Sub-station to Nugape / Mabola Primary Substation Stage III)

Road from Access to Kerawalapitiya GSS to CPSTL Muthurajawela Terminal Road

Road is wide (about 15 m) with pavement (being constructed); Road is full of container and truck movements. Pavement on the LHS is under construction. Trench will be crossing the road to left side of the road.

Structures on the LHS

- DGL Fulfillment Center
- John Keels Warehouse Pvt Ltd
- John Keels PLC Tea Sample Room
- Asia Siyalka Warehouse Structures on the RHS

CPSTL Muthurajawela Terminal Road to Expressway Exit Road : Starting Point (7.01046N & 79.87507E) Road is fairly wide (about 02-lane road (Not divided) with adequate service lines. Road Section belongs to RDA. Road section from the roundabout is one way.

Structures on the RHS:

- Parking of bowsers, Trial ers, etc.
- Entrance to Spectra (7.01861N & 79.8793E)
- Spectra Trial er Logistics park
- Entrance to Litro Gas yard
- Cargill's Food City
- Roundabout with RDA Road and entrance to Colombo-Katunayake Highway (7.01831N & 79.88318E)

Kerawalapitiya Road: This is a Tarred road with no pavement buses ply on this narrow road. Road belongs to PRDA. Entrance/starting point: Highway Bridge to Kerawalapitiya Road (7.01784N & 79.88795E). Trench will take to the LHS.

Structures on the LHS

- Culvert between the 2 Highway Bridges
- 410/1 Parapet wall and steel gate
- Statue of St Sebastian and shrine
- Entrance to St Sebastian Mawatha (7.01637N & 79.88743E)
- Parapet walls and gates / entrances of several households and Commercial properties
- Entrance to Suhada Mawatha (7.01594N & 79.8873E)
- Parapet wall and gates
- Entrance to a concreted, narrow road
- Parapet walls and gates
- Entrance to Muthurasa Mawatha (7.01592N & 79.88732E)
- Roller door; Parapet walls and gates
- Three-wheel park
- Bridge over Wali Oya (7.01468N & 79.88719E)
- Boutiques, gates and parapet walls
- Entrance to Senaratne Auto Service (7.01417 N & 79.88707E)
- Parapet walls and gates
- Entrance to a narrow-concreted road
- Parapet walls and gates
- Entrance to D.D. Pedrick Mawatha
- Parapet wall
- Entrance to Rev. Father Cyril Pieris Mawatha
- Boutique
- Entrance to a narrow gravel road
- Parapet wall and gates
- Entrance to St Joseph Mawatha (7.01195N & 79.88708E)
- Danidu Hardware
- Parapet walls and gates
- Entrance to Daham Mawatha (7.01154N & 79.88692E)
- Narrow gravel road

- Fashion House
- Hansa Stores
- Boutique
- Entrance to Lurdu Mawatha
- Mango tree opposite to a boutique (7.01381N & 79.88693E)
- St Joseph Primary School and St Joseph Church (7.01055N & 79.88665E)
- Entrance to Rev. Maxwell Granvel Silva Bishop Mawatha by the side of St Joseph Church
- Parapet walls and boutiques
- Buddha Statue / shrine
- Entrance to Thuduwa Road (7.01384N & 79.88708E)
- Parapet walls and gates
- Open entrance to a warehouse (7.0082N & 79.8867E)
- Parapet wall
- Entrance to a housing scheme
- Parapet walls and gates
- Entrance to Rose Wood Garden Road
- Entrance to D.L.T. Transport Services with steel gates
- Parapet wall
- Steel gate and parapet wall
- Entrance to an unknown paved road
- Three-wheel park
- Entrance to Puranawella Road
- Parapet walls and boutiques
- Sasika Siriwardena vegetable and fruit stall (7.0064N and 79.8866E)
- Boutiques
- Vidyaloka Maha Vidyalaya (7.00587 N & 79.88661E)
- Entrance to School Avenue
- Boutique and parapet walls
- Entrance to Shanthi Road
- Vegetable vendors
- Boutiques
- Asiri Hardware
- Bakery
- Parapet walls and gates
- Entrance to an unknown road
- Aquarium
- Parapet walls and gates
- Entrance to a gravel road
- Parapet walls and gates
- Entrance to Sri Medananda Mawatha
- Entrance to an unknown paved road
- Boutiques
- Gampaha Ayurvedic Medical Centre
- Buddha Statue next to Gampaha Ayurvedic Medical Centre at bend (7.00114 N & 79.88581E)
- Farm shop
- Boutiques
- Parapet walls and gates
- Entrance to 2nd Lane
- Parapet walls and gates
- Entrance to Mother of Sorrow Lane
- Boutiques

- Entrance to Davith Alwis Lane
- Parapet wall
- Overhead pipe
- Parapet walls and gates
- Entrance to an unknown unpaved road
- Entrance to an unknown unpaved road
- Entrance to 2 unknown roads
- Parapet walls and gates
- End of Kerawalapitiya Road – intersection of this road with Old Dippery Road, Hendala, Wattala (6.99682 N & 79.88709E)

Hendala/Wattala Road: Trench will take to the LHS

Structures on the LHS

- Commercial properties / boutiques
- Keels Supermarket
- Perera and sons
- MahajanaOsu Sala
- MOH office
- Sampath Bank
- 3 Wheel Park

Alwis Town Mawatha: Entrance / starting point (6.99978 N & 79.88645E), trench will take to the LHS

Structures on the LHS

- Parapet walls
- Gates (roller doors) and parapet walls
- Entrance to 1st Cross Lane
- Entrance to an unknown road
- Entrance to an unknown road
- Entrance to Millagahawatte Road
- Entrance to Yodaya Kanaththa Road
- Gates (roller doors) and parapet walls
- Entrance to unknown paved road
- Parapet walls and gates
- Entrance to Alwis Town 8th Cross Road
- Parapet wall and gates
- Entrance to YodayaKanaththa Road
- Entrance to an unknown road
- Entrance to Douglas and Sons Ltd
- Shop and a three-wheel park at junction (6.98827N & 79.88611E)
- Entrance to Samgi Mawatha
- Entrance to Commercial Export Company Ltd

ASP Liyanage Mawatha: Starting point / entrance (6.98711 N & 79.88767 E) End of the Mawatha (6.98405 N & 79.88276 E); Trench will take to the RHS.

Structures on the RHS:

- Parapet wall of Royal Pearl Garden

- Lyceum International School (6.98583 N & 79.8869 E)
- Entrance to Royal Pearl Garden Road
- Houses with roller doors and parapet walls
- Parapet walls
- Entrance to an unknown paved road
- Entrance to 2nd Lane
- Entrance to 3rd Lane
- Entrance to 4th Lane
- Entrance to 5th Lane
- Entrance to 7th Lane
- Entrance to an unknown road
- Causeway
- Entrance to Governor's Park Road
- Roller door and gates
- Parapet wall
- Entrance to 2nd Lane – Governor's Park
- Entrance to Container Yard (6.98405 N & 79.88276 E)
- parapet wall with steel gate

Hekitta Road: Pipe laying work completed on this section

Structures on the LHS:

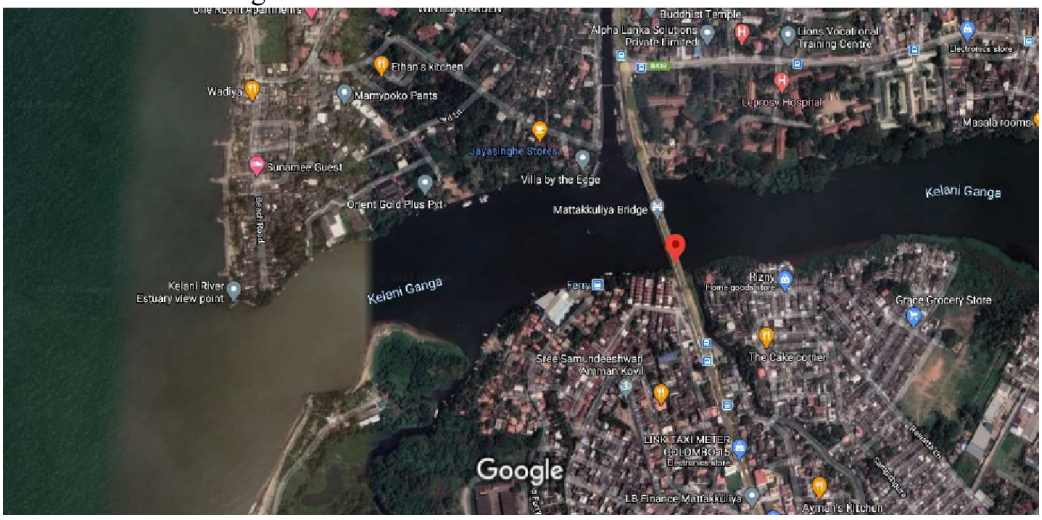
(No inventory was undertaken as there will not be any excavation work to be undertaken).

Edge of the Hekitta Road to Old Negombo Road

HDD entry point at Kelani River:

- LHS: Ducts are already left from the Stage 1 of the project

Kelani River Crossing



Box Culvert: HDD - Cable already laid under stage 1

HDD exit point to New Negombo Road

Mattakuliya Centre Road

Route aligned along 2nd lane of carriageway adjacent to the center median on right hand side

- RHS to the route: Carriage way
- Extreme Right: Parapet walls and gates / entrances of commercial and household properties.
- Entrance to Farm Road (6.97495 N & 79.8763 E)
- Parapet walls and gates / entrances of commercial and household properties
- Hotels
- Cargils Food City
- Entrance to Pre School (Pure Little Hearts)
- Entrance to an unknown road by the side of the International Hindu Guru Peedam Colombo (6.97336 N & 79.8754 E)
- Shops / boutiques

Aluth Mawatha : Section completed with 04 lanes

Route aligned along 2nd lane of carriageway adjacent to the center median on right had side

- Structures on the RHS: Commercial entities having their access to road frontage.
- Adequate pavement space is provided

Aluth Mawatha Section which is not competed with 04 lanes but widening work is in progress

(RHS)- Trench will be on the middle of the carriage way.

- Wall and gates of Laveena Fashion
- Gate and parapet wall
- Small kiosks
- Parapet wall and Steel gate / entrance to E.I. de Silva
- Revon's Grill Restaurant
- Wall of Revon Equipment Suppliers for functions
- Entrance to 819
- Wall and entrance to 813 and 813/3
- Entrance to Sampath Bank (6.96637 N & 79.87121E)
- Buddhika Iron Works
- Wall and entrance to 801
- Entrance to DI Tharushi Salon
- Narrow paved road entrance
- Bare land with a car park
- Inter-section of Rajamalwatte Road (6.96616 N & 79.87085 E)
- Parapet wall and entrance to 791
- Photocopy / binding shop
- Gate and entrance to 783
- Gate to entrance to 781
- Medical Centre (Dr. B.A. Aravindan)
- Gate and entrance
- Gate and entrance to 775 and 775/1/1
- House 773A
- Halal Broiler house
- Narrow paved road
- Well One Food Shop
- Entrance to Colombo South Co-operative Society

- Book shop
- Entrance and parapet wall to 763 (Mission to the Poorest)
- Entrance to 747-1
- Parapet wall and entrance to 745, 743/1/1, 743, 741/1/1, 741 and 739
- Pastry shop
- Unknown paved road entrance
- Wall and gate of 733/1
- Gate of 735
- Salon Keziah
- Wall and gate of 733/A, 731, 731-1/1 and 731-2/1
- Electronic item repairing shop
- Entrance to a fruit stall, boutique and house
- Entrance to Ehans Enterprises
- Gravel road leading to Western Music Class (721/2)
- Entrance to a gravel road
- Entrance to a commercial enterprise
- Wall and gate of 713
- Entrance to St Bridget's Lane
- Entrance to a building with a roller door
- Wall and gate of 709
- Plastic fence and land of AFC Leasing, Susila TVS and Alliance Finance
  Inter-section of Madampitiya Road (6.96487 N & 79.86927 E)
- Dilapidated parapet wall
- Bare land
- Parapet wall and entrance of an old house (681/3 and 681)
- Entrance to a law firm (NilankaNanayakkara and Varunika Jayasuriya)
- Entrance to Seylan Bank (6.96365 N & 79.86845E)
- Entrance to a big bare land
- Entrance to a narrow paved road
- Bare land
- Wall and entrance to 681
- Entrance to Florida Apartments (655)
- Entrance to St Jude Avenue
- Parapet wall and gate of 651 and 653 (Recyclable wastes storage site)
- Entrance to 647 apartment complex
- Bare land with amano sheet wall
- Entrance to 637, 637/3A and 637/3
- Wall and gate of 633 and 633 A
- Unknown road leading to some houses
- Parapet wall
- Inter-section of St James Street (6.96253 N & 79.86729 E)
- Bare land opposite Buddha Statue, flats, 3 wheel park
- Paved road
- Bare lands opposite tailor shop, steel pipes laid by the NWSDB, vehicle and three-wheel park and Mattakkuliya/Kotahena NWSDB office
- Carpeted road to Mattakkuliya/Kotahena NWSDB office
- Bare land opposite flats, garages and volley ball court
- Elevated road and a bus halt opposite to the SathutuUyana
- Bare land opposite Sri Lanka Telecom
- Bare land
- Entrance to De Lasalle Street (6.95968 N and 79.8644 E)

- Parapet wall
- Jesus Lives Church
- Entrance and walls of a flat
- Gravel road
- Dilapidated road
- Parapet wall and gate of 383
- Pastry shop and boutique
- Gate of 377/4
- Wall and entrance to Anjana Apartments (371)
- Statue of Jesus Christ
- Fruit and vegetable stall
- Fish shop
- Dila Salon
- Unpaved road to some houses
- Entrance to LB Finance
- Entrance to Inoka Restaurant
- Litro Gas Shop
- Entrance to a closed bare land
- Gate and parapet walls
- Houses 357 and 355
- WES Express Service
- Bake Away Grocery
- Houses 315 and 347
- RJ Gold House
- Elie Lane
- Statue of Jesus Christ
- Bake House
- Shop and houses 339, 339/1 and 339/1/1/1
- Meat shop
- Studio Blue Ross
- Communications shop
- New Visual Pharmacy and Dialogue Outlet
- Entrance to houses
- St Sebastian Grocery
- Silver Link Agency
- 323 House
- Parapet wall of a house
- Swarna Traders
- Hollywood Restaurant
- Parapet wall and entrance to a house
- Shop
- Paved narrow road
- Parapet wall and entrance
- Entrance to an unknown road
- Parapet wall
- 2 houses
- Tiled road
- House
- Inter-section of Lower Street Andrew Place (6.9569 N and 79.86155 E)
- Shops and Globe Wine Stores
- Matara Bath Kade

- Upper St Andrew's Place
- Parapet wall of Colombo Port

Srimath Ramanathan Mawatha (LHS): Road is having two lanes 13M wide with space for pavement

Structures on the LHS

- Parapet wall of Ceylon Tobacco Company
- Intersection towards George E. de Silva Mawatha to the left (6.94998 N & 79.85727 E) and the traffic color light;
- Church
- Parapet wall of Foreshore Police Station
- Sen Shipping Lanka Pvt Ltd
- Small / narrow entrance to a house
- Parapet wall and steel gate
- Licensed Toddy Tavern
- gates and a wall
- Unknown road
- Walls and entrances/gates
- Fabric material shop
- Unknown road
- Unknown road
- Siva Kovil (6.94744 N & 79.85658 E)
- Kali Amma Kovil (6.94744 N & 79.85658 E)
- CDB.lk office
- Retail shops

St. Anthony's Mawatha (LHS)

Road is with two lanes divided by a steel railing. Recently CMC has developed storm water drainage system.Left side is directed to K.B. Christy Perera Mawatha (6.94674 N & 79.85669 E)

Structures on the LHS:

- Row of shops selling floral decorations located in front of St Anthony's church
- Rest are Commercial enterprises retail shops
- Lottery Stalls, 3-wheel parks, Retail shops

N.H.M Abdul Cader Mawatha - Sea Beach Road (LHS) Road is undivided but fairly wide with pavement for car parking on the LHS; Starting point – 6.94447 N & 79.85511

Structures on the LHS:s

- entrance to House No. 234
- Entrance to Prasanth Electronics
- Entrance to several retail shops
- Entrance to Sea Beach Lane
- Vehicle parking spaces
- Retail shops
- Colombo Gold Centre
- China Street
- Shops
- Sameera Lane
- 2nd Cross Street

- Shops
- 1st Cross Street
- Shops

Sir Baron Jayathilaka Mawatha: Trenches will be on the LHS

Structures on the LHS:

- Round about close to Khan Clock Tower
- Retail shops and Car Park
- Sri Bodiraja Buddhist Temple
- Gate and entrance to Sri Lanka Customs Head Quarters
- Bridge over Beire Canal
- Row of Retail shops
- Cargills Building
- Walkers Building
- Cross roads to Lotus Road & Bristol Street

Janadipathi Mawatha ; Trench will take to the LHS: Road asphalt laid and wide with two carriage ways (One way road – traffic towards Fort and Main Street only)

Structures on the LHS:

- Ministry premises of Foreign Affairs
- Premises of the Presidents House
- Light House Clock Tower (Galbokka)

Galle Buck Road / Upper Chatham street : Trench will be on the LHS

- Sri Lanka Navy Headquarters Clifan Burg House and the cross road connecting Chaitaya road:

Chaitya Road up to Port Sub: Road less traffic and leading towards SLPA, trench will cross to the RHS

Existing structures on the RHS include:

- CEB GSS Colombo Fort
- Port city entrance

12.11. Summary of the inventory of road side structures / other receptors

Road Section	Length(km)	Bridges/ Culverts	By-roads, Intersections/ Roundabouts	Houses with open entrances	Other Shops/ Kiosks Buildings	Religious places/ Statues	Parapet walls & gates	Vehicle & Three Wheel Parks	Schools / Hospitals/ Police
Inside Kerawalapitiya GSS	0.10	01	No	No	No	No	No	No	No
Access Road from Kerawalapitiya GSS to CPSTL Muthurajawela Terminal Road	0.43	No	01	No	04	No	No	01 LHS	No
CPSTL Muthurajawela Terminal Road to Expressway Exit road	1.95	01	01	No	04	No	No		No
Kerawalapitiya Road	2.60	02	26	10	17	03	26	02	02
Hendala Road	0.26	No	No	No	12	No	No	01	02
Alwis Town Mawatha	1.10	No	08	No	03	No	07	01	No
ASP Liyanage Mawatha	1.00	01	08	No	01	No	06	No	01
Hekitta Road	0.85	Not Surveyed							
Hekitta Road to HDD entry point at Kelani River	0.37	02	No	No	No	No	No	No	No
New Negombo Road	0.55	02							
Mattakkuliya Centre Road	0.70	o2	01	No	10	No	03	No	01
Aluth Mawatha – 4 lane section	0.70	No	04	04	20	No	06	No	No
Aluth Mawatha -Narrow section	1.15	02	08	46	33	04	32	04	
Srimath Ramanathan Mawatha	1.00	No	03	No	04	01	05	01	02
St. Anthony's Mawatha	0.30	No	01	03	12	No	No	No	01

N.H.M Abdul Cader Mawatha - Sea Beach Road	1.10		05	01	30	No	No	01	No
Sir Baron Jayathilaka Mawatha	0.68	01	03	-	03	01			
Janadhipathi Mawatha	0.21	No	01	No	03	No	No	01	No
Galle Buck Road / Upper Chatham street	0.25	No	No	No	03	No	No	No	No
Chaithya Road up to Port Sub	0.20	No	No	No	No	No	No	No	No

12.12. Road profile of the route alignment by road sections

FIGURE 14 GRAVEL ROAD LEADING TO KERAWALAPITIYA GSS

FIGURE 15 Work site for CEB close to the GSS Kerawalapitiya

FIGURE 16 CPTSL ROAD (2021)

FIGURE 17 Road is used for parking of Litro Gas laden Trucks (2024 April)

FIGURE 18 Kerawalapitiya Road (Bride Crossing)

FIGURE 19 Alwis Town Mawatha

FIGURE 20 ASP Liyanage Mawatha - Low lying area adjacent to the road

FIGURE 21 ASP Liyanage Mawatha – Canal side

FIGURE 22 Section of the cable-laid area after Mattakuliya Bridge close to the temple

FIGURE 23 Mattakuliya bridge over Kelani River along the end of Old Negombo road (cable is already laid)

FIGURE 24 View of Improvised section of Mattakuliya center Road / Aluth Mawatha - Trench will be excavated at center median on LHS

Figure 25 **IMPROVISED SECTION OF ALUTH MAWATHA**

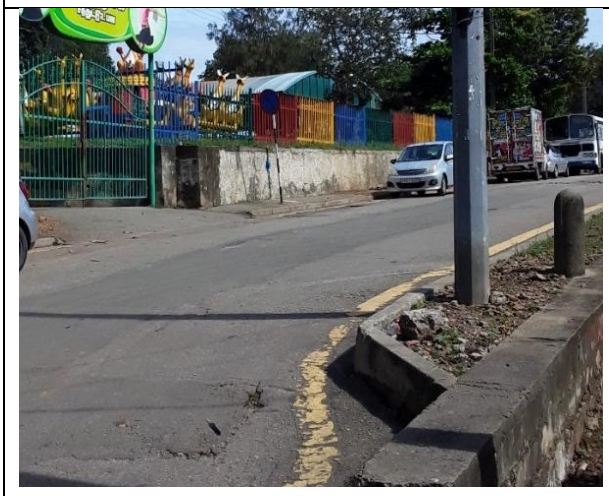


FIGURE 26 Road close to Sathutuuyana along Aluth Mawatha RHS (divided road section

FIGURE 27 Road Opposite Sathutuuyana along Aluth Mawatha LHS

FIGURE 28 Private hospital on the road side

FIGURE 29 Discussions with house occupants whose houses have been identified for acquisition for Aluth Mawatha Development

FIGURE 30 Discussion with vegetable / fish vendors

FIGURE 31 Discussion with Road side House Dwellers

FIGURE 32 Road side small kiosks selling snaks

FIGURE 33 **R**oad side small grocery shops

FIGURE

FIGURE 34 Scrap vendors use the narrow stretch of the road at Aluth Mawatha for loading and unloading purposes

FIGURE 35 Section of Aluth Mawatha rehabilitated by CMC

FIGURE 36 Water Supply pipe laying project and road widening project in progress along Aluth Mawatha (2021)

FIGURE 37 Road side to be used for water supply (2024)

FIGURE 38 Traffic Diversion barriers at lower St Andrews Mawatha

FIGURE 39 Bridge along the narrow section of Aluth Mawatha – Cables will cross this canal bridge

FIGURE 40 Passengers waiting for the bus at the intersection leading to upper St Andrews Road

FIGURE 41 Passenger transport (Public transport plying in along St Andrews Road and reaching to Old Negombo Road

FIGURE 42 Lower St. Andrews by road crossing to College street crossing Three Wheel Parks

FIGURE 43 Lower St. Andrews by road crossing to College street crossing Church

FIGURE 44 Ramanathan Mawatha Color Lights close to SLPP Gate

FIGURE 45 Foreshore Police station along Ramanathan Mawatha on RHS- LHS SLPA boundary parapet Wall

FIGURE 46 Traffic along Ramanathan Mawatha

FIGURE 47 View of St Anthony's Road opposite St Anthony's Church LHS- Row of floral shops and the pavement

FIGURE 48 Road side parking and the row of shops along the sea beach road towards 1st cross street

FIGURE 49 Cables already laid under Phase 1 along the road inside SLPP / New Hartal Bridge

12.13. Photographs taken at the stakeholder meetings

FIGURE 50 Meeting with the RDA Negombo Engineers (2021)

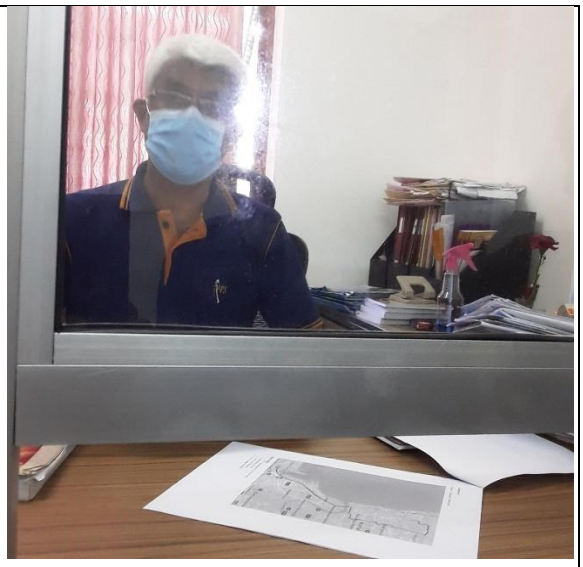


FIGURE 51 Meeting with the Superintendent Engineer of Wattala Pradeshiya Sabha (2021)

FIGURE 52 MEETING WITH RDA ENGINEERS (2021)

FIGURE 53 GNs attended at the meeting at Colombo DS Office (2021)

FIGURE 54 Meeting with CMC Works Superintendent 2021

FIGURE 55 DISCUSSIONS WITH THE CMC ENGINEERS (2024 APRIL)

FIGURE 56 MEETING HELD AT THE DS OFFICE WATTALA 2021

FIGURE 57 DS WATTALA TAKING PART IN THE RECENT DISCUSSIONS WITH THE ESIA TEAM AND THE CEB OFFICIALS

FIGURE 58 GNS TOOK PART IN THE RECENT DISCUSSIONS AT THE DS OFFICE

FIGURE 59 DS COLOMBO INSPECTING THE LAY OUT MAP OF THE UL DURING THE RECENT DISCUSSIONS

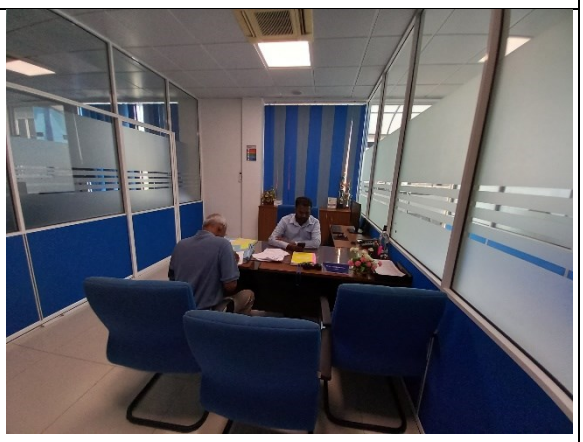


FIGURE 60 MEETING WITH THE WATER ENGINEER AT THE PROJECT OFFICE AT ALUTH MAWATHA

FIGURE 61 GNS TAKING PART IN THE RECENT DISCUSSIONS WITH DS COLOMBO

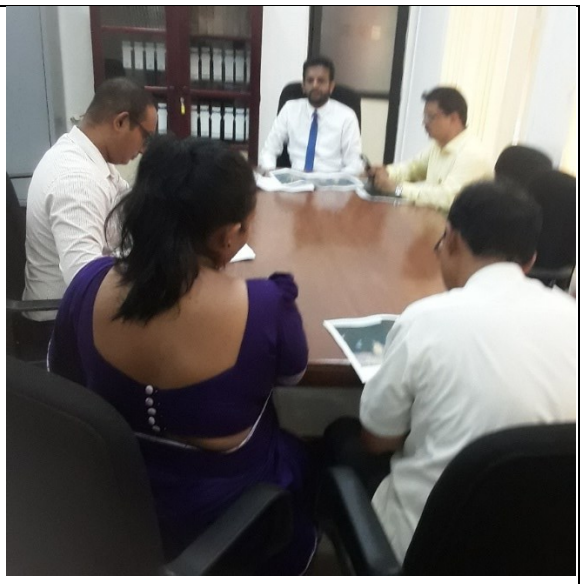
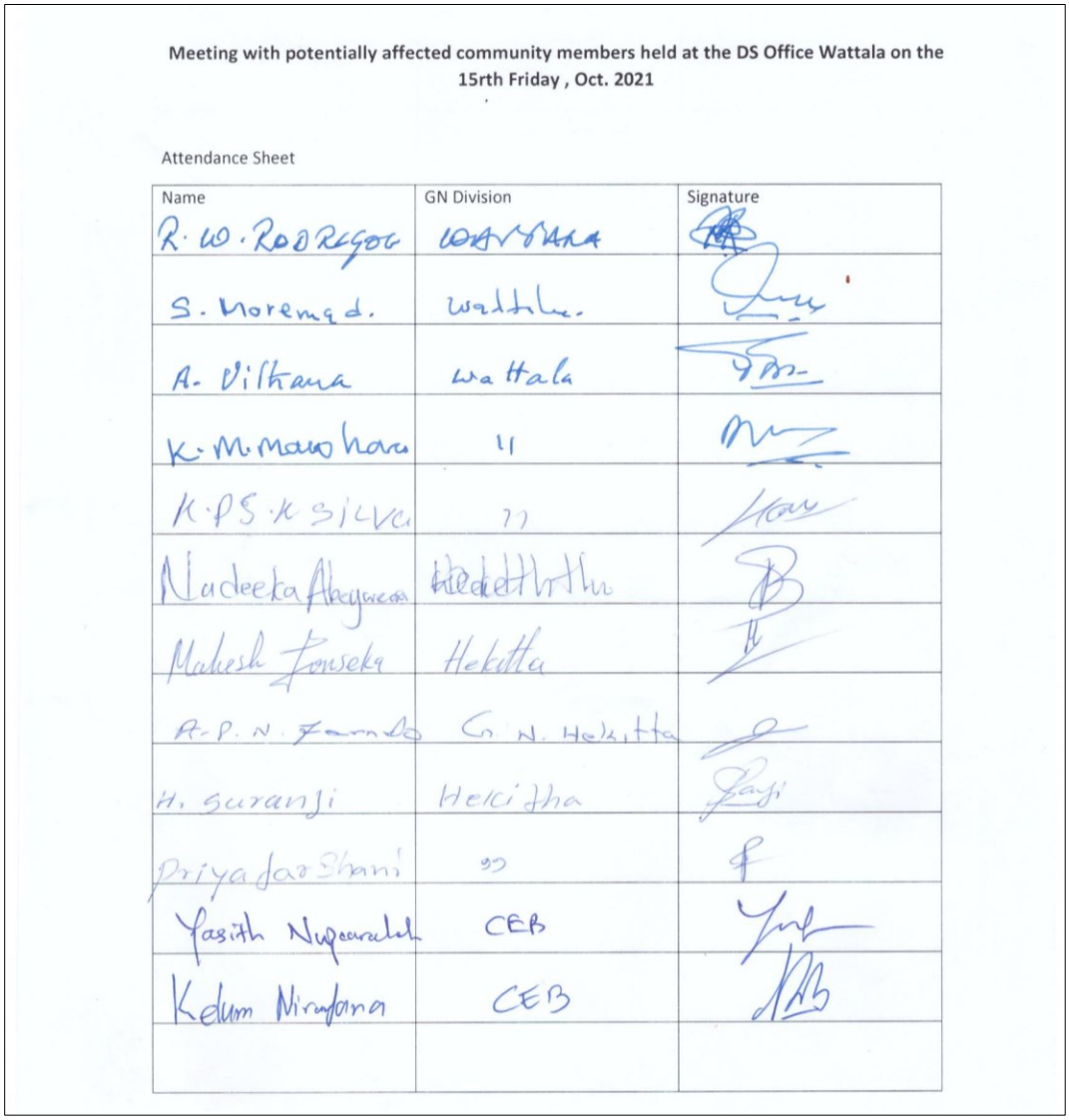


FIGURE 62 CEB OFFICIALS TOOK PART IN THE RECENT DISCUSSION WITH THE DS COLOMBO

12.14. Attendance Record of the Consultation Meeting held at the DS office Wattala



Meeting with potentially affected community members held at the DS Office Wattala on the 15rth Friday , Oct. 2021

Attendance Sheet

Name	GN Division	Signature
R. W. Rodrigo	Wattala	
S. Moremgd.	Wattala.	
A. Vithana	Wattala	
K. M. Manoharan	11	
K. P. S. K Silva	11	
Nadeeka Abeyweera	Hekitta	
Mahesh Jayaseka	Hekitta	
A. P. N. Fernando	G. N. Hekitta	
H. Suranji	Hekitta	
Priyadarshani	99	
Yasith Nipunaketh	CEB	
Kalum Niranjana	CEB	

Attendance of the participants at the meeting held at the DS Office Wattala – April 2024.

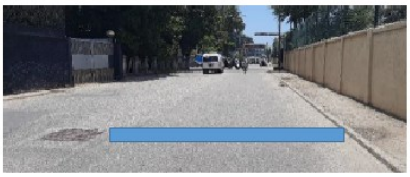
Stakeholder Meeting at DS Wattala.

Kerawalapitiya - Port 220kV underground cable project

03-04-2024 at 1 pm.

No.	Name	Designation	Signature.
1	P.D.T.C Rajika	DS / Wattala	
2	H.I. Sandamali	ADS - Wattala	
3	A.D.P. Ranjith	[illegible]	
4	A.P.N. Fernando	G.N. Hekitta	0772107966
5	W.D.L.L. Wimalawansa	G.N. Kerawalapitiya	0715866221
6	L.S.D. [illegible]	G.N Hendala North / South	0771360170
7	D.S.M. Dissanayake	G.N. Nayakakanda North	
8	[illegible]	[illegible]	
9	[illegible]	[illegible]	0710407669
10	TN [illegible]	PM / CEB	
11	M.R. Kumara	CEB / Civil Engineer	
12			

12.15. Trial Pit Locations

TP-17	Just after the round-about located infront of St,Thomas Church on Sea Beach Road(Near Waraka Kade)		
TP-14	in between the manhole and the padestrian pavemnet near padestrain crossing at the left lane ,Just before the Kochchikade church on Srimath Ramanadan Mawatha		
TP-13	At right lane in between the NWSDB Manhole and the SLPA Boundary, just before the Hettiyawatta Junction on Srimath Ramanadan Mawatha		
TP-10	Across the road just before the Lower St.Andrews road		
TP-07	Across Enire road just before the St.James Street-Aluth Mawatha Junction		
TP-06	Across Enire road just before the Madampitiy Roada-Aluth Mawatha Junction		

	Location Description		
TP-22	Left lane of the Janadhipathi Mawatha,Infront of president's House		
TP-21	In between two manholes infront of EPF on Sir Baron Jayathilake Mawatha		
TP-20	Just before custom HO after the round-about(Khan Clock Tower) on Sir Baron Jayathilake Mawatha		
TP19	In Between two Manholes,Infront of SLPA Gate No-03 Near Pedestrian Crossing on N H M Abdul Cader Road		
TP-18	inbetween two CMC Manholes,Infront of Gold Center on N H M Abdul Cader Road(Sea Beach Road)