REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES PROJECT

Site Specific Environmental and Social Management Plan

Site No.76 – L3
Ella – Wellawaya Road – Near culvert 25/6
Badulla District

March 2022

Prepared for:

ASIAN INFRASTRUCTURE INVESTMENT BANK

Prepared by:

National Building Research Organisation
99/1, Jawatta Rd | Colombo 05
Tel: 011-2588946, 011-2503431, 0112-2500354

TABLE OF CONTENT

List of Figures

List of Tables

Abbreviations

AIIB	Asian Infrastructure Investment Bank
CEA	Central Environmental Authority
CEB	Ceylon Electricity Board
DFC	Department of Forest Conservation
DS	Divisional Secretary
DWLC	Department of Wild Life Conservation
EH & S	Environmental Health & Social
E&SU of PMU	Environmental & Social Unit of Project Management Unit
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
GN	Grama Niladhari
GOSL	Government of Sri Lanka
GSMB	Geological Surveys & Mines Bureau
LHS	Left Hand Side
NBRO	National Building Research Organization
RDA	Road Development Authority
RHS	Right Hand Side
SSE & SMP	Site Specific Environmental and Social Management Plan

1. Introduction

1.1 Project overview

The Government of Sri Lanka has received a loan from the Asian Infrastructure Investment Bank (AIIB) for mitigating/rectifying unstable slopes in high-risk areas especially in 11 districts of 06 provinces of the country. The project requires to be implemented in accordance with environmental and social safeguards and mandates of the AIIB and that of Sri Lanka. Considering the nature of project actions and its implementation, an environmental and social management framework (ESMF) has been prepared as required by the AIIB environmental and social safeguard policy.

The purpose of the environmental and social management framework (ESMF) is to provide a guide for application of AIIB safeguards and national environmental and social mandates during the implementation of project actions. The project implementing agency (NBRO) is expected to ensure implementation of environmental and social management plans prepared under the ESMF during all phases of project implementation so that the impacts on the environment and community are minimum.

During the scoping exercise it was revealed that the environmental & social setting, and health & safety conditions are more site specific, and require to be addressed specific to site conditions. Therefore, the ESMF has recommended a site specific environmental and social assessments followed by Site Specific Environmental and Social Management Plans (SSE&SMP) for each site. The SSE&SMP gives planning, design, construction & operation phase environmental, social, and health & safety management measures to be considered in the project Implementation.

This is the site specific environmental and social management plan for **Ella – Wellawaya Road – Near Culvert 25/6** landslide mitigation site. This plan has been prepared by an in-depth environmental and social assessment to:

i. Identify sensitive environmental and social elements in the project influence area
ii. Identify significant environmental and social impacts due to project actions
iii. Propose mitigation measures
iv. Decide appropriate environmental and social monitoring requirements specific to this project
v. Study relevant environmental regulations and procedures to be followed during project implementation specific to the site

1.2 Intended users

The document provides an in-depth insight into site specific environmental and social issues associated with the proposed project and the mitigation measures and intend to be used by landslide mitigation design team, the PMU and the contractor in the implementation of ESMP component of the project. The SSE&SMP is published in NBRO website and can be viewed by wide range of interested parties (public, stakeholder organizations) can be utilized by the contractors for the project and will form the basis of site-specific management plans that will be prepared by the contractors as part of their Site Specific Environmental and Social Management Action Plans (SS- ESMAP) prior to commencing works.

2. Description of the project and site descriptions

2.1 Name of the project

Rectification of Site No.76 – L3, is identified as Ella-Wellawaya Road – Near Culvert 25/6, located in Badulla District

2.2 Location details

The proposed mitigation site falls under Rawana Ella GN division of Ella DS division in Badulla District of Uva Province.

GPS references of the site – 6.865283°N and 81.05285°E

Elevation – The elevation ranges from 2100 ft AMSL to 2500 ft AMSL (640 m – 762 m)
Nearest town to the site –Ella can be recognized as the nearest administrative town, is about 4 km away from the mitigation site.

Accessibility to the location

Mitigation site is located within the limits of Ella. The mitigation site is adjacent and it can be reached directly via Wellawaya – Ella – Kumbalwela Hwy (A23). When travel from Kumbalwela junction, which is located in Badulla – Bandarawella Rd (A16), taking towards Wellawaya – Ella- Kumbalwela Hwy (A23). Ella town can be reached after travelling 3.2 km on the same road. Then the mitigation site is located 1.1 km away from Ella town. Figure 1 below shows the accessibility to the location (Not in a Scale).

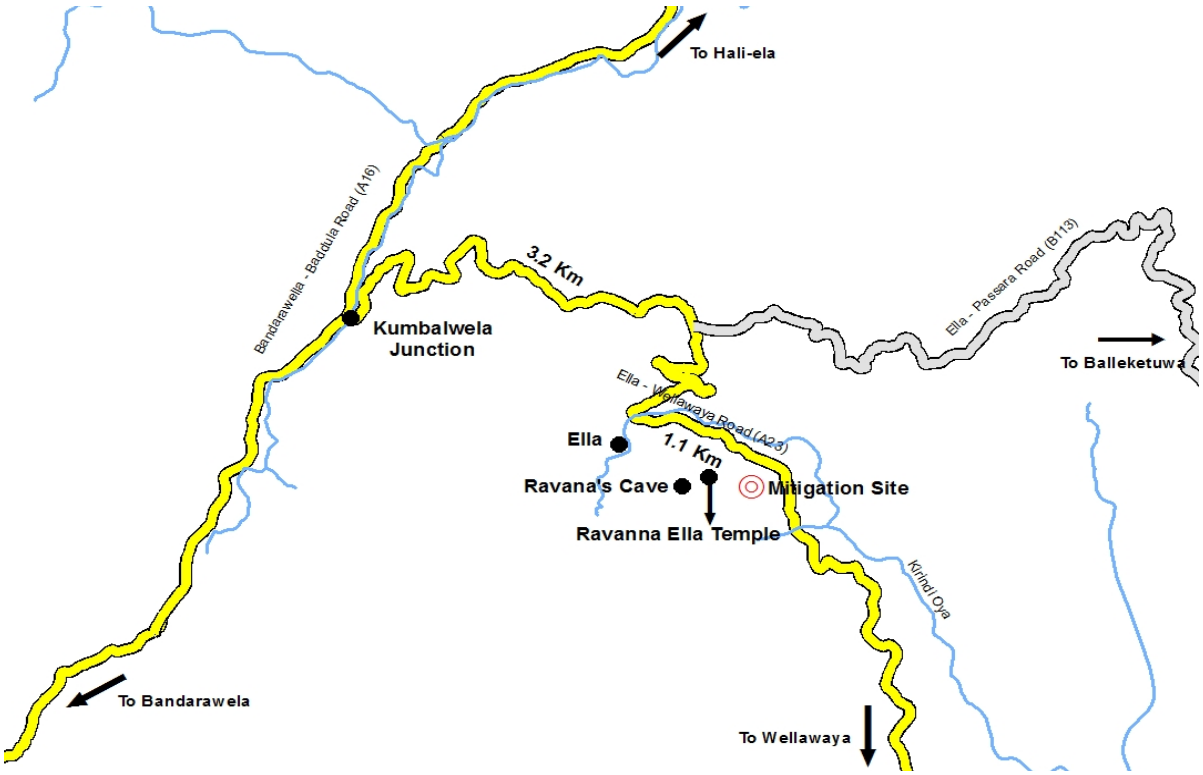

Figure 1: Accessibility to the location (Not in a Scale)

2.3 Topography and Land Ownership

The proposed mitigation site is located within the Ella-Wellawaya Road (near culvert 25/6). The general topography of the site is characterized by varying slopes of 45 to 60 degrees from the access way with the average cross-sectional length of 159 m towards the toe of the slope. The major portion of the slope fluctuates between 50-60 degrees with steep slope at the topmost part.

Slope gradient of the area is about 40 degrees to the North-East direction and contained with escarpment slope. Unstable boulders can be observed above the road (approximately 4m diameter). The site comprises colluvium soil and along with the sudden rock movements caused by surface runoff caused larger sized boulders has moved closer to Ella-Wellawaya road. Currently, the road subsidence can be seen in the area.

The extent of the land area of the mitigation site is about 20,000 square meters. The steep slope has been modified to construction of the Ella – Wellawaya Road. The ownership of the land in the impacted area is belong to privet sector (Refer figure 2 for Google image of the proposed landslide mitgation site and sorrounding features and service infrastructure.)

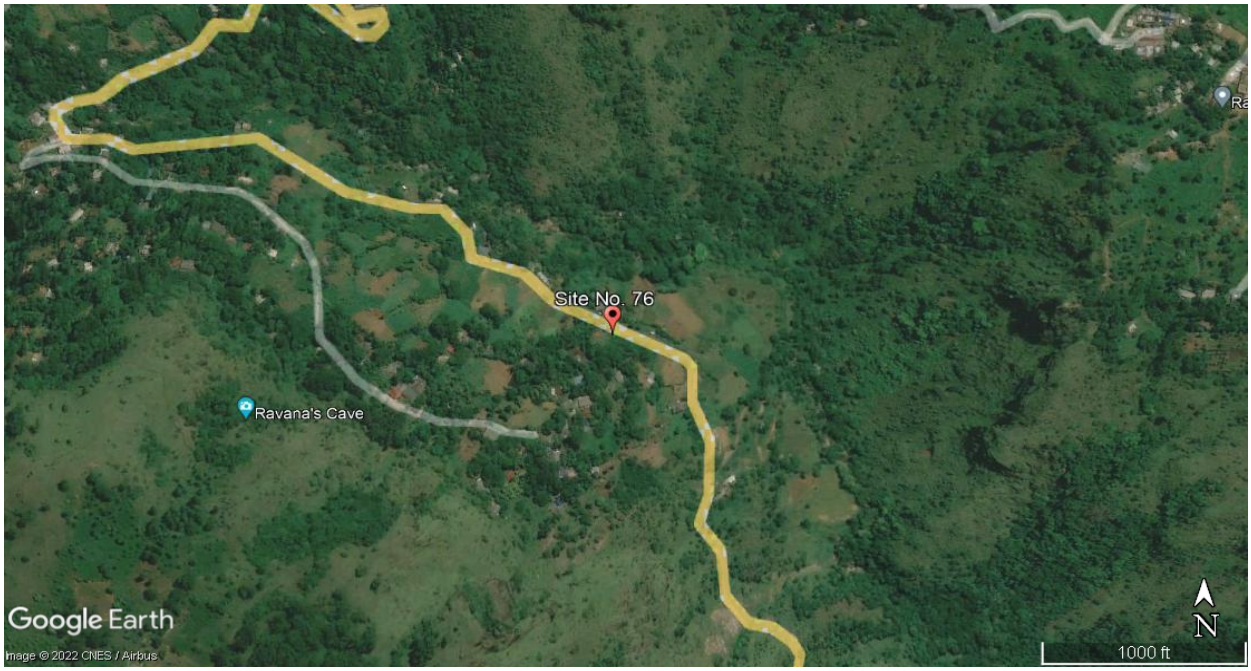

Figure 2: Google image of the proposed landslide mitigation site, the surrounding environmental features and service infrastructure

2.4 Meteorology of the area

Ella is one of the most visited tourist places in Sri Lanka, and climate plays a major role on tourist attraction. Accordingly, Ella enjoys an equatorial (or tropical rainforest) climate in accordance with the Kappen-Geiger classification. The yearly average maximum temperature in Ella is 27°C (ranging from 25°C in December to 28°C in April). Annual rainfall is 4891 mm, with a minimum of 224 mm in January and a maximum of 744 mm in October, as seen in figure 3.

The best time to visit Ella would be during Summer (March to June) and Winter (December to February) which are the two peak seasons. Monsoon (July to November) in Ella is considered a low season and travelling during Monsoon would mean quite a few travel restrictions.

(Source: **https://www.triphobo.com**).

So, while implementing the mitigation measures, two things need to be considered; firstly, off tourist seasons, secondly, low rainy period. Accordingly, making flexible schedule would reduce the impact.

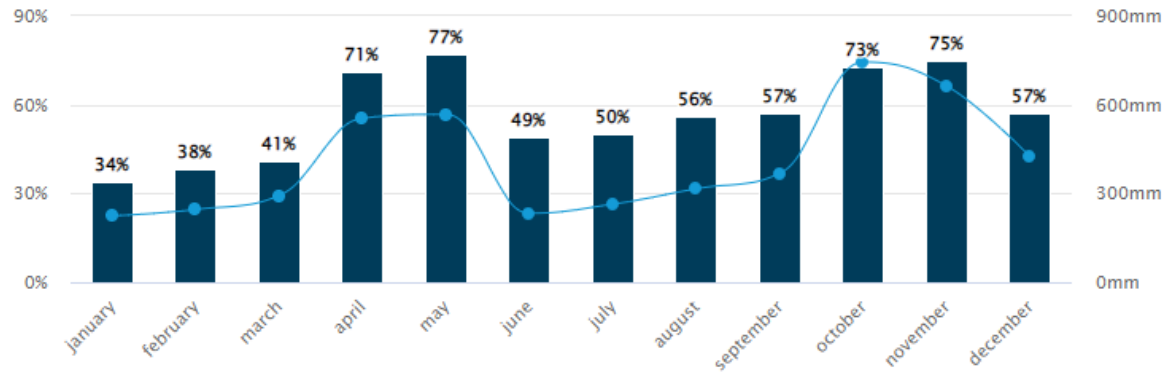

Figure 3: Annual precipitation (Rainfall) of Ella

(Source: whereandwhen.net: https://www.whereandwhen.net/when/central-and-south-asia/sri-lanka/ella/)

3. Landslide hazard incident details

3.1 Account of incident

An unstable slope at the RHS of Ella – Wellawaya (A23) near culvert 25/6 has been identified by the Landslide Research and Risk Management Division of NBRO, Badulla District office, as part of the landslide hazard investigation of the area. The main cause of the cutting failure is poor drainage system along the access way on the top of the gradient and a certain level of human impact too. As, there are no proper drainage system to infiltrate the rain water, the water pressure in the middle of the flow path increases and unsurprisingly flows directly through the slant (45^0-60^0) vertically. Because the slope modifications have not followed engineering slope stability norms while drainage management on the slopes was poor. In the year of 2020, displacement of the upper layer of soil occurred due to this improper surface runoff through the slope. Due to the local failure of this site, road subsidence can be seen in the area.

Figure 4 and 5 provides cross sections, land use, risk elements and special features of the location.

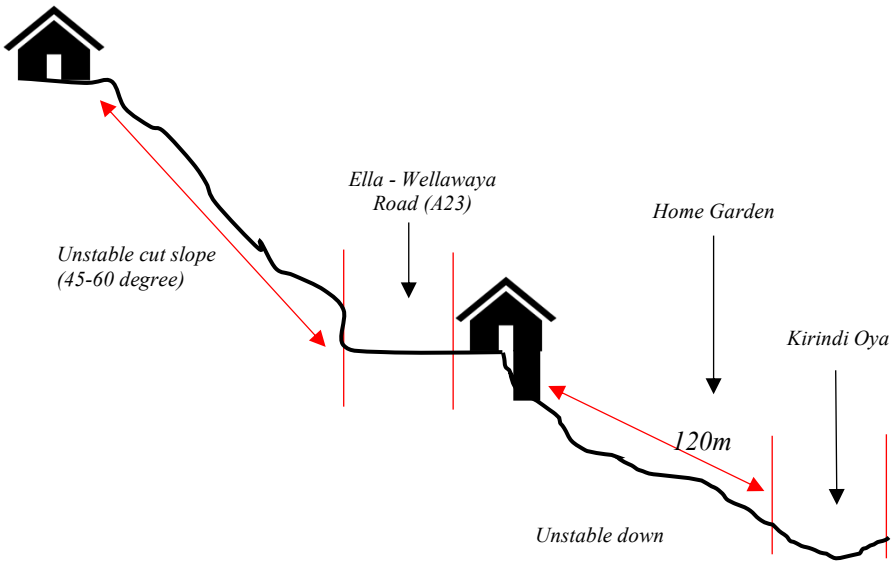

Figure 4: Cross sections, Land use, Risk elements and special features of the location

3.2 Effects and consequences of landslide

During intense rainy periods dislodged soil mass and boulders through the unstable cut slope tends to fall imposing risk to the vehicle using the Ella – Wellawaya Road (A23). Especially, during the peak seasonal times, huge number of tourists use this road as their main access way and stop near the roadside to take a break or to enjoy the scenic beauty of Ella. In such situation, this could be endangered to their lives. There are 2 commercial spaces (shop and a guest house) located in front of the cutting failure (approximately 17 m distance). So, this could create huge impact to the customers who visit or stay in this place.

Also, there are possibilities of losing home garden due to the cutting failure. The both, up slope and the down slope contains home gardens.

A spring is running close to the mitigation site and none of the surrounding people use the water. Still, it could affect the hydrologic connectivity and subsurface water-storage dynamics. In such case, again it would be a source for accelerating the landslide.

3.3 Description of any remedial measures already undertaken to reduce the potential risk

With the occurrence of cut slope failure in 2020, NBRO had inspected the unstable slope in the Ella – Wellawaya road (near culvert 25/6). However, no any remedial measures have been taken in this site.

3.4 Evacuations

No any building was evacuated due to the risk

3.5 Resettlement (progress)

No any resettlement for this site.

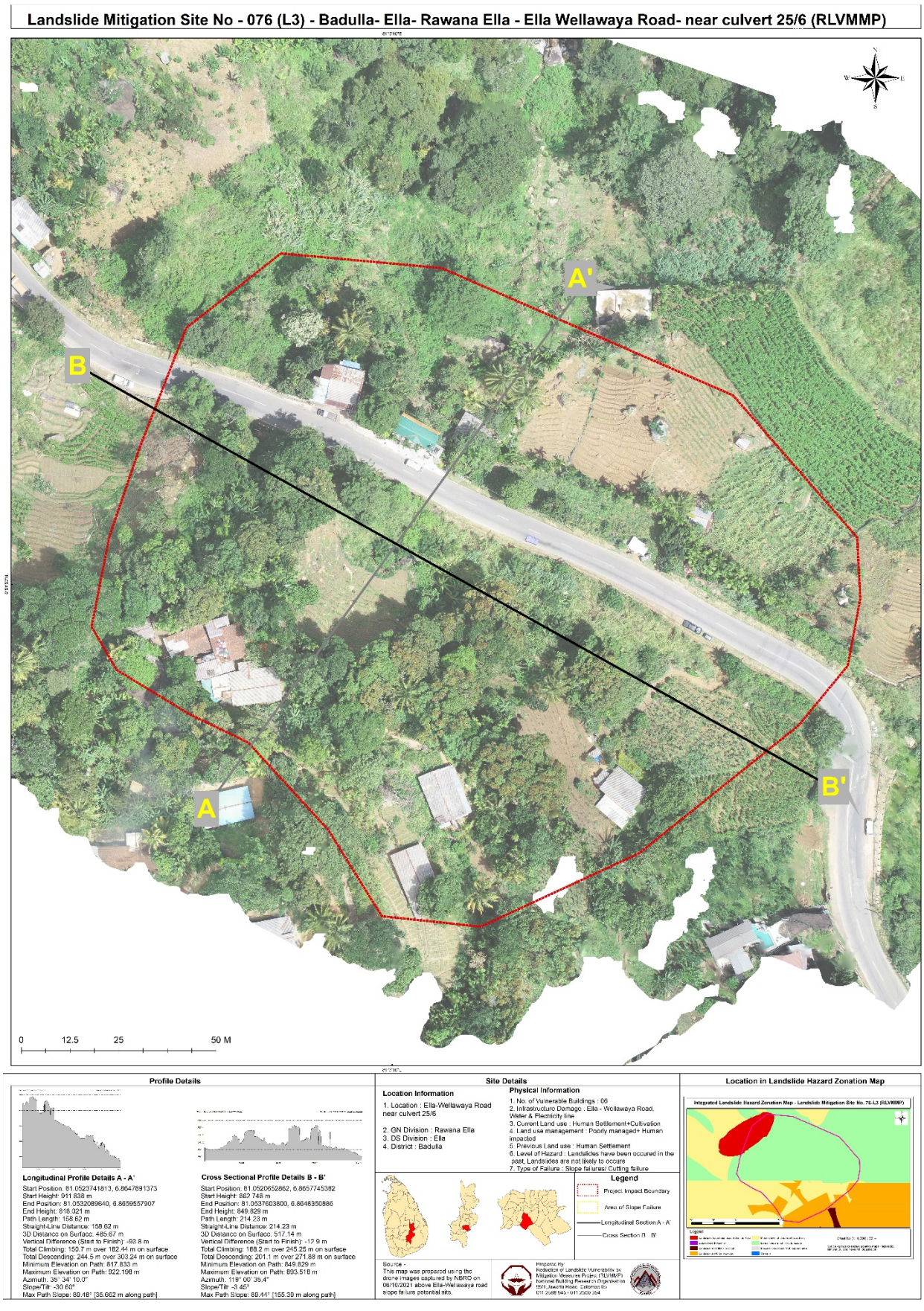

Figure 5: Cross Section, Land-use, Risk Elements and the spatial features of the location

4. Description of the area of the landslide/slope failure and areas adjacent to the landslide and current level of risk

4.1 Surrounding area of the slope failure

The affected site is located RHS of Ella-Wellawaya Road (near culver 25/6), at the premises, a cut slope area could be identified. Two commercial buildings and home gardens are located at the down-slope area. There are 4 houses located at the upslope of area. A spring is running adjacent to the area of the cutting failure. Some vegetation plots with leaks and beans are scattered around the cut slope area. There are no any other important monuments located at the surrounding area of the mitigation site (within 100 m distance). Water supply lines could be observed in the mitigation site and similarly, electricity supply lines and electricity poles are also located very closer to the impacted area. A drain system could be observed along the road, but not continuous and not properly maintained.

The mitigation site is located in a medium dense built environment and within approximately 500 m distance, Ravana's cave and Ravana Ella Temple are located along with that more than 15 restaurants, hotel spaces, residential area, café and viewpoints could be seen. The most important aspect is Ella-Wellawaya Road (A23) which is the main access path to the Ravana Falls, during the seasonal peak time, Ella-Wellawaya (A23) road sides are highly congested with parked vehicles to experience the natural beauty of Ella. Several cutting failures can be identified along the road due to not following proper engineering guidelines and poor drainage management. Nearly with 120 m distance Kirindi Oya is running in the downslope of the mitigation site.

4.2 Current level of risk

The almost vertical non-engineered slope cut will be at risk of future failure due to recurring extreme precipitation events. Due to this the Ella-Wellawaya Road (A23), the commercial spaces, spring and the home garden located in the down slope and the upper slope are at risk due to the cutting failure.

5. Description of the works envisaged under the project

The proposed project aimed to combat further progressive failure of cut slope. Ella-Wellawaya Road (A23), commercial spaces and the home gardens; therefore, preventive measures such as unstable boulders, construction of a retaining wall, drainage improvement, and soil nailing will be implemented. Environmentally friendly mitigation measures are highly encouraged in this site as it is located in environmental sensitive and tourism area. It is better to allocate space from the mitigation place in order to implement/construct future potential uses.

6. Brief description on the surrounding environment with special reference to sensitive elements that may be affected by the project actions

The affected site is located Ella-Wellawaya Road (near culvert 25/1). There is a variation on elevations within the site.
Following sensitive elements will be at risk due to project actions;

i. Ella-Wellawaya Road (A23) close to the culvert 25/6
ii. Home gardens located at up and down slope
iii. Water supply and electricity line
iv. Drainage
v. Spring running through the slope
vi. Commercial space

Refer figure 5: Sensitive elements that may be affected by the project actions.

Figure 6a: Ella-Wellawaya (A23) road located close to the cutting failure

Figure 6b: Home Garden at the upper – slope of the mitigation site

Figure 6c: Side and the front view of the commercial space adjacent to mitigation space

Figure 6d: Electricity line

Figure 6e: Spring located close to the mitigation site

Figure 6f: Drainage and the Water supply line going through the down slope of the area

Figure 6: Sensitive elements that may be affected by the project actions

7. Identification of social and environmental impacts and risks related to the works

7.1 Positive impacts

- The project will reduce further cutting failures at the upslope section near culvert 25/6 in Ella – Wellawaya (A23) Road.

- Therefore, the proposed project will significantly enhance safety for commuters, tourists and pedestrians during rainy seasons. It will allow to keep the road open throughout the year.

- This location is highly tourist attraction destination in the country. Therefore, tourism will not be interrupted during rainy season while the safety of commuters will be ensured.

- If the mitigation measures are implemented in the site, it will support to enhance the safety of the home garden located in the down and upper slope of the mitigation site.

- There are 2 commercial spaces operating as restaurants located closer to the mitigation space. Implementing the mitigation measures will support to prevent destruction of livelihood and income loss.

7.2 Negative impacts

The mitigation works are generally confined to an area which is already unstable and highly potential for slope failures. Therefore, negative impacts are much localized and also limited to construction period.

Table 1: Negative impacts and their level of significance

Impacts during the construction period	Level of Significance
7.2.1 Hydrological and water Quality impacts	
7.2.1.1 Impacts of the drainage pattern of the premises Disruption of existing surface and sub-surface drainage pattern in the area is envisaged due to the reshaping of the unstable slopes, removal of soils, and diversions of existing drainage and surface runoff flow paths. The mitigation works in this site will focus largely on the drainage improvement. Due to diversions, cut-off drains and increased sub-surface drainage, the premises will have increased flows at higher velocities in rainy periods. Also, while excavations and land clearings during the construction will cause continuous runoff of the surface water with mud downward the slope in rainy days.	**Significant**
7.2.1.2 Water pollution impacts "Kirindi Oya" is located within 120 m distance of the site, so, there is significant impact to the water pollution. During rainy season fines sediments, soil particles can contaminate the downstream through the drainage. Also, during slope excavation, removal of debris can generate sediment laden runoff and there could be a possibility that contaminated runoff may enter the water body to pollute the water. At the same time, the spring which is located near the mitigation site will be highly impacted if proper precautionary measures were not taken during the construction.	**Significant**
7.2.1.3 Erosional impacts The mitigation works in this site will focus largely on the drainage improvement. Therefore, during rainy season heavy flow of water is expected to be generated and move through the exposed surface. Also, there is a spring running in the upper slope area. So, if proper mitigation/ covering method is not followed, it will be accelerating the erosional impacts.	**Significant**
7.2.1.4 Open defecation and waterborne infections As the site is located within a commercial space the possibility of open defecation is low. So, it is better to make proper sanitary arrangement for the labors, in order to totally avoid the open defection and waterborne infections. Because the commercial space owners won't be happy if their space is continuously occupied by the labours, as it will disturb to their customers.	Less significant
7.2.1.5 Impacts on the downstream water uses "Kirindi Oya" is running in the down slope of the mitigation site, and there are few houses and home gardens located in the downslope. During the construction, there are possibilities of construction materials mixing with the water sources, especially in rainy time. This will affect to the people who are based on the Kirindi Oya water source.	**Significant**

7.2.1.6 Impacts on ground water table and ground water quality Dewatering during construction could lead to lowering groundwater table when the aquifer is over drained. Mixing of construction materials including cements and other grout materials use for soil strengthening with sub-surface water flows will cause temporary water quality degradation and accumulation of unwanted substances. During the construction period, the hazardous waste from chemical substances, waste water from the construction activities and discharge of waste matter from onsite septic systems would cause adverse impacts on the ground water quality. Due to the construction activities at the slope area, the ground water table tends to draw down causing water seepage close to the road to dry out.	**Significant**
7.2.2 Environmental Impacts	
7.2.2.1 Noise and vibration impacts Construction noise are expected from machinery in site preparation and landscaping. The tourists are coming to enjoy the natural beauty of Ella in calm and quiet environment. So, this machinery could disturb the tourist as well as the commuters using the Ella-Wellawaya (A23) Road. Subsequently, the commercial spaces located in front of the cutting failure as well as the residential area located in the upper & down slope will be highly effected due to the machinery noise and vibration.	**Highly Significant**
7.2.2.2 Air pollution impacts Potential impacts on the air quality will be due to the fugitive dust and the exhaust gases generated in and around the construction site due to vehicular movement and site clearance, storage and handling of construction materials such as sand, cement, etc. This will impact the residents who are living in an around the mitigation site and the commuters, pedestrians and the customers visits restaurants at the downslope. At the same time the tourists who are visiting during the construction will be affected by air pollution, and pollution preventive measures are not followed.	**Highly Significant**
7.2.2.3 Solid waste disposal issues Poor management of solid waste such as litter, food waste, construction waste during the construction phase may lead to create inconveniences to people, can block the drains to make breeding grounds for water borne refection vectors and pathogens peril. Waste can pollute the soil, and leave various environmental impacts specifically in the wildlife conservation area, if proper disposal mechanism is not in place during the construction period. Since the mitigation work take place in environmental sensitive area, solid disposal place should be placed external to the premises.	**Highly Significant**
7.2.2.4 Explosive hazards and hazardous materials Since the affected area has large rock boulders, explosives may be used if the rock blasting is envisaged. This may pose risk to commuters of Ella – Wellawaya road, tourist of Ella and surrounding and construction workforce due to unsafe use. Since there are commercial spaces in front of the cutting failure location, the impact will be increases as per the customers visits.	**Significant**
7.2.3 Biological /Ecological Impacts	

7.2.3.1 Effects on Fauna & Flora The trees found in the area are not endemic, threatened or identified in the red list of IUCN. Still as per the Director General of Wildlife Conservation statement "Hunting ,shooting, killing, capturing of any wild animals or set instrument to kill or capture of any wild animals, taking or destroying eggs or nest of birds or reptile, damaging to breed places of animals are forbidden" So, while implementing the mitigation measures there could be intentionally or unintentionally can causes damage to the breeding places due to several reasons, such as explosive hazards materials, air pollutions, noise and vibration effects. So before implementing the mitigation measures on the wildlife conservation approval is mandatory.	**Highly Significant**
7.2.4 Social and Economic Impacts	
7.2.4.1 Impacts on agriculture within the area to be remedied/ immediately to the site There are some agricultural practices within a certain distance to the site in the upper slope, such as beans, leeks, and banana. Sometimes, construction will lead to removal of these vegetation and will have impact on income earning of the planters.	**Less significant**
7.2.4.2 Cracks in the building due to vibration impacts Vibration can affect the stability of the commercial building in down slope. The houses are located very close to the mitigation site, approximately 17m distance, it has huge impact. In case of the effect to these building, proper compensation mechanism has to be followed.	**Highly Significant**
7.2.4.3 Loosing access to land and transport infrastructure Most of the construction activities will be focused on unstable slope area adjacent to Ella-Wellawaya (A23) road. Hence, during construction phase, this road function will be temporary obstructed. The traffic due to full/partial road closure may obstruct the smooth flow of vehicles during the week days, school times, (in morning, day time and evening). This will cause nuisance to pedestrians and commuters. Especially, as it is a tourism-based location, the flow of the tourist may affect.	**Significant**
7.2.4.4 Impacts on livelihood/ business and income activities There are two commercial spaces (a Shop and a guest house) located in front of the cutting failure. During the construction, the business activities of these places will be highly affected and hence the commercial spaces need to be temporarily evacuated. It will create huge impact to the income activities of these people. So, before construction, proper awareness of the owners of these commercial settings is very much needed.	**Significant**
7.2.4.5 Impacts on service provision (water supply, sewage, electricity) During the construction works and moving machinery Ella-Wellawaya (A23) road can be disturbed and damaged. Electricity line, water supply line, and drainage lines can also be impacted. So proper safety mechanism (replacing) is needed before construction with the consultation of users.	**Significant**
7.2.4.6 Risks of people accessing the site during construction Excavation machineries, loaders, trucks etc. will be used in this premises where people are moving. Site may use high voltage power for operation of certain machinery. Construction may use materials such as metal aggregates, steel etc. which can be injurious under improper storage and handling. Since the site is located adjust to Ella- Wellawaya (A23) road, ignorance of entry of people, especially tourist with careless operation of machinery can cause fatal injuries and accidents to them.	**Significant**

7.2.4.7 Work camps and lay-down site requirements The camps site will be selected in the close proximity to the mitigation site. If proper camp management is not in place, it may result several labour issues, social issues with the commuters and tourist, nuisances, and management of waste etc. If temporary camps are built in the close proximity of the site, management of solid waste and sewage will be an issue. In order to provide electricity, water and other facilities require for workers from the premises, permission must be obtained from relevant parties.	**Significant**
7.2.4.8 Relations between workers and the tourist/ people living in the vicinity of the site and possibility of disputes Construction workers at this site will from different social backgrounds and from different geographical areas often under poverty. Usually, they are with poor educational and social background. So, there may be disputes with the workers of construction site and the villagers as the people are living nearby. As there are residential area and commercial spaces located adjacent to the mitigation location the level of disputes is compatibility high. Further, the site is located in one of the prominent tourist spots and it is important to consider the tourists perspective as well. Tourists could be locals and foreigners. Locals may have an overall understanding about the construction site situation but foreigners may not. So, the relevant officers should take the responsibilities in order overcome/resolve the disputes.	**Highly Significant**
7.2.4.09 Workers safety during construction The workers may be exposed to risk from falling. Fatal injuries may occur if the slopes fail. The heavy construction machinery may be used in limited work spaces. Risk of hazard from vehicles and construction machineries accidents is significant at this site. Contractor may engage under age workers (children) for construction work, which is risky and can results serious accidents and injuries.	**Significant**
7.2.4.10 Need for people to enter or cross the site There will be an issue regarding entering or crossing the site during construction since the site is located adjusted to Ella – Wellawaya (A23) road.	**Significant**

8. Significant Environmental and Social Impacts

Environmental, social impacts or risks that will require special attention on the part of NBRO.

8.1 Priority Health and Safety Issues. Specific H&S concerns that require measures that go beyond the standard contractual requirements for contractors

The health and safety issues pertinent to this site is significant as the workers have to work on almost vertical unstable slope with a risk of slope collapse. The health and safety issues of workers safety is highly significant at this site. Such common E & HS issues have been discussed in the **ESMF**. Worker safety requirement in the construction site is more detailed under 2003 5: Safety equipment and clothing in the section 2003: Working conditions and community health and safety in the Bidding document.

8.2 Child labour & forced labour

Child labor & Forced labor is detailed under 2003.3 under section 2003: Working conditions and community health and safety in the Bidding document.

9. Environmental Social Management Plan (ESMP)

Measures to manage and or mitigate the impacts and risk. Especially the significant impacts and risks identified in sections 7 & 8. This section will include the specific recommendations and requirements of the ESMP for design stage, construction phase and maintenance operation phase.

9.1 Resettlement action plan

There is no project-based resettlement in this site. The road may have some impacts in the form of structural damage during the project actions due to ground vibration induced by heavy machinery operation. The roads already consist with road subsidence. (The scheme of compensation, in case of damage to structures due to project should be arranged, (Refer 2002.2.17) utilities and roadside amenities in contracts requirement to ESMP.

9.2 Evacuation of people

The two commercial spaces are need to be evacuated during the construction as those are located close proximity to the site. The area in the downslope (part of Ella-Wellawaya Road) should be named as a "No Entry Zone" for the construction period. To reduce the risk to public properties, it is better, not to allow the vehicle to park on the both side of the road in front of the mitigation site.

9.3 Procedure for removal of damaged structures, facilities infrastructure (consent from owners to remove the articles)

There is no any damaged structure near or adjusted to the site.

9.4 Requirement for compensation for loss of property /uses due to project actions

It may require to compensate if any damages happen to the infrastructures or any other element of the area during constructions.

9.5 Public awareness and education- needed for following areas

Programs to inform and educate about the risks posed by landslide.

9.6 Design based Environmental/ Social Management considerations

Following environmental and social design considerations are recommended for this depending on its environmental and social relevance.

Table 2: Design stage Environmental & Social considerations

Design feature	Recommended level of consideration for this site
i. **Natural resource management and resource optimized designs** Project specific designs should be considered minimum number of removals of grown tree species. Sufficient emphasis should be made to consider conservation of trees if important tree species are found. As per the statement of Director General of Wildlife conservation "On any state land fell, collect, damage, or remove any plant, construct any building, road or path, cleaning, cultivation, mining, filling, disposing, garbage is forbidden". So, the consideration level should be high.	High
ii. **Site Planning** During site planning it is necessary to be cautious on possible re-activation of slope failures and movements of soil masses. Hence Ella- Wellayawa (A23) road should not be installed in the danger zones of the slides.	High
iii. **Habitat connectivity and animal trails** If large fractions of home garden/ forest patches are required to be cleared in ecologically fragile habitats as for permanent structures or for access, or if deep drains etc. are to be made the designs should include habitat connectivity features, animal trails and vegetation strips and etc. even if the impacts are localized.	High

iv. Conservation of water resources If extraction of water is involving as a mitigation measure, as the extracted water is in a good quality and yield it can be considered as a source of water for usage such as gardening and sanitary activities. Special attention to the quality of the water should be given as septic tank is located close to the proposed mitigatory site.	Medium
v. Interruption to water supply lines and sewage lines There is a water supply line running adjacent to the site, along the road and proper steps and actions need to be adopted in order to protect these lines.	High
vi. Aesthetically compatible design considerations The designs in aesthetically sensitive environment should consider structures that blend with natural environment to keep the visual pollution to minimum, specifically in this Ella area. Service of landscape architect may be important for the design of suitable mitigation structures.	High
vii. Consideration of green environmental features As many of the mitigatory works are carried out in well maintained premises, it is recommended to consider green environmental designs as much as possible in the designs e.g.: use of local vegetation species for erosion control, combination of plants to sustain species diversity in the environment, avoiding inclusion of potentially invasive species & etc.	High
viii. Workers and community/tourist safety Activation of landslide may occur during construction phase and may pose threat to workers, and the tourist. Therefore, design-based safety consideration such as berms, safety nets, safety fencing etc. should be considered specific to safety of tourist.	Very high
ix. Erosion control structures During rainy season the flow in the drainage structures can be significantly high. During rainy season the heavy flow of surface runoff can be expected through the unstable slopes. This water should be conveyed to nearby storm water drains. Hence the design should adequately consider flow speed breakers to reduce erosive flows of slopes.	High
x. Low post maintenance and operation designs The mitigation should consider passive techniques such as gravity drains for drainage management. Correct pipe diameters, pore diameters and laying angles should be considered to avoid clogging of drains. Low maintenance structures and designs such as designs to withstand erosive forces, sediment trapping systems etch should be considered if drain water is expected be directed to natural streams. The materials used for structures and should be chosen carefully so as to withstand weather conditions with high durability. Designs should specially consider corrosion prevention techniques if steel structures are used.	High

9.7 Mitigation of impacts during the construction phase

9.7.1 Construction contractors' requirement to comply with environmental and social management during the construction phase

Measures to manage and to mitigate the environmental and social impacts are generally common to all landslide mitigation sites. Such impacts are largely attributed to activities in the construction phase. The mitigation of impacts therefore becomes an obligation of construction contractor. NBRO has prepared a comprehensive document on "***contractors' requirement to comply with Environmental and Social Health and Safety (ES & HS) management during the construction phase"*** to be included in construction contractors' bid document. The main sections are summarised below (Table 3) indicating the degree of relevancy for this site. For details ESMP for construction contractors should be referred.

Table 3: Contractor requirement to comply with ES & HS

Reference No. as per construction contractor's obligation to ESMP	Item	Relevant to the project
2002. Environmental and Social Monitoring		
2002.2 1)	Storage on site	Highly Relevant
2002.2 2)	Noise and Vibration	Highly Relevant
2002.2 3)	Cracks and damages to the buildings	Relevant (buildings)
2002.2 4)	Disposal of waste	Highly Relevant
2002.2 5)	Disposal of refuse	Highly Relevant
2002.2 6)	Dust control	Highly Relevant
2002.2 7)	Transport of Construction materials and waste	Highly Relevant
2002.2 8)	Water	Relevant
2002.2 9)	Flora and Fauna	Low Relevant
2002.2 10)	Physical and cultural resources	Low Relevant
2002.2 11)	Soil Erosion	Highly Relevant
2002.2 12)	Soil Contamination	Relevant
2002.2 13)	Borrowing Earth	Relevant
2002.2 14)	Quarry Operations	Relevant
2002.2 15)	Maintenance vehicles and Machinery (pollution)	Highly Relevant
2002.2 16)	Disruption to public	Highly Relevant
2002.2 17)	Utilities and roadside amenities	Relevant
2002.2 18)	Visual environment enhancement	Relevant
2002.5. Environmental Monitoring	Baseline surveys (air, water, noise, vibration, crack surveys)	Refer site specific monitoring plan
	Surveys during construction (air, water, noise, vibration, crack surveys)	Refer site specific monitoring plan
	Surveys during operation phase	Refer site specific monitoring plan
	Reporting and maintenance of records	Relevant
2003. Working Conditions and Community Health and Safety		
2003.2	Safety organization and communication	Highly Relevant
2003.3	Child Labor and Forced Labor	Highly Relevant
2003.4	Safety reports and notification of accidents	Highly Relevant
2003.5	Safety Equipment and Clothing	Highly Relevant
2003.6	Safety inspections	Highly Relevant
2003.7	First Aid Facilities	Highly Relevant
2003.8	Health and safety information and training	Highly Relevant
2003.9	Plant equipment and qualified personnel	Highly Relevant

Relevant: *The section is relevant to the site as a common ESMP applicable to any site*
Highly relevant: *The contractor should pay special emphasis in the preparation of environmental method statements to ensure that the relevant ESMP is implemented specific to the site*
Possibly relevant: *This ESMP will be triggered if the site come across with relevant aspect during project implementation*
Not relevant: *The section may not be relevant to this site under disclosed conditions*
Optional: *require to be implement if needed only*
Refer site specific monitoring plan*: Contractor is obliged to carry out monitoring as specified in the site-specific monitoring plan in addition to monitoring requirement indicated in contractors ESMP*
Reference: Contractors Obligation for implementation of ESMP

9.7.2 Site Specific mitigation

Given below are the site-specific mitigation measures that the project is expected to implement during the construction period.

Table 4: Site specific ES & HS mitigation measures

Mitigation item	Project implementation phase	Responsibility
i. Minimize erosional impacts during construction It is recommended that mitigation works involved with site clearance, slope reshaping, removal of debris etc. are avoided during rainy season. Therefore, it is imperative that site works in upslope mitigation are carried out in the dry season and avoid such activities on upslope area in the wet season as much as possible. This should be considered in project planning stage. Silt traps should be introduced to cut down sediment laden runoff.	Site preparation & construction	Construction Contractor
ii. Planning project activities inside the sites As contractor has to operate mitigation actions along the Ella – Wellawaya (A23) premises, he/she should carefully prepare a plan for management of construction activities inside the premises. This should include careful selection of material storage, mixing of concrete, cleaning activities etc. which considering the safety and optimization of space.	Site preparation & construction	Construction Contractor
iii. No Entry Zone The PMU should make a detailed assessment on possible risk of slope destabilization in the site during construction phase. "No entry zone" may require to be declared. Also mitigate the risk of accidents from moving vehicles operational machinery construction activities, electrical leakages etc. should be given high priority in the health and safety management plan. Sign boards indicating slope instability risk are strongly recommended at this site.	Construction	E & S Unit of PMU contractor
iv. Machinery and material transportation The Ella -Wellawaya (A23) road will require to use for machinery, materials and vehicle transportation during construction phase. Therefore, extreme care should be taken as possible accidents and damages to the road are high. Alternative parking facility for the tourist should be arranged nearby to the high scenic viewpoints which fallen under cutting failure location.	Construction	E & S Unit of PMU Contractor
v. Noise and vibration control The noise and vibration generating activities may disturb the smooth flow of activities in an around Ella mitigation area as well as the tourists and commuters passing the site. Vibration generating activities should be done within the prescribed limits to avoid damage to structures. Cracks in the buildings should be monitored before, during and after completion of the project. Suitable compensation should be made if cracks from the damages or cracks enlarge due to construction work.	Construction	Construction Contractor
vi. Disposal of construction waste The contractor should pay special attention with respect to disposal of construction waste. Waste if generated should store properly without getting washed off and dispose according to approved procedures by the PMU. Construction waste should not dispose within the premises or anywhere else close by the mitigation site.	Site preparation & construction	Construction Contractor

vii. Dust and aerosol control screens The dust particles generated during the construction period can influence tourists, residents and commuters. Special screens etc. should be used if heavy dust or aerosol generating activities are envisaged.	Site preparation & construction	Construction Contractor
viii. Water & Electricity for construction Water for construction should be obtained only from approved places. If the Contractor intends to use water from Kirindi oya or from the spring of upper slope area, they should be informed and the required permission should be taken. As the electricity line is going through the site prior permission from CEB is needed.	Construction	Construction Contractor
ix. Priority Health and Safety Issues As the workers in the site have to work in high-risk conditions, it is imperative to implement recommendations given in section 2003 of contractors' obligation on ESMP under "working conditions and community health and safety". These recommendations should be followed carefully in a proper organization and safety monitoring system. i. Additionally, work should be discontinued for sufficient time period during rainy period as working on unstable slopes will be highly risky in the rainy season. ii. A good warning system and fulltime watchmen is highly recommended for this site for both worker and public's safety. iii. Safety barriers and safety nets should be installed at places of risk to protect workers and community from boulder falling risk iv. Proper emergency management unit for other accidents (first aids facilities, safety items, hospitalization facilities and transportation facilities) should be maintained for this site.	Construction	E & S Unit of PMU contractor
x. Safety structures/sign boards During construction phase adequate safe fencing should be established to prevent potential falling risk of workers from upslope areas. Warning sign boards indicating slope instability risk should be placed at the unstable slope area. As the risk is high during the rainy season where there is no construction work it is mandatory that safety signs boards are displayed even during the no project period as well.	Construction	E & S Unit of PMU contractor
xi. Interruption to water lines Necessary arrangements should be taken to provide alternative water supply in case of an interruption to water supply. The water users should be consulted during project mobilization to inform the requirement to shift the water lines to a safe location if water lines are running through the project site.	Construction	Construction Contractor
xii. Use of sanitary facilities of contractor's workforce Sanitary facilities should be arranged for the workforce not contaminating spring.	Construction	Construction Contractor
xiii. Working hours Construction activities are best done during the day time. If night time construction are required proper traffic management is needed.	Construction	Construction Contractor
xiv. Need for people to enter or cross the site Possible unauthorized access to the site should be avoided by awareness, warning signs and vigilance by the contractor's full-time watchmen.	Construction	Construction Contractor

xv. During construction good housekeeping should be maintained to minimize visual pollution	Site preparation & construction	Construction Contractor
xvi. Worker's code of conduct Possible disputes between the labor force and the community should be prevented by maintaining the agreed code of conduct by the contractor.	Construction	Construction Contractor

9.7.3 Monitoring requirements specific to the site

Following monitoring plan is strongly emphasized during the construction phase specific to this site. In addition to this, monitoring procedure indicated in the contractors' obligation to ESMP should also be implemented by construction contractor. The contractor is expected to indicate in the bid the ESMP procedure to be implemented along with relevant proofs of his competency. The cost for ESMP will require to be indicated as a separate pay item. The environmental and social management method statement is expected to be submitted by the selected construction contractor and to be approved by the PMU unit.

Table 5: Environmental and Social monitoring plan; construction phase

Monitoring requirement	Parameters	Frequency
i. Baseline monitoring	Water quality	Once
	Pre-crack survey for the adjacent buildings	Once*
	Ground vibration	Once*
	Air quality: particulate matter	Once*
	Background noise measurement	Once*
ii. During construction	Water quality	-
	Crack survey for the administrative buildings	Once*
	Ground vibration	During operation of drilling machinery, boring works, or any works that generate ground vibrations*
	Construction noise	Once a month during heavy noise generation times *
	Air quality particulate matter	Once a month *
iii. Vehicular Emission	All machinery/vehicles operational should have the emission control test certificate as applicable - should be checked by the site ES officer of the consultant	
iv. Monitoring agency	* A competent independent monitoring agency with registration of Central Environmental Authority for all parameters except crack surveys **Crack surveys should be conducted by competent agency acceptable to PMU	
v. Reporting requirements	**Stream water quality** – as per National Environmental (Ambient Water Quality) Regulations, No. 01 of 2019 **Pre-crack survey of the buildings** -Professional report **Ground vibration**-as per the interim standards on vibration for the Machinery, Construction activities and Vehicular movements, CEA **Background noise measurement** –Extraordinary Gazette No.924.1, May 23,1996, CEA **Air quality particulate matter**- The National Ambient Air Quality standards stipulated under the Extraordinary Gazette, No. 1562/22 August 15, 2008 -Central Environmental Authority of Sri Lanka.	

10. Public and Stakeholder Consultation - the public consultations that have been and/or will be held

The owners of the commercial building (restaurant) situated closer to the mitigation site were consulted during the field visit. People living surrounding the mitigation site stated that they were aware of landslide mitigation project and the funding mechanism. The occupants expressed their willingness to the project and to give full support to the project.

Mr.Tharanga Rukshan, Ella Range Assistant, Department of Wildlife Conservation, stated, the project would be highly supportive for the safety of the tourists as well as the commuters of Ella- Wellawaya (A23) Road. Also, he mentioned that he could able to give fullest support to implement the project.

The Additional Director Mr. Sadaath from Central Environmental Authority was consulted regarding the site and according to him, this project is not fallen under the prescribed project. But, under the Soil Conservation Act 772/22 of 1996. of National Resource Management Centre, Badulla District is an environmentally sensitive area. Therefore, the Basic Information Questionnaire (BIQ) is needed to fill for the project and submit the application. Further, he said the mitigation work is aimed at soil conservation and there was no issue of approval.

11. Preventive Measures for Covid-19 that was issued by Sri Lankan National Health Authority

COVID-19, the novel coronavirus infection has not been totally eradicated in the world. Therefore, to prevent/ control of the spread of infection also to prevent panic situations in the event of detecting a suspected case, all contractors are required to develop a COVID-19 Preparedness plan and need implementing in the site as per the "HEALTH AND IMMUNITY ENHANCEMENT GUIDELINES FOR COVID -19 and DENGUE, CIDA Health Guidelines for Construction Industry Version 4(Revised) CIDA, January 2021".

12. Labour Management

Sound worker-management relationships, treating workers in the project fairly and providing safe and healthy working conditions is required. Responsibility is lies with the PMU and the construction contractor.
The Objectives are;

- To promote safety and health at work.
- To promote the fair treatment, nondiscrimination and equal opportunity of project workers.
- To protect project workers, including vulnerable workers such as women, persons with disabilities, children and migrant workers, contracted workers, community workers and primary supply workers, as appropriate.
- To prevent the use of all forms of forced labor and child labor.
- To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national laws.
- To provide project workers with accessible means to raise workplace concerns.

13. Clearances, no objection, consent and approvals required for the implementation of the project

Table 6: Clearances, no objection, consent and approvals

Requirement / Approval / Institution	Relevance to the project
13.1 Project implementation	
Approval from the District Secretariat	The approvals will be required and the proposals need to be presented at the District Coordinating Committee, to which chief minister and stakeholder agencies in the district will also participate. The Officer of PMU will present the project, disclose the project details and various concerns including environmental and social issues will be discussed at this meeting. The issues arrived will be addressed in the ESMP, the decisions and recommendations taken up at this meeting will be considered in the ESMP.
Approval from the planning committee	The approval from the planning committee of the Ella Pradeshiya Sabha
13.2 Approval from the state lands owners relevant to the project	
Central Environmental Authority	Consent from District Central Environmental Authority is required as the area belongs to a sensitive area as per the Gazette of the Democratic Socialist Republic of Sri Lanka, Extraordinary No.1550/9 dated 28.05.2008 Soil Conservation Act (Chapter 450).
Department of Forest Department of Wildlife Conservation	As the mitigation site is belongs to Department of Wildlife Conservation, approval form Department of Wildlife Conservation is needed. Also, there are no forest reservations, so the Department of Forest approval is no needed.
Geological Surveys and Mines Bureau	Approval will be obtained for for extraction of materials, transportation and disposal of earth, rocks and mineral debris. (If necessary, only).
Ella Pradeshiya Sabha	Approvals from Ella Pradeshiya Sabha will be obtained for the disposal of waste and plant litter.
Ceylon Electricity Board	Approvals from the regional office of Ceylon Electricity Board will be required to use in the mitigation site.
13.3 Consent/ no objection/ legally bound agreement from the private land ownerships	
Land owner (Department of Wildlife Conservation)	Signing a legally bound agreement between the land owners (Department of Wildlife Conservation) and the project implementing authority allowing no-objection to remove the structures, access the land, implement construction works, and engage in long-term maintenance works

The tentative timeline for getting approval is given in the table 7.

Table 7: Tentative timeline for getting approvals

Approvals	Month 1				Month 2			
	W1	W2	W3	W4	W1	W2	W3	W4
Project implementation ***Approval from the District Secretariat*** Submission of application Project briefing Respond to comments Approvals								
Approval from planning committee Submission of application Project briefing Respond to comments Approvals								
Other approvals GSMB Ministry of Defense (Depends on the requirement)								
Consent/ no objection from the land ownership (Rathnapura Divisional Secretariat Office)								

14. Grievance redress mechanism for this site

The PMU ES officer is responsible for establishing the grievance redress mechanism for this site for impact communities; *(Reference: Environmental and Social Management Framework for recommended procedure for establishment of grievance redress mechanism).*

All complaints regarding social and environmental issues are received either orally/ telephone communication or in writing by the following person/ location.

- Project Director/ RLVMMP

Tel : +94 112 559 869
Fax : +94 112 502 611
E-mail : pd.rlvmmp@gmail.com
Web : rlvmmp.lk

- District Offices/ NBRO or
- Site Offices/ RLVMMP
- Online Grievance Redresses Mechanism System **(https://rlvmmo.lkgrms)**

15. Information disclosure

It is the responsibility of the PMU to disclose the ES information to following agencies and organizations by indicated modes as a minimum as given in the following table.

Table 8: Proposed scheme of information disclosure

Information	Proposed agencies	Mode of information disclosure
i. Project plan (site details, design implementation arrangements)	District CEA, District Secretariat, Divisional secretary, other district	Meetings, District coordination committee, submission of relevant

	levels Agencies, NBRO district office, AIIB	report to sign agreements, approvals and consents.
ii. Environmental and Social Management plan	District CEA, AIIB	Meetings, District Coordination Committee, submission of relevant report to sign agreements, approvals and consents
iii. Monitoring reports (baseline and during construction)	District CEA, AIIB and relevant parties as appropriate	Progress meetings, special meetings, submission of relevant reports
iv. Site inspections for environmental conformance workers health and safety	District CEA, Divisional secretary, District Office NBRO, AIIB and relevant parties as appropriate	Written and verbal communications, submission of relevant reports
v. Decisions taken and progress review meetings pertinent to ES matters	District CEA, Divisional secretary, District Office NBRO, AIIB and relevant parties as appropriate	Meetings, submission of relevant reports
vi. Grievance redress mechanism	Relevant parties, AIIB	Meetings, written and verbal communications

Annexure I: Images of the site condition and the consultation

Unstable Up slope area

Commercial building located in the down slope

The drainage running in the downslope

Vegetable plots located adjacent to the mitigation site

	
Road subsidance in the site (infront of the cutting failure)	*Consultation with Mr.Tharanga Rukshan Ella Range Assistance*