



REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES PROJECT

Site Specific Environmental and Social Management Plan

Site No. 148

**Failed Slope between culvert No. 31/1 and 31/2 of
Hatton – Maskeliya - Delhouse Road (B-149)
Nuwara Eliya District**

September 2022

Prepared for:



**ASIAN INFRASTRUCTURE
INVESTMENT BANK**

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Abbreviations

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

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) (*Ref <https://www.nbro.gov.lk/images/AIIBProject/ESMF.pdf>*) 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 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 and 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 **Failed Slope on RHS in between culvert No. 31/1 and 31/2 of Hatton - Maskeliya - Delhouse Road (B-149)** 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 current level of risk due to slope instability
- iii. Identify significant environmental and social impacts due to project actions
- iv. Propose mitigation measures
- v. Decide appropriate environmental and social monitoring requirements specific to this project
- vi. 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 intends to be used by landslide mitigation design team, the PMU and the contractor in the implementation of Environmental and Social Management component of the project. The SSE&SMP is published in project 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 (SSE-SMAP) prior to commencing works.

2. Description of the project

2.1 Name of the project

Rectification of Site No. 148, Nuwara Eliya District, for **Failed Slope in RHS in between culvert No. 31/1 and 31/2 of Hatton – Maskeliya - Delhouse Road (B-149)**

2.2 Location details

The proposed mitigation site falls under 320B Seethagangula GN division of Ambagamuwa DS division, Nuwara Eliya District, Central Province.

GPS references of the site – 6.824816°N and 80.530168°E

Nearest town and accessibility to the site–

Nallathanniya town is about 1.7 km from the site. The site can be accessed via Hatton- Maskeliya -Delhouse (B 149) Road (Refer figure 1)

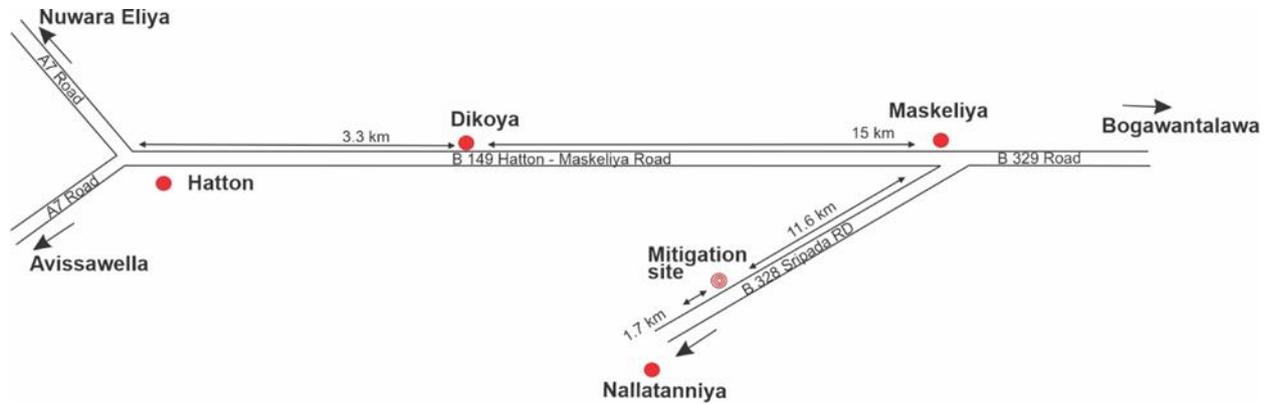


Figure 1: Road map showing the accessibility to the site

2.3 Topography and land ownership

The proposed mitigation site is located within a tea plantation land and road reservation area. The elevation of the area is 1240 m. The extent of site proposed to be mitigated is about 6000 m². The unstable area is located in a concave shape sloppy terrain where the natural slope has been cut for the road construction. The land of the tea plantation belongs to Field No: 6B, Walamale Division of Lakshapana Estate of Maskeliya Plantations Plc and the road reservation (ROW) is owned by Road Development Authority. A natural stream called “Seethagangula” is flowing at the toe area of the failed location, and joins to Maskeli Oya via Maussakele Reservoir (Refer figure 2 and 3; Google and drone image of the proposed landslide mitigation site respectively, and the surrounding environmental features and service infrastructure).

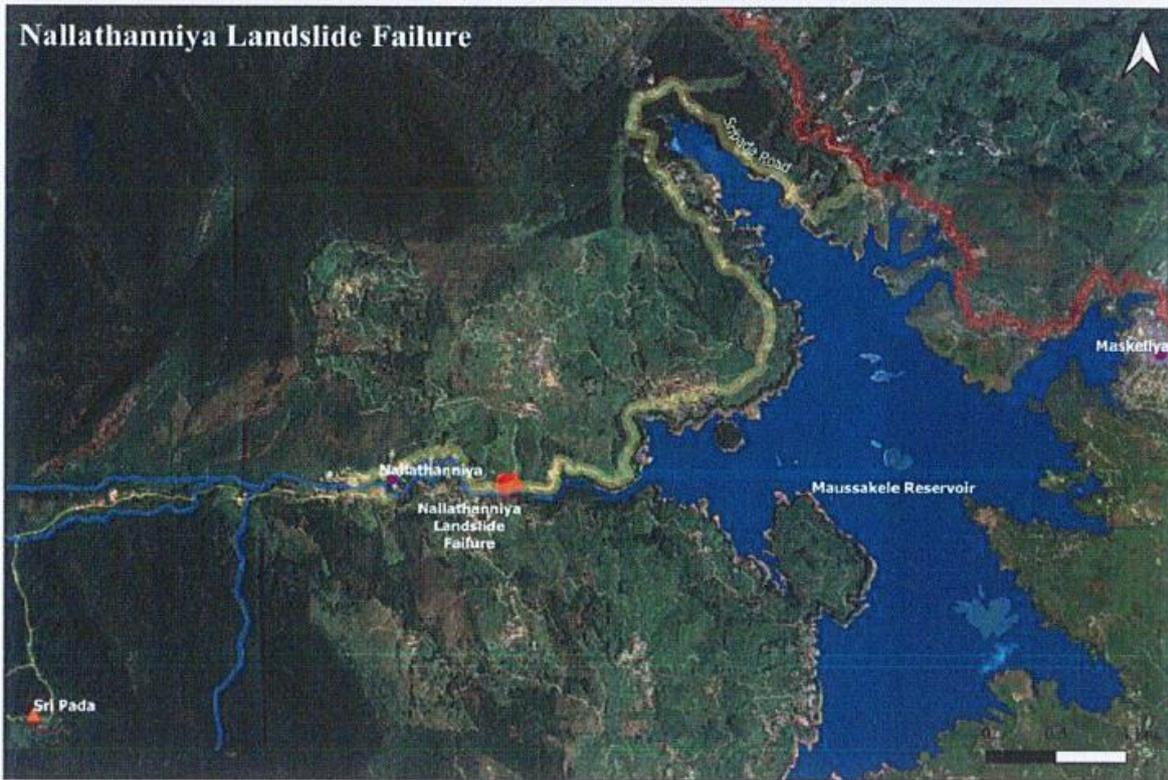


Figure 2: Google image of the proposed landslide mitigation site, the surrounding environmental features and service infrastructure.



Figure 3: Drone image of the proposed landslide mitigation site, the surrounding environmental features and service infrastructure.

2.4 Meteorology of the area

Annual average rainfall – 2550 m

Annual average temperature – 19.1 °C

(Source: Website of Divisional Secretariat –Ambagamuwa)

2.5 Demographic feature of the area

The Population of 320B Seethagangula GN Division was 4,296 including 2,097 males and 2,199 females. (Census and statistical report - 2012)

3. Landslide hazard incident details

3.1 Account of incident

A ground instability was developed at Nallathanniya area, close to 30 km post at RHS slope of Hatton Maskeliya Delhouse Road (B-149) during the period from 03.08.2022 to 06.08.2022 with the high precipitation in the area. A major slope failure has reported on 06th of August 2022 at this location between culverts No. 31/1 and 31/2 Hatton Maskeliya Delhouse Road (B-149). *Refer Figure 4: cross sections, land use, risk elements and the photographs of special features of the location.*

3.2 Effects and consequences of landslide

The collapse has damaged the plot of a tea estate. As the debris had crossed road and continued up to the stream, Seethagangula, and it had blocked completely the stream flow path causing temporary inundation in upstream area and damaging aquatic ecology and riverine vegetation in the affected stream section. The sediment deposited in the stream caused high turbidity and effected downstream uses such as bathing.

The deposited soil and boulders rest on the Hatton Maskeliya -Delhouse Road. The incident has completely obstructed the movement of traffic. The road is the only access route to Nallathanniya area which is the only access to one of the most popular travel destination, tourist attraction and a place of high religious significance of the country and in the world, Sri Pada. As a result of the failure, a large number of families were isolated and day to day lifelines were disturbed due to nonavailability of alternative access to nearest towns and facilities.

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

Perceiving this ground instability, with the request of District Secretary Nuwara Eliya, Divisional Secretary Ambagamuwa and the Officials of Road Development Authority (RDA), Officials of National Building Research Organisation (NBRO) had conducted preliminary site investigations on 2022.08. 07, 08 & 09 and NBRO has given recommendations for emergency disaster response by the report Ref. No. NBRO/LRRMD/NE/ABD/LI/2022/0888ERR). Further, Detail investigations were conducted during the period from 2022.08.09 to 2022.08.19 and NBRO has given long term recommendations including several measures to be followed (described below) as the site is stable temporary due to prevailing dry condition. (Ref report No: NBRO/LRRMD/NE/ABD/LI/2022/0888).

1. Divert rain water flowing from the upper slope area to the unstable area, by constructing a proper surface drains system (cut-off drains) and maintain the surface drains system in the long term.
2. Remove the debris accumulated on the left lane (LHS) obstructing the B/149 road, and pile it up parallel to the right side lane of the road so that it would act as a retaining wall to strengthen the toe support for the unstable area.
3. After implementing the aforementioned recommendations no.1 & 2, keep monitoring the unstable area continuously for any changes, and if the area is observed to be in a temporarily stable condition, following recommendations should be implemented.
4. Under normal weather conditions, transportation activities should only be allowed in this section of the road during day time (6.00 am-6.00 pm) and it is better to use only one lane (LHS) of the road. Transportation should only be allowed under supervision of flagmen in order to avoid any traffic congestion in the region. If the road is used for traffic during night time, the unstable area should made clearly visible with proper lighting.

5. Changes and movements within the unstable area should be monitored, whenever this road section is open for transportation.
6. Vehicle movement in this section of the road should be limited or temporarily halted if the unstable area receives heavy precipitation i.e. a rainfall of 50 mm or more within a 24 hr period or a rainfall of corresponding or more intensity in a short period. For this purpose, a rain gauge should be installed in the area and an officer should be assigned to take rainfall measurements. Moreover, after a heavy rainfall, this section of the road should only be reopened on the recommendation of NBRO.
7. Based on the data obtained from the ongoing preliminary studies and the results of future detailed investigations, long term stabilization measures should be planned and implemented. A report containing detailed plans for the purpose will be issued in due course. Until the unstable slope is stabilized as per such engineered plans, landslide danger exists in the area.

3.4 Evacuations

There are no houses located close by to be required for evacuation during the project.

3.5 Resettlement

There is no requirement of project-based resettlement Programme for this site. No adverse impact on livelihoods is expected.

Rectification of Failed Slope Between Culvert No.31/1 and 31/2 of Hatton Maskeliya Delhouse Road B-149

Location details

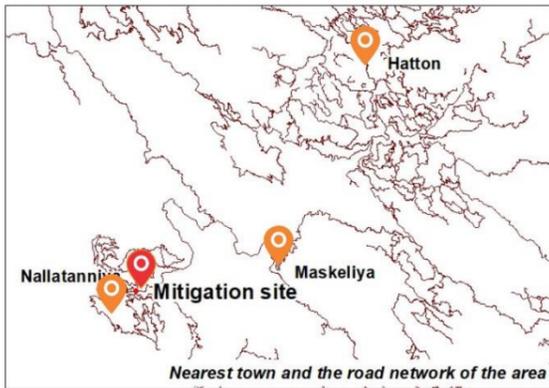
- o GN Division : Seethagangula
- o DS Division : Ambagamuwa
- o District : Nuwara Eliya
- o Province : Central Province

Landslide hazard information and terrain features

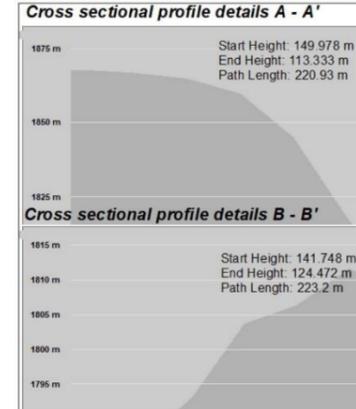
- o Type of Failure : Ground subsidence
- o Potential damages : Road
- o Land Use : Tea land
- o Land ownership : RDA/Plantation company
- o Average area : 6000 Square meters
- o Natural features : Stream



Terrain View on Google Image



Nearest town and the road network of the area



Images of the project area



	Legend <ul style="list-style-type: none"> High way class A High way class B Other road Minor roads (Jeep & cart) Foot path Board gauge single (tracks) Tunnel 	<ul style="list-style-type: none"> Bridge Ferry Causeway Bridge/ Culvert Foot bridge Railway station/ railway halt 	<ul style="list-style-type: none"> Forest/ Shrub Bare land Other houses/ Buildings Tea Potential area 	<ul style="list-style-type: none"> Home gardens with mixed trees and other perennial crops Nearest Railway station/town Cross sections Flow path/ Streams flow directions 		REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES PROJECT Asian Infrastructure Investment Bank (AIIB) Prepared By: Environmental Studies & Services Division (ESSD) National Building Research Organization 99/ Jawatta Road, Colombo 05 011 2588 945 / 011 2500 354

Figure 4: Google image, cross sections, land use, risk elements and the photographs of special 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 Area of the landslide

The area of the slope failure is located in an area where the slope had been cut to provide space to rehabilitate the Hatton Maskeliya Delhouse Road (B-149) in between culvert No. 31/1 and 31/2.

The upslope area is dominated by tea plantation of Lakshapana Estate, Maskeliya Plantations Plc. An estate Road is running through the upslope tea plantation. The leopard, sambo, birds are the faunal species found in this area.

Seethagangula stream is flowing at the toe of the slope, parallel to the main road. Seetha Gangula (cold stream) is a popular stream found on the way to Sri Pada. It starts from Sri pada and surrounding mountains and join Maskeli Oya via Maussakelle Reservoir and link with River Kelani. It is customary for the devotees to have a bath from this cool spring water before the climb. As the name implies, the water is very cold at these heights.

The affected road; Hatton Maskeliya Delhouse Road (B-149) is the only main access road to Nallathanniya area which provides the facilities and access to the pilgrims and tourists of the Adams Peak, one of the most popular travel destination, tourists attract and figures in the stories of four major faith traditions, Hinduism, Buddhism, Christianity and Islam. Further, during the Sri pada season pilgrim vehicles are parked both side of this road (Nallthaniya- Maskeliya road) including this road section . Futher both side of this road are used to build temporary boutiques during Sri pada season, and throughout these 06 months period the people income is largely depend of seeling variety of items to Sri pada pilgrims.

4.2 Areas adjacent to the landslide

A semi-permanent boutique; Rana hotel is located about 50 m from the site towards Maskeliya. Also, there are 2 temporary boutiques close to the site. The Maussakele Reservoir which is almost entirely maintained by the inflow of water from the Maskeliya Oya is located very close to the site. The Maskeliya Dam (also known as the Maussakele Dam) is a large gravity dam at Maskeliya, along with the Castlereigh Dam, the dams are the highest point and beginning of the Lakshapana Hydropower Complex, involving a number of dams, penstocks, and hydroelectric power stations. The dam creates the Maskeliya/ Mausakele Reservoir over the route of Maskeliya Oya, a major tributary of the Kelani River.

There are many famous and tourist attractive places around the unstable area. Both local and foreign tourists visit these places through this Maskeliya – Hatton main road. Sacred Adam’s Peak is the one of the most popular destination, tourist attraction and a place of high religious significance among all religions local and foreign. There are also other tourist attractions around the area where people use Hatton – Maskeliya road to visit these places. Some of these tourist attractions are Mulgama Seethagangula Ella (located about 300 m towards Maskeiya), Mohini Ella (located about 550 m) in Northern direction), Lovers’ Leap waterfall, Hakgala Botanical Garden, Warleigh Church, Horton Plains and St. Clair’s waterfall. *Ref. Figure 5)*

The surrounding area of the unstable slope section contains mostly tea plantations owned by different tea estates.

Adams Peak (Sri Pada/ Samanala) is the third highest mountain in Sri Lanka. The boundary of the Adams Peak Nature Reserve is located about 650 m and 2.8 km towards Southern and Western direction of the failed slope area respectively. It covers an area of 22,380 hectares and was declared as a sanctuary by the British Government on 25th October 1940. Subsequently, due to the importance of the sanctuary, the Adams Peak Nature Reserve Sanctuary was established in 2007 considering the need for conservation. 12979 hectares (32448 acres) selected by the government have been declared as Nature Reserves. The Peak is a highly sensitive high water catchment area with dense forest cover which is considered as a mountain forest. The three rivers Kalu, Walawe and Kelani originate directly from this forest and 295 small waterfalls connected to these rivers originate from the springs of the area. Laxapana, YakaAdu Falls, Mapanana Falls,

Murray Falls, Gatmore Falls, Deeyan Falls, Alupola Falls are the waterfalls cascade down from various places in the Siripa Range. There are endemic plants, herbs, shrubs, and creepers that only can be seen in this region. According to the Range Office- Palabaddala Wildlife Conservation (DWLC), the project site does not fall within the Adams Peak Nature Reserve or its buffer zone.

The Buddhist Sinhalese and the Hindu Tamils each have their own connection to Sri Pada. Buddhists regard the footprint as Buddha's, hence its name Sri Pada, "holy footprint." The Hindus believe that while dancing to create the world, the god Shiva left his footprint; thus, for them, the mountain is Sivanolipatha Malai (Lord Shiva's Footprint on the Mount). Muslims believe that the mountain is where Adam stood on one foot after being cast out of the Garden of Eden. One tradition suggests that God put Adam there because it was as close to heaven as he could get. Some Christians also believe the footprint is that of St. Thomas, who is credited with bringing Christianity to Sri Lanka.

Accordingly, the courtyard at the top of Mountain where Sri Pada Padma (height 2243 m / 7360 ft.), which is revered by local and foreign pilgrims as a place of worship, common places such as the mountain track system of devotees etc. belong to the Adams Peak Nature Reserve Sanctuary.

The Siripa/Samanala Range receives an average annual rainfall of 5,000 mm during the six months of the year and the highest rainfall is received during the Southwest monsoon months of May-June-July. Due to the low rainfall during the Northeast monsoon from December to January and February, the Sri Pada pilgrimage season begins with the Unduvap Poya (Fullmoon Poya day of month of December) and continues until the Vesak Poya. (Fullmoon Poya day of month of May).

Sri Pada plays a pivotal role in the origin story of Sri Lanka's indigenous inhabitants, the Veddha, also known as the Wanniyala-Aetto. According to the story, around the 5th or 6th century B.C., Prince Vijaya travelled from India with hundreds of followers to the island of Sri Lanka and set up rule over the local people through marriage to Kuveni, a local demon-worshipping princess. When Vijaya rejected Kuveni for an Indian princess, their two children moved to the region around Sri Pada, in south-central Sri Lanka. Their descendants are the Veddha, who are now outnumbered by the dominant Sinhalese people and the larger minority group of Tamils. To the Veddha, the mountain is known as Samanala Kanda after the guardian god Saman.

Refer Fig 4: Google image, cross sections, land use, risk elements and the photographs of special features of the location

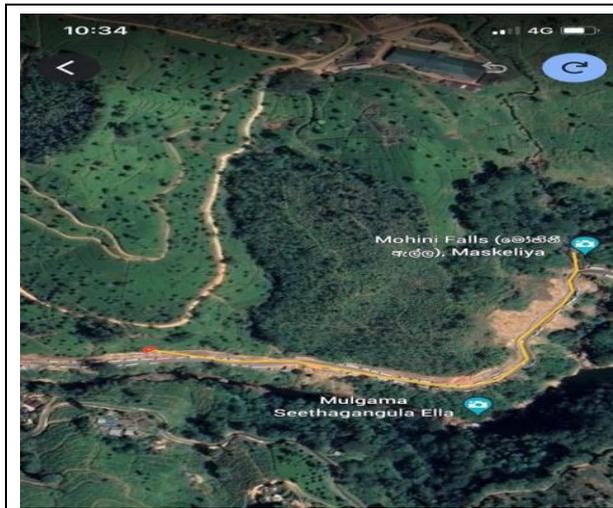


Figure 5a: Google image showing Mohini Ella and Mulgama Seethagangula Ella



Figure 5b: Sri Padha (Adams's Peak)

Fig. 5: Naturally and culturally sensitive locations

4.3 Current level of risk

During initial investigations carried out by NBRO with the presence of officers of Disaster Management Centre, Road Development Authority and the District Secretary Nuwara Eliya, it was observed that there is a significant risk for this slope instability to be further propagated with the forthcoming heavy rains and the dislodged earth due to such event will cross the road and direct to the stream (Seethagangula) at the toe of the slope and will block its flow and may create temporary flood condition and develop a debris flow.

During rainy season it poses a high risk on the commuters and vehicle transportation in the road due to potential risk of the slope failure. The unstable slope section in the tea plantation imposes a high risk on the workers of the tea estate. The estate road and the Hatton Maskeliya Delhouse road are at risk.

Also, during future failures, the road section needs to be closed for the commuters and traffic and it would limit continuous functions of the road between Hatton and Nallathanniya.

As this is the main access way to Nallathanniya and Adam's Peak, the obstruction of accessibility may pose a significant impact on life line facilities, services and related economic activities.

If the site is not rectified to prevent future failures, the slope failure with soil masses would disturb all functions of the vehicle transportation between Hatton and Nallathanniya. The commuters, pedestrians, pilgrims, tourists, workers of the neighboring tea plantations and their livelihood activities would be at risk due to this unstable slope section. Also, the tea plucking activities and the collecting tea leaves would be difficult and risk due to unstable slope.

With the future failure, the government has to spend more money on rehabilitation from future slope failure.

The Sri Pada pilgrimage season commences in Full moon Poya day of December and ends up in Full moon Poya day of April in the following year and a significant number of local and foreign tourists travel through Nallathanniya route due to its shorter distance and easiness in climbing the mountain. Hence the failed slope should be restored before the Sri Pada season commences as it affects the tourism activity and the associated life line facilities.

5. Description of the works envisaged under the project

Based on preliminary investigations, NBRO had carried out detailed investigations and designed suitable rectification measures to minimize the risk posed by this unstable slope section to ensure the safety of the commuters and the continued and uninterrupted function of this main road to Adam's Peak. The proposed activities include Earthworks including excavation removal of debris and unstable rock boulders

- Removing of trees (few) and tea bushers
- Removing dislodged soil and reshaping
- Protecting the slope with soil nailing
- Drainage management using surface and subsurface drainage network
- Alleviate local slope failures by way of increasing the development metric solution of exposed finished surface via nature-based solution.
- Further, in order to restore and retain the natural aesthetic outlook of this location, the protection works will essentially include nature-based surface protection solutions like turfing and planting.

Ref. Figure 6: View after mitigation of the failed location



Figure 6: View after mitigation of the failed location

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

The elements and services at risk during the project implementation are;

- i. Hatton Maskeliya Delhouse Road (B-149) in between culvert No. 31/1 and 31/2.
- ii. Commuters and pedestrians and traffic
- iii. Seethagangula stream flowing at the downslope
- iv. Tea cultivation and harvesting activities of upslope of site of Lakshapana Estate of Maskeliya Plantation PLC, a private entity
- v. The Maussakele Reservoir
- vi. Current services, economic and tourism activities of the area

(Refer Figure 7a, 7b, 7c and 7d: Sensitive elements that may be affected by the project actions)



Figure 7a: Scarp of the slope failure and upslope tea plantation



Figure 7b: Entire slope failure area

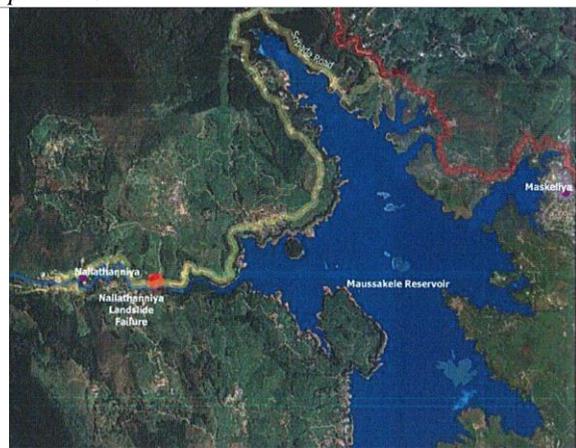


Figure 7c: The Maussakele Reservoir



Figure 7d: Seethagagula stream, Estate road and Hatton Maskeliya Delhouse Road B-149



Figure 7e: Up slop area of the mitigation site



Figure 7f: down slop area of the mitigation site

Figure 7: Sensitive elements that may be affected by the project actions

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

Chart below summaries the positive and negative impacts which are envisaged during project actions and their significance.

6.1 Positive impacts

The site at the Hatton Maskeliya Delhouse Road (B-149) in between culvert No. 31/1 and 31/2 is currently posing a severe risk on the commuters due to ground instability in the area. Under this project the site will be rectified and make stable.

- This road is one of a route for famous Sri Pada Pilgrimage. Tourism and Adam’s Peak pilgrim activities and other life line activities of the people in the area will be benefitted largely by this mitigation.
- The Nuwara Eliya area is considered by many to be one of the most scenic areas in Sri Lanka. This area has population centers such as Badulla and Hatton and tourist destinations such as Horton Plains, different waterfalls and reservoirs. The Hatton – Maskeliya road passes through the tea estates, pine forests, waterfalls, bridges etc and is a route with exceptional scenic beauty for current and future ecotourism. The proposed project will significantly enhance safety of the road for commuters, tourists, pilgrims and pedestrians during rainy season and will allow keeping the road open throughout the year. The remediation may secure the cost of road rehabilitation from future slope failure in the area.
- The people in the area would not be isolated due to future slope instability incidents.
- The route is a transportation path for tea industry and several of indirect development and economic activities. The mitigation work will ensure uninterrupted traffic flow and road connectivity throughout and will increase the safety of commuters during rainy season. The RDA would be benefitted from this project
- The mitigation of the site prevents deposition of dislodged soil and debris to Seethagangula and then passage to Maussakelle reservoir due to upcoming slope failures and prevent temporary flooding condition, obstruction of downstream uses, ecosystem alternation and river riparian damages.
- The workers, proprietors, of Laxapana tea estate and their livelihood would also be benefitted.

6.2 Negative impacts

The mitigation works are generally confined to already failed land area. 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
6.2.1 Hydrological and water Quality impacts	
<p>6.2.1.1 Impacts of the drainage pattern of the area</p> <p>Disruption to existing surface and sub-surface drainage pattern in the area is envisaged with the project implementation. The mitigation works in this site will focus on the drainage improvement. Therefore, during rainy season heavy flow of water is expected to be generated and would be accumulated between the road and the slope. The water inundation of the existing drainages may be expected. Increase of water through the unstable slope may intensify the risk of slope failures of the unstable section.</p>	<p>Highly Significant</p>

<p>6.2.1.2 Water pollution and impacts on surface water quality</p> <p>During the slope excavation, removal of debris can generate high sediment laden runoff there could be a possibility that contaminated runoff may pollute the water within the stream flowing downslope to the affected area. Improper disposal of oils and other harmful substances/contaminants from machineries, leakages from temporary storage tanks, solid waste and wastewater disposal/dumping could occur causing adverse impacts on quality of the water. During rainy season, the rainwater running through the disturbed slope tends to pick up sediment, oil and other pollutants generated during construction can contaminate the water of the stream.</p>	<p>Highly Significant</p>
<p>6.2.1.3 Erosional impacts and stream/ reservoir bed alterations</p> <p>The project activities will open the slope for surface erosion during the construction phase. The existing surface and sub-surface drainage pattern in the area will be disrupted during construction phase. Therefore, the erosional impacts are highly significant due to Seethagangula stream and Maussakele reservoir are located close proximity to the mitigation area.</p>	<p>Highly Significant</p>
<p>6.2.1.4 Open defecation and waterborne infections</p> <p>As site is located close to stream and tea plantations, possibility of open defecation is high. Faecal contamination of water of the stream or runoff water flow will be expected during construction due to open defecation of the contractor's workforce as the area consists thick vegetation cover.</p>	<p>Highly Significant</p>
<p>6.2.1.5 Impacts on the downstream water uses</p> <p>The construction activities will be carried out on slopes with thick soil overburden consisting of both residual and colluvium soils. Therefore, the slope will be prone to erosion during land clearing and land reshaping phase. This may increase the sediment load in stream which at present has clean water, and affect the users at down slope areas.</p>	<p>Highly Significant</p>
<p>6.2.1.6 Impacts on ground water table and ground water quality</p> <p>Addition or mixing of construction materials including cements, grout materials 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, wastewater from the construction activities and discharge of waste matter from onsite septic systems would cause adverse impacts on the ground water quality as the water of the downstream may use by the residents. Due to the mitigatory activities carried out in the slope area, the ground water quality will be impacted or there will be a possibility for the ground water table draw down.</p>	<p>Significant</p>
<p>6.2.1.7 Impacts on water or wetlands</p> <p>Improper disposal of oils and other harmful substances/contaminants from machineries, leakages from temporary storage tanks, solid waste and wastewater disposal/dumping from workers' sites could occur causing adverse impacts on quality of the water in the stream that may use to fulfill the water requirement of down slope houses.</p>	<p>Significant</p>
<p>6.2.2 Environmental Impacts</p>	
<p>6.2.2.1 Noise and vibration impacts</p> <p>Noise and vibration are expected from construction equipment. The pedestrians and commuters on roads will also have an effect from noise and vibration. The commuters on the road will be exposed to high noise during heavy noise generating activities, such as operating loading and unloading of materials, movement of machinery in addition to above mentioned construction works.</p>	<p>Significant</p>

<p>6.2.2.2 Air pollution impacts</p> <p>Construction activities that contribute to air pollution include: land clearing, operation of diesel engines, demolition and burning. Operating vehicles at high speed under dry weather conditions can increase such pollution. Improper handling and transferring of materials can also generate dust. Improper storage of materials can potentially generate dust if not properly covered. During construction, it generates high levels of dust typically from concrete, cement, wood, stone, and silica. The Hatton – Maskeliya road is used heavily for vehicles moving (buses, bicycles, lorries, trucks, tippers, three wheels). The air pollution may have significant impact on the commuters and pedestrians. The air pollution impacts from the construction are locally significant during dry periods for commuters and workers of tea plantation.</p>	<p>Highly Significant</p>
<p>6.2.2.3 Solid waste disposal issues</p> <p>Haphazard disposal of solid waste; various types of waste such as litter, food waste, construction waste will be generated and may store or dispose on site. The littering and hap hazard storage and disposal of solid waste in and around the site will create inconveniences to the commuters, pedestrians, workers of the tea plantation workers. It can block the drainages to make breeding grounds for water borne diseases. Waste can pollute the soil, and leave various environmental impacts if proper disposal mechanism is not in place during the construction period.</p>	<p>Highly Significant</p>
<p>6.2.2.4 Explosive hazards and hazardous materials</p> <p>Since the affected area has rock boulders, explosives may be used if the rock blasting is envisaged. This may pose risk due to unsafe use. As these operations are to be done on affected slopes the risk of improper use of explosive and accidents from rock fragments are highly significant.</p>	<p>Significant</p>
<p>6.2.3 Biological /Ecological Impacts</p>	
<p>6.2.3.1 Effects of important wildlife habitats</p> <p>There are no forested/ wild-life reservation areas within the project influence area with high biodiversity.</p> <p>The Adams Peak Nature Reserve sanctuary, which contains large block of sub montane and montane forest with high endemism in species of flora is located is located about 650 m and 2.8 km towards Southern and Western direction of the failed slope respectively. According to the Range Office- Palabaddala, Department of Wildlife Conservation (DWLC) the project site not falls within the buffer zone of the Nature Reserve. However, there may be impact if people engage in poaching and hunting</p>	<p>Significant</p>
<p>6.2.3.2 Effects on Fauna & Flora</p> <p>Majority of the trees found in the area are not endemic, threatened and identified in the red list of IUCN. The fauna found in the area are leopards, samboos and birds and workers may engage in hunting and poaching</p>	<p>Significant</p>
<p>6.2.4 Social and Economic Impacts</p>	
<p>6.2.4.1 Impacts on agriculture within the area to be remedied/ immediately to the site</p> <p>There is a tea cultivation immediately adjacent to unstable slope area. During the construction period, this land use pattern may be affected by disposal of spoil and debris or parking machineries and their oil leakages.</p>	<p>Significant</p>
<p>6.2.4.2 Cracks in the building due to vibration impacts</p> <p>There are no buildings located close by.</p> <p>During construction the road could be cracked due to improper use of construction machinery.</p>	<p>Significant</p>

<p>6.2.4.3 Loosing access to land and future development activities</p> <p>The land where the project activities are envisaged belongs to Lakshapana Estate and the road reservation of RDA. The mitigation works will be concentrated on both upslope and down slope of the road. This area is a mainly tea cultivated land, there will be some impacts to the land owner with regard to loosing access to the land (during construction) and loss to valuable use of the tea cultivation. In contrary, remediation works in the upslope will increase the stability of the boundary and protect the land from future failures.</p>	<p>Significant</p>
<p>6.2.4.4 Impacts on livelihood/ business and income activities</p> <p>The tea cultivation immediately adjacent to the unstable land would be affected during the construction period. The collecting and transportation of tea to factories would be interrupted during construction phase. This would affect the income of the community.</p> <p>The parking of pilgrim vehicles both sides of this road section would not be possible during the construction period</p>	<p>Highly Significant</p>
<p>6.2.4.5 Impacts on service provision (water supply, sewage, electricity)</p> <p>There are no sewage and electricity lines to be impacted by the construction period.</p>	<p>Insignificant</p>
<p>6.2.4.6 Effect due to loss of infrastructure and safety</p> <p>During construction phase the main road from Hatton-Maskeliya Road will be obstructed by frequently moving machinery, loaders, trucks etc. as the access road is very narrow. Therefore, most of the heavy machinery, trucks and loaders can obstruct the pedestrian passage and cause traffic during peak times.</p>	<p>Significant</p>
<p>6.2.4.7 Work camps and lay-down site requirements</p> <p>The camps site will be selected in the neighbourhood of community. If proper camp management is not in place, it may result several labour issues, social issues with community, conflicts for shared resources with the community, 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.</p>	<p>Significant</p>
<p>6.2.4.8 Relations between workers and staff/ people living in the vicinity of the site and possibility of disputes</p> <p>The construction workers at this site will be from different social backgrounds and from different geographical areas often under poverty. Usually, they are with poor educational and social background. Such communities may have a wide range of social issues to cause dis-stress on the neighbouring community and the workers of the project. Although the workers who would engage in such issues will be rare, even few possibilities cannot be ignored.</p>	<p>Less Significant</p>
<p>6.2.4.9 Workers safety during construction</p> <p>The workers may be exposed to risk from falling. Fatal injuries may occur if the slope fails. The risk of slope failure is aggravated during the rainy season. This risk is highly significant. Risk of hazard from vehicle and construction machinery accidents is highly significant at this site. Contractor may engage under age workers (children) for construction work, which is risky and can results serious accidents and injuries. During the southwest monsoon season, heavy mist is observed in the Sri Pada area, it causes visibility problems during construction</p>	<p>Highly Significant</p>

<p>6.2.4.10 Safety to the public from construction activities: High risk for commuters</p> <p>During construction phase the road will be obstructed by the frequently moving machinery, loaders, trucks etc. As most of the mitigation works are to be carried out in limited space on slopes the heavy machinery, the trucks and loaders etc. can obstruct the commuter /pedestrian passage and may pose high risk on their life. There is a risk of falling loose rocks on the road during excavations and removal of rocks posing risk on the commuters.</p> <p>The same risk at a high level will be there for the workers of the tea estate located in upslope and down slope as they will be exposed to a longer duration to this risk during the construction phase. Therefore, the risk on them is highly significant.</p>	<p>Highly Significant</p>
<p>6.2.4.11 Impacts on transport infrastructure (especially temporary loss of road or rail access, risks of traffic congestion)</p> <p>The traffic due to full/partial road closure may obstruct the smooth flow of vehicles during the week days, in office hours, school times, on holidays, Siripada season. This will cause nuisance to pedestrians and commuters. A sharp bend is located close to the site towards Nallathanniya. During the construction part of the road may need to be closed. It affects vehicle movements.</p> <p>The vehicle parking during Sri pada season will be affected.</p>	<p>Significant</p>
<p>6.2.4.12 Areas used for businesses, agriculture or other within the area to be remediated</p> <p>There is tea cultivation in the both up and down slope area immediately adjacent to the site owned by the Lakshapana Estate. Some of the trees and tea plants will be removed during construction.</p> <p>During Sri pada season boutiques are established at the both side of this road section. The income of them would be affected.</p>	<p>Significant</p>
<p>6.2.4.13 Areas used for businesses, agriculture or other immediately adjacent to the site</p> <p>There is tea cultivation in the both up and down slope area immediately adjacent to the site owned by the Lakshapana Estate. The Rana Hotel and other two boutiques are located close to the site. The boutiques would benefit due to the project as the construction workers could buy meals, refreshments from these boutiques.</p> <p>During Sri pada season boutiques are established at the both side close to this road section. The income of them would be affected.</p>	<p>Significant</p>
<p>6.2.4.14 Need for people to enter or cross the site</p> <p>Excavation machineries, loaders, trucks etc. will be used in the area used to access in to the unstable slope area. There is no special need for commuters and neighbouring community to enter the site for other purposes. Construction may use materials such as metal aggregates, steel etc. which can be injurious under improper storage and handling. However, unauthorised entry of ordinary people may occur due to intentional or unintentional purposes and they may be at risk due to operating machinery, vehicles, electricity, and may be blasting materials.</p>	<p>Highly Significant</p>

7. Site Specific Risk Analysis

Table 2: Site specific risk analysis

Risk	Affected group	Risk level
1. Facing accidents when working close to the road (as there is a large bend close to the site)	Workers	Very high
2. Transporting materials and machineries	Workers	Very high
3. Throw out disposals (litter, bottles, and food) to the construction site from the commuters.	Workers	Very high
4. Facing accidents during constructions at night time	Workers	Very high
5. Accidents from the construction activities and materials placed close to the road	Commuters	Very high
6. Injuries due to rock particles due to explosions/ blasting	Workers Commuters	Very High
7. Rock fall from the unstable area	Workers Commuters	High
8. Work with electrical supply lines	Workers	High
9. Site Working - Working in poor visibility (during misty appearance/ dark times)	Workers Commuters	High
10. Lone Working	Workers	High
11. Emergency evacuation	Workers	High
12. Extreme weather conditions (wind, rain etc.)	Workers	High

8. Significant Environmental and Social Impacts

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

9.1 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 an unstable slope with a risk of falling. 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.

9.2 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.

10.1 Resettlement action plan

There is no project-based resettlement in this site.

10.2 Evacuation of people

During construction there could be injuries due to unexpected accidents and due to aggravated landslide during construction.

The contractor shall alert on NBRO rainfall early warning and evacuation would be required.

The project ES & HS unit also should be vigilant on extreme weather conditions and NBRO rainfall early warning alerts and should make early response in case of an emergency.

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

This risk may not be triggered in this site.

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

This risk may not be triggered in this site.

10.5 Public awareness and education- needed for following areas

- i. Programs to inform and educate people in the vicinity and the workers of the plantation estate about the risks posed by unstable land section
- ii. Requirement for special awareness for commuters and the people passing through the area using the road with potentially high-risk during construction phase and early warning.

10.6 Design based Environmental/ Social Management considerations

The site is located in an aesthetically beautiful, environmentally sensitive natural environment in the rural setup. Hence, following environmentally and socially significant design considerations are recommended.

Table 3: Design stage Environmental & Social considerations

Design feature	Recommended level of consideration for this site
<p>i. Natural resource management and resource optimized designs</p> <p>Project specific designs should be considered to eliminate mass clearing of vegetation and minimum number of removals of grown tree species. Sufficient emphasis should be made to consider conservation of trees if important tree species are found.</p>	Very High
<p>ii. Site Planning</p> <p>During site planning it is necessary to be cautious on possible re-activation of landslide with rock fall. Also, the site is located in a very limited space of a slope with a road. The vehicle parking sites, material storage and temporary shelters etc. should not be installed in the danger zones of the slides. It is very necessary to keep trained flagman or safety officer during the construction period and proper communication between contractor's workforce and the other responsible officials should be maintained.</p>	Very High
<p>iii. Habitat connectivity and animal trails</p> <p>If large fractions of vegetation 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.</p>	High

<p>iv. Conservation of water resources</p> <p>If involves extraction of water both surface and sub-surface. The water extracted is in relatively good quality. In a well thought design this extracted water can be conveyed in such a manner that the water can be accessed by wild fauna as well as the neighboring communities for bathing and other domestic purposes</p>	High
<p>v. Aesthetically compatible design considerations</p> <p>The designs in aesthetically sensitive environments should consider structures that blend with natural environment to keep the visual pollution to minimum. As the tourism industry is one of the major economic growth points for the project area, greening could be used in construction activities to develop the area as a tourist attraction. Service of landscape architect may be important for the design of suitable mitigation structures.</p>	Very High for upslope area
<p>vi. Consideration of green environmental features</p> <p>As many of the mitigatory works are carried out in ecologically sensitive habitats, 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.</p>	Very High for upslope area
<p>vii. Conservation of social and Cultural features</p> <p>The local cultures and heritages are strengthened by their close connections to the natural environment that sustains them. Therefore, the project actions should be carried out considering local culture and social aspects, providing opportunities to reinforce them during the project actions.</p>	Low
<p>viii. Workers/ commuters and community safety</p> <p>Due to the close proximity to the roads people may face accidents specially the workforce during the construction phase. Unauthorized entry and ignorance may cause severe accidents around the site. Activation of slides or ground subsidence may occur during construction phase and may pose threat to workers of RDA, passengers and commuters. Therefore, design-based safety consideration such as beams, safety nets etc. should be considered.</p>	Very high
<p>ix. Erosion control structures</p> <p>In drainage management, water is extracted and conveyed to nearby stream often through culverts. During rainy season the flow in these drainage structures can be significantly high and this may cause stream bed erosion. Hence the design should adequately consider flow speed breakers to reduce erosive flows entering natural streams. This should be an inclusive part of the design if there are streams and culverts in the proximity of the mitigation site.</p>	High
<p>x. Low post maintenance and operation designs</p> <p>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 etc should be considered if drain water is expected be directed to natural streams.</p> <p>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.</p>	Very High

10.7 Mitigation of impacts during the construction phase

10.7.1 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 4) indicating the degree of relevancy for this site. For details ESMP for construction contractors should be referred.

Table 4: 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 (road reservation)
2002.2 2)	Noise and Vibration	Highly relevant (commuters, pedestrians)
2002.2 3)	Cracks and damages to the buildings	Relevant
2002.2 4)	Disposal of waste	Relevant
2002.2 5)	Disposal of refuse	Highly relevant (road reservation)
2002.2 6)	Dust control	Highly Relevant (commuters, pedestrians)
2002.2 7)	Transport of Construction materials and waste	Relevant
2002.2 8)	Water	Relevant
2002.2 9)	Flora and Fauna	Relevant
2002.2 10)	Physical and cultural resources	Not 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	Not relevant
2002.2 15)	Maintenance vehicles and Machinery	Relevant
2002.2 16)	Disruption to public	Highly relevant (community nearby)
2002.2 17)	Utilities and roadside amenities	Highly relevant (road)
2002.2 18)	Visual environment enhancement	Highly relevant (Aesthetically sensitive road section)
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 (unsafe slope, commuters, heavy machinery)
2003.3	Child Labor and Forced Labor	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	Relevant
<p>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 Reference: Contractors Obligation for implementation of ESMP</p>		

10.7.2 Site Specific mitigation

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

Table 5: Site specific ES & HS mitigation measures

Mitigation item	Project implementation phase	Responsibility
<p>i. Minimize erosional impacts during construction</p> <p>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 The Contractor shall take measures to minimize the soil erosion that may result from construction activities The contractors should strictly follow the control measures in the ESMP in the 2002.2 - Part 2- Works requirements</p>	Site preparation & construction	Construction Contractor
<p>ii. Invasive species</p> <p>Should be avoided in using vegetative erosion control structures. Native plants in the local environment should be chosen for vegetative control. The species used for vegetative control measures need approval from the Department of Wildlife Conservation & Department of Forest.</p>	Construction	Construction Contractor
<p>iii. Impacts on transport infrastructure (especially temporary loss of road or rail access, risks of traffic congestion)</p> <p>A good traffic control should be implemented in the construction stage. As there are bends on the road adjacent to the site proper road safety measures should be included with warning signs and permanent trained watchmen, luminous sign boards indicating slope instability risk and road obstruction signs, night lamps etc. are strongly recommended at this site. The contractors should strictly follow the control measures in the 101 -Part 2-Works Requirements</p> <p>The parking of vehicles/ building temporary boutiques at his section during Sri Pada season should not be allowed</p> <p>The boundary that limit the parking and building boutiques to be demarcated.</p>	Construction	Construction Contractor and
<p>iv. Priority Health and Safety Issues</p> <p>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.</p> <ol style="list-style-type: none"> i. Prepare a special Occupational Health and Safety Management Plan prior to commencement of construction activities ii. A good warning system and fulltime watchmen is highly recommended for this site for both worker and commuter safety. iii. Safety barriers and safety nets should be installed at places of risk to protect workers and commuters from boulder falling risk Adoption of standard worker safety methods 	Construction	PMU Construction Contractor

<ul style="list-style-type: none"> iv. Provision of personal protective equipment (PPE) such as hard hat safety boots, helmets, protective clothing goggle etc. v. Provision of trainings and awareness programs to employees/employees vi. Conducting hazard analysis and plan/provide adequate mitigation measures for such hazards identified, prior to carrying out major construction activities vii. If the wasp nest is in the vicinity, it is mandatory to use Evacuation Centres for ensure of workers' safety viii. Additionally, work should be discontinued for sufficient time period during rainy period as working on unstable land will be highly risky in the rainy season 		
<p>ix. Throw out disposals (litter, bottles, and food) to the construction site from the commuters.</p> <p>Put up the safety sign boards prior to the construction site indicating people at work. The commuters should be aware about the construction activities through notices erected before reaching the proposed mitigation site.</p>	Site preparation & construction	Construction Contractor
<p>x. Injuries due to rock particles due to explosions/ blasting</p> <p>Minimize all blasting activities during peak times and making awareness announcements through the blasting period. Establish an emergency accidents preparedness plan for their injuries due to rock particles due to explosions/ blasting.</p>	Construction	Construction Contractor
<p>xi. Disposal of construction waste</p> <p>The contractor should pay special attention with respect to disposal of construction waste. This site is located close to a main road in a rural landscape with a pleasing environment. Also, this main road is used by many tourists as Nuwara Eliya and Hatton are two main tourist attraction places in Sri Lanka. Stream is flowing through the site and water seepages are available in the area during rainy season. Therefore, such waste if generated should store properly without getting washed off and dispose according to approved procedures by the PMU. Construction waste should not dispose along the road or into the drainages.</p>	Site preparation & construction	Construction Contractor
<p>xii. Impact on down slope water users</p> <p>Stream is flowing at the downslope of the unstable slope. The construction activities may pollute the water flowing. The contractors should strictly follow the control measures in ESMP in the 2002.2, part-2 Works Requirements</p>	Site preparation & construction	Construction Contractor
<p>xiii. Onsite sanitary facilities for the workers</p> <p>The contractor should prepare temporary sanitary facilities for the workforce within the site, to mitigate open defecation of the workers.</p>	Site preparation & construction	Construction Contractor
<p>xiv. Dust and aerosol control screens</p> <p>Dust particles generated during the construction period can influence the commuters, pilgrims and tourists. The commuters traveling in the Hatton - Maskeliya main road specially tourists could be affected from generated dust particles. Special screens etc. should be used if heavy dust or aerosol generating activities are envisaged.</p>	Site preparation & construction	Construction Contractor
<p>xv. Water for construction</p> <p>Water for construction works should be obtained only from the approved sites.</p>	Construction	Construction Contractor
<p>xvi. Working hours</p> <p>The construction activities should be restricted to day time only. Working after 6.p.m. is not recommended for any reason due to safety issues.</p>	Construction	Construction Contractor

<p>xvii. Impact on service infrastructure Telecommunication, electricity, water lines should be relocated before construction starts as per the approval of PMU.</p>	Construction	Construction Contractor
<p>xviii. 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.</p>	Construction	Construction Contractor
<p>xix. During construction good housekeeping should be maintained to minimize visual pollution</p>	Site preparation & construction	Construction Contractor
<p>xx. Fire hazard and forest fires The electrical lines should be placed safely to ensure no leaking of current and sparks, burning in the construction should be prohibited</p>	Site preparation & construction	Construction Contractor
<p>xxi. Worker's code of conduct Possible disputes between the labor force and the commuters and tourists should be prevented by maintaining the agreed code of conduct by the contractor. Possible disputes between workforce and commuters should be avoided especially when using shared resources such as common bathing and washing places etc.</p>	Construction	Construction Contractor
<p>xxii. Snake bites management and emergency management by accidents Proper emergency management system for snake bites (include awareness on snake bites, safety shoes while at work, first aid on a snake bite, hospitalization and admission to correct hospital where snake bite management facilities are available) should be introduced. Accidents are common in these kinds of sites. Proper emergency management unit for other accidents (first aids facilities, safety items, hospitalization facilities and transportation facilities) should be maintained for this site.</p>	Construction	Construction Contractor
<p>xxiii Disturbance to fauna and flora The contractor should not deviate from the design without permission from the PMU to fell forest trees, clear large section of forest trees etc. construction activities should be carried out with minimum disturbance to wild life habitats. The wild fauna niches (dens and wild animals) in found should be protected or relocate safely. Hunting and poaching wild animals and collection of valuable forest specimen are prohibited under the fauna protection ordinance and hence such activities should be strictly prohibited.</p>	Construction	Construction Contractor

10.7.3 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 6: Environmental and Social monitoring plan; Pre construction and construction phase

Monitoring requirement	Parameters	Frequency
i. Baseline monitoring	Water quality	Once*
	Pre-construction crack survey of the road	Once*
	Ground vibration	Once*
	Air quality	Once*
	Background noise measurement	Once*
ii. During construction	Water quality	If noticeable water quality impairment due to sediment laden runoff
	Crack survey for the risk buildings	If noticeable displacement is observed during construction **
	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	<p>Stream water quality – Comparison with National Environmental (ambient water quality) regulations, no.01 of 2019</p> <p>Pre-construction crack survey of the high-risk buildings-Professional report</p> <p>Ground vibration-as per the interim standards on vibration for the Machinery, Construction activities and Vehicular movements, CEA</p> <p>Background noise measurement –Extraordinary Gazette No.924.1, May 23,1996, CEA</p> <p>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.</p>	

11. 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.

12. 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.

12.1 Public Consultations

Chief Monk, Sri Pada, Mr. G.K.G.A.R.T.K.Nandana, District Secretary, Nuwaraeliya, Mr Nayanappriya Bandara Herath, Manager of Lakshapana Estate, Mr. Rangana, Executive Engineer, Norwood Road Development Authority, and Ms. Sisikumari, Grama Niladhari, Seethagangula GN division were consulted and made aware of landslide early warning alerts, the mitigation project and the funding mechanism. They stated that the mitigation works are appreciable and expressed his willingness to the project with the full support of the staff. Also, Owner of Rana Hotel, located close to the failed slope as aware about the mitigation project and he also agreed to the project with the full support.

Prior to start of activities of the construction at least one meeting to be organized by the Project Management Unit to aware the Project Affected People who live nearby. This meeting should provide information regarding the ESMF, this ESMP, GRM and AIIB Project-affected people’s mechanism.

12.2 Stakeholders involved in the consultations any recommendations or agreements reached in the consultations (Refer annexure II)

Mr M.K.P Welikannage, the Provincial Director of Central Environmental Authority in Central Province was consulted in 2019 during the preparation of SSE-SMP for the sites located in the central province to know about the project works and to get the clearances for the project. He emphasized; landslide mitigation projects are not considered as prescribed projects in the Gazette. As the proposed project intends to reduce the risk from landslide for an emergency action, CEA approval is not needed considering the priority of the project. The information obtained from the discussion is quoted here.

Table 7 presents the expected Stakeholder Engagement Plan in the project.

Table 7: Stakeholder Engagement Plan

Method of Engagement	Stakeholder/ Stakeholder institution	Involvement
Meeting and Site visit Pre-Bid Visit	District Secretary- Nuwaraeliya Divisional Secretary - Ambagamuwa Range forest officer Nallathanniya - Department of Wildlife Conservation Pradeshiya sabha -Ambagamuwa Central Environmental Authority Road Development Authority Ceylon Electricity Board Forest Department	Aware on the project ESMP, ESMF and GRM Aware on the immediate requirement of clearances
Consultation	Central Environmental Authority Road Development Authority Divisional secretary	To get clearance before construction commence
Request letter	Pradehiya Sabha -Ambagamuwa	To remove solid waste
Request letter	Geological Survey and Mines Bureau	To remove soil, boulders
	Medical Health Officer (MOH)	To conduct Sexual Transmission Disease (STD) program

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

Table 8: 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 Ambagamuwa 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 Nuwara Eliya District is under the sensitive area under Soil Conservation Act 25 of 1951.
Department of Forest Department of Wildlife Conservation	As there is no forest reservations and wildlife habitats; Department of Forest and Department of Wildlife Conservation approvals are not needed
Geological Surveys and Mines Bureau	Approval will be obtained for extraction of materials, transportation and disposal of earth, rocks and mineral debris. (If necessary, only).
Ambagamuwa Divisional Secretariat	Approvals from Ambagamuwa Divisional Secretariat will be obtained for the disposal of waste and plant litter.
Ceylon Electricity Board	Approvals from regional office of Ceylon Electricity Board will be required for power supply for site operation.
National Plant Quarantine Service	Approval from Additional Director National Plant Quarantine Service Katunayake for Director General of Agriculture under the Plant Protect Act No. 35 of 1999 Plant or seed if needed for bio-Project Managed slope mitigation shall be imported into Sri Lanka under the authority and in accordance with the conditions, of a plant importation permit issued.
13.3 Consent/ no objection/ legally bound agreement from the private land ownerships	
Land owner (RDA & Lakshapana Estate)	Signing a legally bound agreement between the land owner 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 9.

Table 9: Tentative timeline for getting approvals

Approvals	Month 1				Month 2			
	W1	W2	W3	W4	W1	W2	W3	W4
Project implementation								
<i>Approval from the District Secretariat</i>								
Submission of application	—							
Project briefing		—						
Respond to comments			—	—				
Approvals					—	—		
<i>Approval from planning committee</i>								
Submission of application		—						
Project briefing			—					
Respond to comments				—				
Approvals					—			
<i>Approval from state land owners RDA</i>								
Submission of application		—						
Respond to comments			—					
Approvals				—				
<i>Other approvals</i>								
GSMB		—	—					
Ministry of Defense (Depends on the requirement)								
Consent/ no objection from the land ownership (Lakshapana Estate)	—							

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/ RLVMMMP

Tel : +94 112 559 869

Fax : +94 112 502 611

Email : pd.rlvmmmp@gmail.com

Web : rlvmmp.lk

- District Offices/ NBRO or
- Site Offices/ RLVMMMP
- Online Grievance Redresses Mechanism System (<https://rlvmmp.lk/grms>)

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 10: 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, RDA, Other district levels Agencies, NBRO district office, AIIB	Meetings, District coordination committee, submission of relevant 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, RDA, Divisional secretary, Police, State Land Owners, Grama Niladhari, 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, RDA, Divisional secretary, Police, State Land Owners, Grama Niladhari, 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

Table 11: Level of information gathered through consulting institutions

Date	Institution	Person contacted for information
04/07/2019 @ 10.00 hrs	Central Environmental Authority	Mr M.K.P Welikannage, Provincial Director, Central Environmental Authority Central Province
28/09/2022 @ 9.00 hrs (Over the Phone)	Lakshapana Estate	Mr Nayanappriya Bandara Herath Manager, Lakshapana Estate
28/09/2022 @ 9.30 hrs (Over the Phone)	District Secretariat Office Nuwara Eliya	Mr G.K.A.R.T.K.Nanadana District Secretary, Nuwara Eliya
28/09/2022 @ 9.45 hrs (Over the Phone)	Grama Niladhari Division - Seethagangula	Ms Sisikumari Grama Niladhari Seethagangula

Annexure I: Images of the site condition and the consultation



Consultation with Mr M.K.P Welikannage, Provincial Director, Central Environmental Authority, Central Province



Consultation with business Community and handover the leaflets about the Project work



Consultation with Owner of Savindu Hotel, Seethagangulagama, Nallatanniya



Consultation with business Community who are shop owners of Nallatanniya.



Consultation with Owner of Rana Hotel, Nallatanniya



Consultation with Manager of the Lakshapana State and Divisional secretary of Ambagamuwa DS division

Annexure II: Report on the Stakeholder Consultation: Nuwara Eliya District

Institution	Name and designation of the contact officer	Concerns raised
Central Environmental Authority	Mr M.K.P Welikannage, Provincial Director, Central Environmental Authority Central Province.	<ul style="list-style-type: none"> ✓ Under the Soil Conservation Act 25 of 1951 of National Resource Management Centre, Nuwara Eliya District has been gazetted as a sensitive area. ✓ Under this gazette any development is not allowed irrespective of the magnitude of the project. ✓ In a disaster this is not needed. ✓ Landslide mitigation projects are not considered projects prescribed in the Gazette. ✓ The Basic Information Questionnaire (BIQ) is needed to fill for the project and submit the application ✓ As the proposed project (mitigation) intends to reduce the risk from landslide for an emergency action CEA approval is not needed considering the priority of the project. ✓ Before project commence a request indicating the mitigation sites need. ✓ If the project is carried out in a sensitive area, even not within a prescribed project, consideration of sensitive area will govern the process.
Road Development Authority	Chief Engineer Nuwara Eliya	<ul style="list-style-type: none"> ✓ This area is under the jurisdiction of Nuwara Eliya District RDA office ✓ The RDA has no objection and states the mitigation is very much needed. ✓ Other concerns raised <ul style="list-style-type: none"> • A proper handing over of the project is required after the mitigation • RDA will do the maintenance after mitigation • It is emphasized that during the construction the contractor should use Personal Protective Equipment • At all times, the contractor shall provide safe and convenient passage for vehicles, pedestrians, and traffic safety measures, barricades, flagmen and for the night work, lights and illumination should be provided. ✓ It is also stated that Construction waste/ excavated materials should not be a nuisance to public/commuters

Annexure III: Proposed procedure for obtaining approvals from state land owners and environmental agencies.

1. Proposed procedure by RDA for approval for implementation of landslide mitigation projects in RDA reservation areas

- i. The design to be accepted by the RDA: The project implementing agency should submit detailed design report to RDA with a formal request on nature of approvals required. PMU should prepare above documents and should submit the documents to RDA regional office.
- ii. RDA regional office will evaluate the proposal and may call for project briefing. The PMU should provide necessary briefing as appropriate
- iii. On the approval by RDA an agreement will be signed between RDA and Project implementing agency to access the site, erect structures, and implement mitigation works.
- iv. A condition that would include is
 - A proper handing over of the project is required after the mitigation
 - RDA will do the maintenance after mitigation
 - It is emphasized that during the construction the contractor should use Personal Protective Equipment

- At all times, the contractor shall provide safe and convenient passage for vehicles, pedestrians, and traffic safety measures, barricades, flagmen and for the night work, lights and illumination should be provided.
- Construction waste/ excavated materials should not be a nuisance to public/commuters

Annexure IV: Study team

Name	Designation	Position in the study
SAMS Dissanayake	Senior Scientist/ESSD/NBRO	Senior Environmental Scientist
Prabath Liyanaarachchi	Scientist/ ESSD/NBRO	Environmental scientist
H Kusalasiri	Technical Officer/ESSD/NBRO	GIS/Demographic data /survey support
MPAN Mihindukulasooriya	Technical Officer/ESSD/NBRO	Report Preparation

Annexure: List of references

1. Contractor's obligations for Generic Environmental and Social Management Plan- Sri Lanka Landslide Mitigation Project-AIIB
2. Environmental and Social Management Framework-Sri Lanka Landslide Mitigation Project - AIIB
3. Resettlement Planning Framework- Sri Lanka Landslide Mitigation Project -AIIB
4. Felling Trees (Control) Act by Ministry of Agriculture, Rural Economic Affairs, Livestock Development, Irrigation and Fisheries and Aquatic Resources Development
5. Report No. NBRO/LRRMD/NE/ABD/LI/2022/0888ERR and Report No: NBRO/LRRMD/NE/ABD/LI/2022/0888 of LRRMD/ NBRO
6. Census and Statistical Report (2012), Department of Census and Statistics