REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES PROJECT

Site Specific Environmental and Social Management Plan

Site No.133
Pendrose Estate
Between Inguruoya and Galabada - CH 93 + 15
Kandy District

January 2020

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

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Abbreviations

AIIB	Asian Infrastructure Investment Bank
CEA	Central Environmental Authority
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
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 Organization
PRDA	Provincial Road Development Authority
RHS	Right Hand Side
LHS	Left Hand Side
SLR	Sri Lankan Railways

1. Introduction

1.1 Project overview

The Government of Sri Lanka intends obtaining a loan from the Asian Infrastructure Investment Bank (AIIB) for mitigating/rectifying unstable slopes in high risk areas especially in 11 districts of 6 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 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 **Pendrose Estate in between Inguruoya station and Galabada station - CH 93 + 15** 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 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 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 (SSE-SMAP) prior to commencing works.

2. Description of the project

2.1 Name of the project

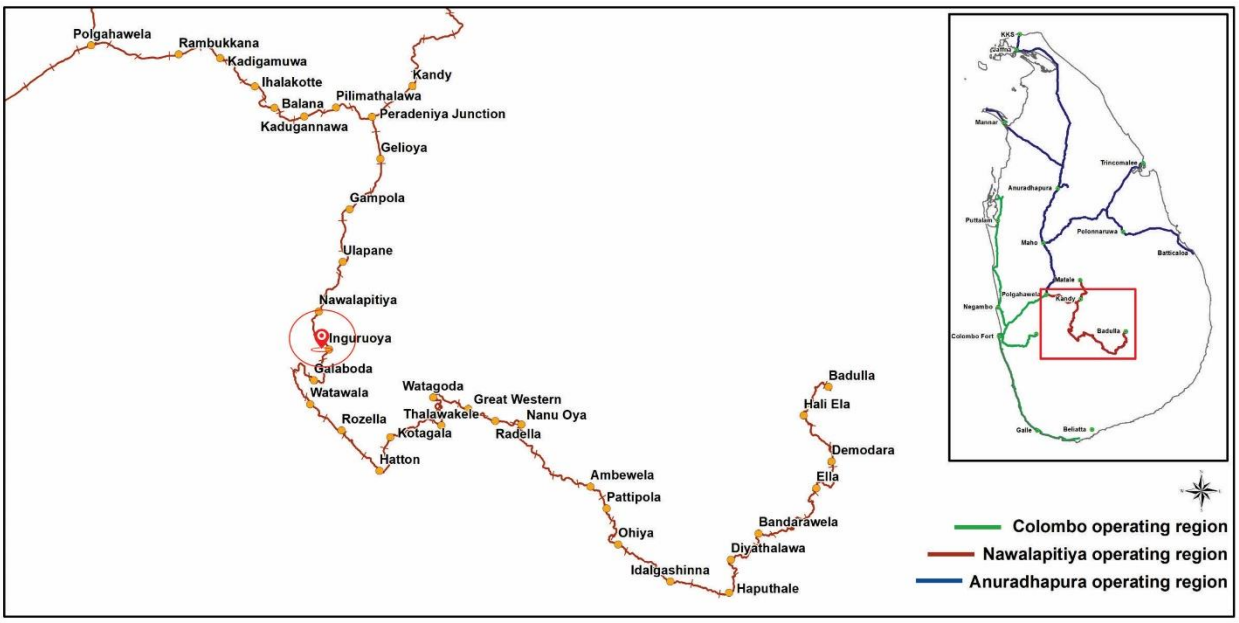
Rectification of Site No 133, Kandy District, Pendrose Estate in between Inguruoya and Galabada - CH 93 + 15

2.2 Location details

The proposed mitigation site falls under Moragolla Mahakanda GN division of Pasbage Koralee DS division, Kandy District, Central Province.

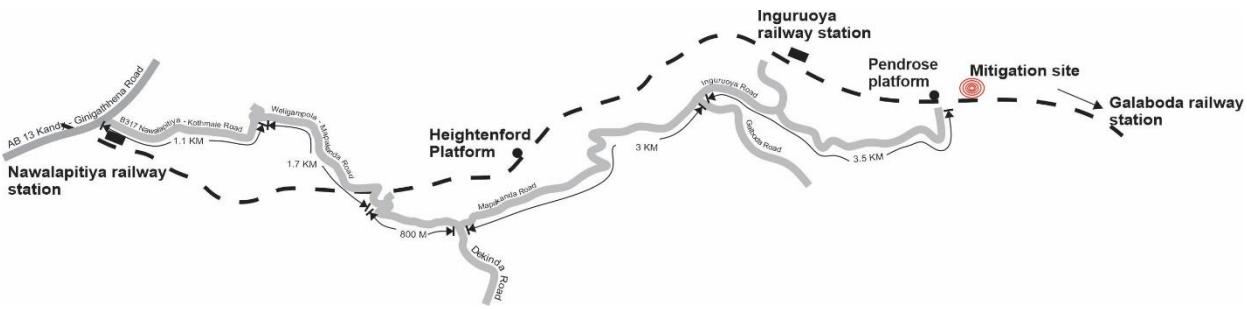
GPS references of the site – 6.989775°N and 80.539890°E

Nearest town and accessibility to the site –Pendrose estate is located on the Main line between Pendrose plateform and Galabada railway station. The location is in between the the 52nd railway station and 53rd railway station of the Main Line of the Railway network and is operated by Nawalpitiya operation area of Sri Lanka. The estate is located at 157km from Colombo Fort and 150km from Badulla railway station.



Pendrose plateform is located in Inguruoya and Galabada railway station the Main Line in between of the railway network.

Nawalapitiya is the nearest town about 10.1 km from the site. The site can be accessed Inguruoya road from Nawalapitiya town. The easiest access of the mitigation site is railway access.



2.3 Topography and land ownership

The site proposed to be mitigated is located at the in between the Pendrose platform and Galabada railway station of Colombo-Kandy Railway line at Pendrose estate. The Elevation of the area is 680m. The extent of site proposed to be mitigated is about 8000 m^2.

The railway line reservation land is owned by Sri Lanka Railway Department and upslope and downslope lands are owned by Pendrose Plantation Company. *Refer figure 1; Google image of the proposed landslide mitigation site, the surrounding environmental features and service infrastructure.*

Figure 1: Google image of the proposed landslide mitigation site, the surrounding evironmental features and service infrastructure.

2.4 Meteorology of the area

Annual average rainfall – 4285 mm
Annual average temperature – 17-27 °C

2.5 Demographic feature of the area

The Population of Moragolla Mahakanda GN Division is 391 including 193 males and 198 females. (Census and statistical report - 2012)

3. Landslide hazard incident details

3.1 Account of incident

According to the information of villagers, a previous slope failure was happened in that area in year 2004 and seven houses were damaged in upslope area. The railway line was damaged and obstructed and the department of Sri Lanka Railway was renovated the location temporary. But there is a high potential for landslide incident in future. The nearby area was subsidized and a large tree was fallen to the railway line in between Inguruoya and Galabada railway stations at CH 93+15 section the both sides of Kandy- Badulla railway line in Pendrose area.

3.2 Effects and consequences of landslide

The failed soil mass and rock boulders had damaged and blocked the railway line and the workers of the Department of Sri Lanka Railway have removed them immediately. The railway transportation was ceased for few days due to the incident. No causalities or any injuries were recorded due to the incident. The damaged railway line section had made high risks for railway commuters as this is the only access railway road to the Badulla area.

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

Department of Sri Lanka Railway have constructed a gabion wall as remedial measures to reduce the ground subsidence and potential risk of the area.

3.4 Evacuations

There are no evacuations based on this location.

3.5 Resettlement (progress)

There is no resettlement programme with reference to this location.

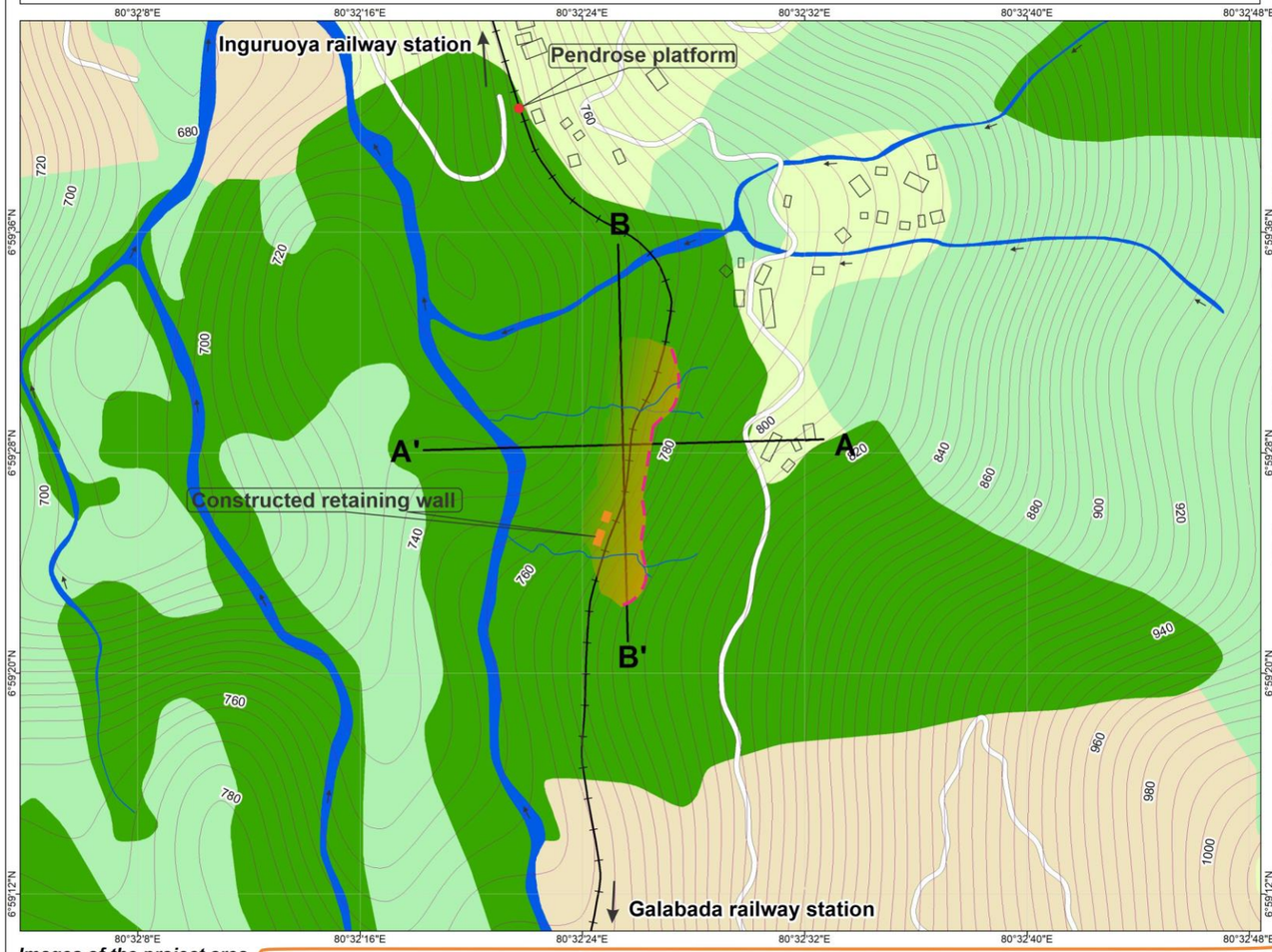
Location : Site No.133 Pendrose Estate in between Inguruoya and Galabada railway stations (Ch 93+15)

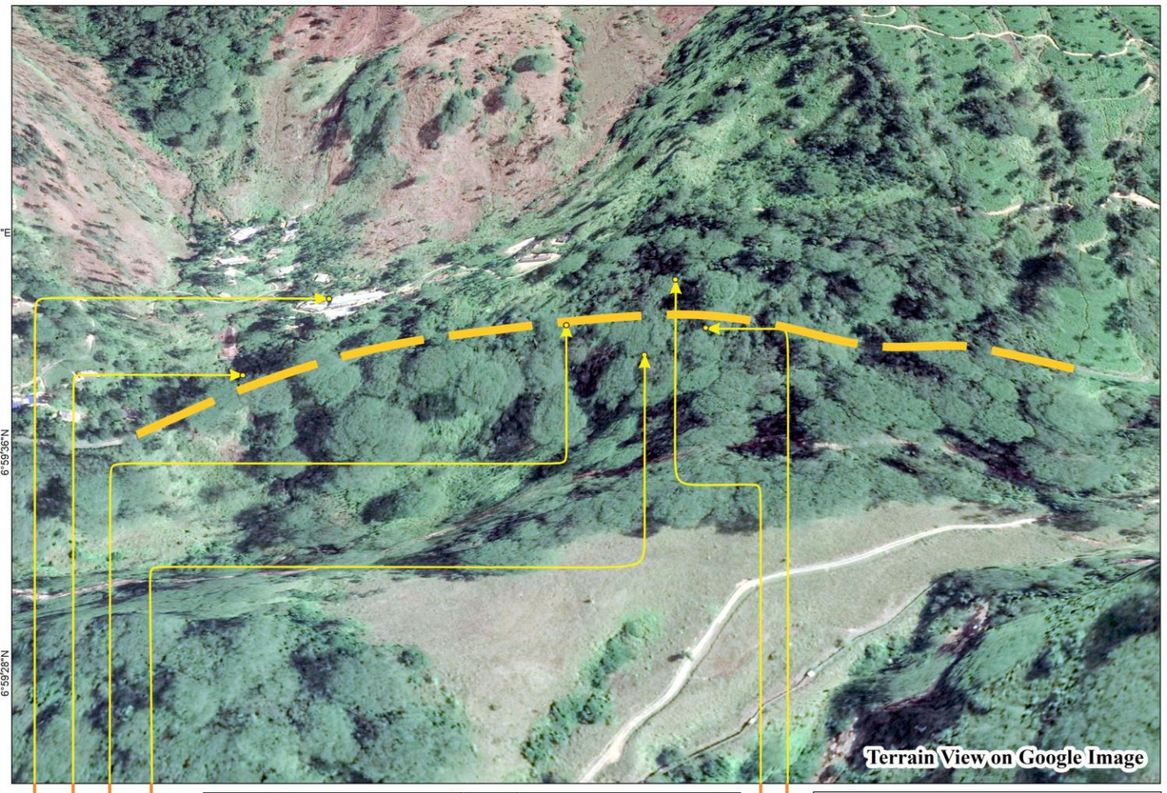
Location details

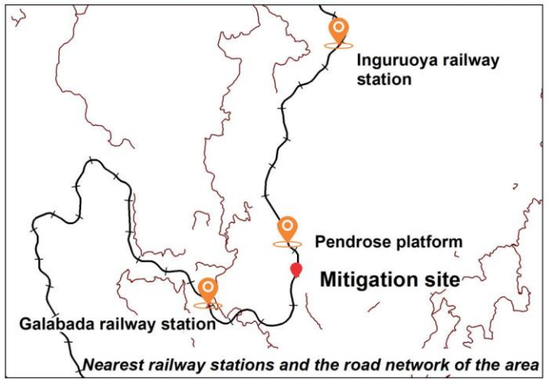
- o GN Division : Moragolla mahakanda
- o DS Division : Pasbage Korale
- o District : Kandy
- o Province : Central Province

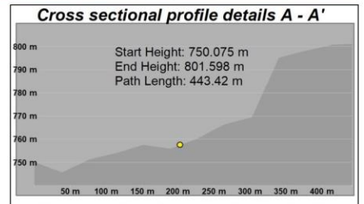
Landslide hazard information and terrain features

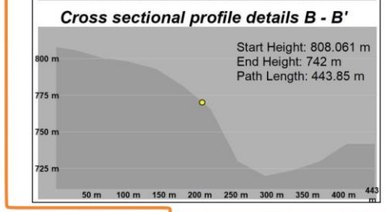
- o Type of Failure : Ground subsidence
- o Potential damages : Railway line
- o Land Use : Home gardens, shrub, tea & grass
- o Land ownership : SLR
- o Average area : 8,000 Square meters
- o Natural fetures : Stream











Images of the project area

Nearest upslope houses

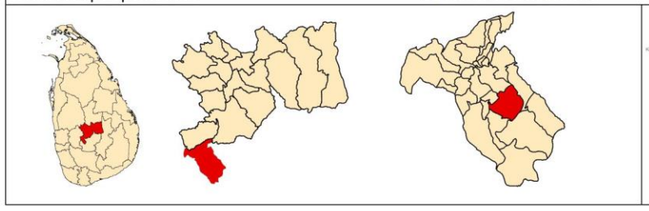
Stream close to the site

Temporary repaired railway track

Downslope vegetation cover

Upslope vegetation cover

Constructed retaining wall



Legend

- High way class A
- High way class B
- Other road
- Minor roads (Jeep & cart)
- Foot path
- Broard gauge single (tracks)
- Tunnel
- Bridge
- Ferry
- Causeway
- Bridge/ Culvert
- Foot bridge
- Railway station/ railway halt
- Forest/ Shrub
- Grass land
- Other houses/ Buildings
- Tea
- Potential area
- Home gardens with mixed trees and other perennial crops
- Nearest Railway station/town
- Cross sections
- Flow path/ Streams flow directions

0 30 60 120 180 240 Meters

Source
This map was prepared using the Google images and field data on May 2019 above near Pendrose Estate landslide potentail site

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Asian Infrastructure Investment Bank (AIIB)

Prepared By:
Environmental Studies & Services Division (ESSD)
National Building Research Organization
99/1, Jawatta Road, Colombo 05
011 2588 945 / 011 2500 354
www.nbro.gov.org

Figure 2: 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 and ground subsidence were happened in between Inguruoya and Galabada railway stations at CH 93+15 section the both sides of Kandy to Badulla railway line in Pendrose area. Two locations are identified as the potential landslide area. The area is highly forested area and two seasonally recharged water streams are flowing through the potential area. A small permanent water stream is flowing 50 m from the site. Houses are located at the upslope area of the railway line.

Present land uses in the affected area is largely covered with thick tree canopy layer. Tree species are the dominant plants. Tea plantation can be seen in the downslope area. The under canopy cover consists with grasses and various small plants. *Refer Fig 2: Google image, cross sections, land use, risk elements and the photographs of special features of the landslide mitigations*

4.2 Areas adjacent to the landslide

State Tamil community is living in the upslope area with minimum facilities. Pendrose railway platform is located about North Eastern 450m away from the mitigation area. A small grocery and a house located near the railway line and platform. There are occupied houses in the upslope area to the Penrose platform and one house comprises of a small boutique. The present land uses in the affected area is largely home gardens with plantation crops. Tree species such as Jak, Avacado, Mango, Cardamom, Gambooge, Pepper, Areca nut and *Duriyan* are the dominant plants.The public transport bus is stopped near the platform. There are no employees are currently employed in the Pendrose platform and the passengers get train tickets from the guard officer of the train. Traveling by taking a train from Pendrose platform is the easiest access to Nawalapitiya, Galabada and Inguruoya area due to absence of bus transportation system and roads are in dilapidated condition for vehicle movement. There are 11 trains stoppings at the Pendrose platform every day. About 150-250 passengers use the Pendrose platform daily and out of them about 50 represents school children who travel to schools at Nawalaipaitya town*Refer Fig 2: Google image, cross sections, land use, risk elements and the photographs of special features of the landslide mitigations*

4.3 Current level of risk

As the vehicle road to the village is difficult and remote, majority of the villagers are using railway transportation. The residents who live nearly 2 or 3 km buffer of the railway platform are come to the station on foot. Some villagers are using railway road to walk for their day to day activities such as go to grocery, neighboring houses etc. Nearly 14 train journeys are operating through this platform. If the site is not rectified to prevent future slope failures, it can directly affect the rail transportation of the area. The life of the railway commuters and the tourists would be at risk. Also, during future failures, it would discontinuous all functions of the railway transportation trough the line as this is the only access railway line to Badulla. There is no double line facility form Kandy to Badulla, therefore the obstruction of accessibility poses highly significant impact on rail transportation, life line facilities of the villagers and related economic activities including the transactions.

5. Description of the works envisaged under the project

The location is highly potential for landslide. Therefore, preventive measures such as toe protection with retaining structures, soil nailing and surface and subsurface drainage improvement will be introduced.

6. 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. Rail transportation between Kandy and Badulla
ii. Railway commuters and tourists
iii. Neighbouring houses and its occupants and their livelihood activities
iv. Pendrose Estate, tea and pepper cultivation

v. Natural water streams flowing through the unstable area
vi. Current services, economic and tourism activities of the area

(Ref. Fig.3 Sensitive elements that may be affected by the project actions)

Figure 3a: Risk area of the railway line and exsisting retaing wall

Figure 3b: Seasonal recharge streams at upslope

Figure 3c:Stream nearby the site

Figure 3d: Subsidied diwnslope area (after constructed a gabian wall)

Figure 3e: Tamil community in the upslope area

Figure 3f: Pendrose railway platform, nearby grocery and commutors

Figure 3: Sensitive elements that may be affected by the project actions

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

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

Impacts

7.1 Positive

- Secure the railway line to Badulla
- Enhance rail-road safety for commuters, tourists and pedestrians
- Secure the cost of road rehabilitation from future slope failures
- Tourism activities and other life line activities the area will be benefitted

7. 2 Negative

7.2.1 Hydrological

Impacts of the drainage pattern of the area	**Highly Significant**
Water pollution and impacts on surface water quality	**Highly Significant**
Erosional impacts and stream bed alterations	**Highly Significant**
Open defecation and waterborne infections	**Significant**
Impacts on the downstream water uses	**Significant**
Impacts on ground water table and ground water quality	**Highly Significant**
Impacts on water or wetlands	**Highly Significant**

7.2.2 Environmental

Noise and vibration	**Significant**
Explosive hazards and hazardous materials	**Insignificant**
Air pollution impacts	**Low Significant**
Solid waste disposal issues	**Highly Significant**

7.2.3 Biological & Ecological

Effects of important wildlife habitats	**Significant**
Effects on Fauna & Flora	**Significant**
Impacts on stream ecology of the area	**Significant**

7.2.4 Social & Economic

Impacts on agriculture within the area	**Insignificant**
Cracks in the building due to vibration	**Significant**
Loosing access to land and future development activities	**Significant**
Impacts on households living in high-risk or medium-risk areas	**Significant**
Impacts on livelihood/ business and income activities	**Insignificant**
Impacts on downstream services (water supply, sewage, electricity)	**Insignificant**
Effect due to loss of infrastructure and safety	**Significant**
Risks of public accessing the site during construction	**Highly Significant**
Work camps and lay-down sites	**Significant**
Relations between workers and the people and possibility of disputes	**Highly Significant**
Workers safety during construction	**Highly Significant**
Safety to the public from construction activities: High risk for commuters	**Highly Significant**
Impacts on transport infrastructure	**Highly Significant**
Impacts on the areas used for businesses	**Insignificant**
Need for people to enter or cross the site	**Significant**
Priority health and safety issues	**Highly Significant**

Figure 4: Summary of the impacts which are envisaged during project

7.1 Positive impacts

- The objective of this project is to ensure that further occurrence of slope failures and ground subsidence will be prevented to an acceptable level for Pendrose Estate, in between Inguruoya and Galabada railway stations at CH 93+15 railway road section. The Main Line is a major railway line in the rail network of Sri Lanka and considered by many to be one of the most scenic train journeys in all of Asia. The line begins at Colombo Fort and travels through the Sri Lankan hill country to reach Badulla. The Main Line operates through major population centers and tourist destinations such as Nuwara Elliya, Hortin Plains. Main line passes through the tea estates, pine forests, waterfalls, bridges and tunnels. The proposed project will significantly enhance railway safety for commuters, tourists and pedestrians during rainy season and will allow to keep the railway track open throughout the year.The remediation may secure the cost of railway track rehabilitation from future ground subsidence in the area.
- Upslope area and the State Tamil community will be safe due to the risk condition.
- The proposed project will significantly enhance railway road safety for commuters, tourists and pedestrians during rainy seasons. It will allow to keep the road open throughout the year. Quick remediation may secure the cost of road rehabilitation from future slope failures on the area.
- Due to the risk of land subsidizing, harvesting crops would be difficult would reduce the income of the household. Hence the project will enhance the cultivation of cash crops and there by household economic activities will be benefitted.
- Railway transportation, tourism activities and other life line activities of people in the area will be benefitted largely by this mitigation.

7.2 Negative impacts

The mitigation works are generally confined to already slope and rocks failed 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
7.2.1 Hydrological and water quality impacts	
7.2.1.1 Impacts of the drainage pattern of the area The mitigation works in this site will focus largely on the improve surface drainage system and construct toe protections like retaining walls and soil nailing to the unstable slopes. Due to the project activities, disruption to existing surface and sub-surface drainage pattern in the area will not be expected. But, during rainy season heavy flow of water is expected to be generated and will flow towards the stream and seasonal recharged water streams which are flowing through the unstable slope area. There will be significant impacts on the drainage pattern of the area.	**Highly Significant**
7.2.1.2 Water pollution impacts on surface water quality During rainy season fines, sediments, soil particles may direct and contaminate the water stream and the seasonal recharging streams. During slope excavation, construction of surface and sub-surface drainage network, removal of debris can generate high sediment laden runoff and there could be a possibility that contaminated runoff may enter seasonal streams and pollute the water. 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.	**Highly Significant**
7.2.1.3 Erosional impacts and stream bed alterations The mitigation works in this site will focus on construction of well-planned surface drainage and sub-surface drainage system. Therefore, during rainy season heavy flow of water is expected to be generated to enter the nearby stream and other seasonal recharging	**Highly Significant**

streams from surface runoff or through surface drains. Then the erosional impact is significant.	
7.2.1.4 Open defecation and waterborne infections Faecal contamination of streams and seasonal recharging streams will be expected during construction due to open defecation of the contractor's workforce as the area consists thick vegetation cover.	**Significant**
7.2.1.5 Impacts on the downstream water uses The construction activities will be carried out on the railway line area. The water users of downslope area will be affected from the contaminations of the streams which are nearby to the railway line. Therefore, the impact on the downstream water users will be significant.	**Significant**
7.2.1.6 Impacts on ground water table and stream water quality 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, waste water from the construction activities and discharge of waste matter from onsite septic systems would cause adverse impacts on the ground water table and stream water quality as the nearby residents use water from the main stream. Due to the mitigatory activities carried out in the slope area, the stream water quality will be impacted.	**Highly Significant**
7.2.1.7 Impacts on water or wetlands 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 is flowing adjacent to the site.	**Highly Significant**
7.2.2 Environmental Impacts	
7.2.2.1 Noise and vibration impacts Noise and vibration are expected from construction equipment. Noise and vibration impacts are significant as there are houses with occupants at the upslope area of the proposed mitigation site. Also, the day time noise generated from the movement of machinery and vehicles during construction phase will not disturb to the railway passengers because the noise and vibration impact is affected them only few minutes.	**Significant**
7.2.2.2 Air pollution impacts Construction activities that contribute to air pollution include: land clearing, operation of diesel engines, demolition, burning, from storage, transportation disposal of construction materials, construction waste and working with toxic materials. During construction, it generates high levels of dust typically from concrete, cement, wood, stone, and silica. The air pollution impacts from the construction is locally significant during dry periods for railway commuters.	**Low Significant**
7.2.2.3 Solid waste disposal issues 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 station will create inconveniences to the railway commuters, passengers, staff of the station and the neighboring community. It can block the water seepages 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.	**Highly Significant**
7.2.2.4 Explosive hazards and hazardous materials Since the affected area has no rock boulders, explosives may not be used and the rock blasting is not envisaged.	**Insignificant**
7.2.3 Biological /Ecological Impacts	

7.2.3.1 Effects of important wildlife habitats No forested/ wild-life reservation areas can be seen within the project influence area with high biodiversity, or habitat fragmentation. But there can be seen a dense growth of trees and shrubs the around the site. Animals like wild pig, monkeys, reptile species, bird species and small mammals such as rabbits, Hedgehog , Giant squirrel , Indian Palm cat (Kalawadda) etc. are found in that area according to the community. The contractor's workforce may engage in hunting and pouching in this area. Hence the project will have a significant effect on the wildlife habitats.	**Significant**
7.2.3.2 Effects on Fauna & Flora Majority of the trees found in the site are not endemic, threatened and identified in the red list of IUCN. During the project implementation there will be requirements of cutting or uprooting trees, some of may be regulated under Felling of Trees (Control) Act. Hence the removal of them may be required approval from the relevant authorities. Valuable timber species may be removed from the system unintentionally/intentionally if proper supervision is not done by the Environmental and Safety Officer with relevant knowledge on these species. Collection of valuable tree specimens, illegal tree felling for timber extraction and intentional and unintentional setting of forest fire may happen in the area by contractor's workforce.	**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 no agricultural practices within the area to be remedied or immediately to the site.	**Insignificant**
7.2.4.2 Cracks in the building due to vibration impacts There are several estate worker's houses located at the upslope of the mitigation site. During the construction heavy machinery will be used and the vibration can cause cracks in these houses. Vibration can affect the stability of the upslope houses.	**Significant**
7.2.4.3 Loosing access to land and future development activities During construction phase, the railway road will be temporary obstruct but the rail transportation will be continuously operated. The mitigation works will be concentrated only within the unstable slope area and besides the railway line. There will be no impacts to the Department of Railway with regard to future development activities or loss to valuable uses.	**Significant**
7.2.4.4 Impacts on livelihood/ business and income activities There is no significant impact on livelihood, business or income activities of the area because the area is located within the railway reservation area.	**Insignificant**
7.2.4.5 Impacts on service provision (water supply, sewage, electricity) There are no water supply, sewage or electricity line through the site.	**Insignificant**
7.2.4.6 Effect due to loss of infrastructure and safety The access to the proposed site is only through the railway line. During construction phase, the continuous railway transportation will be obstructed by frequently moving machinery, loaders, trucks etc. This can obstruct the railway transportation and impact to the safety of the workers.	**Significant**
7.2.4.7 Risks of public accessing the site during construction Excavation machineries, loaders, trucks etc. will be used in the site. 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. The villagers will be attracted to these machineries, materials and may even enter the site without proper awareness of the site staff. Ignorance of entry of general public and careless operation of machinery can cause fatal injuries and accidents.	**Highly Significant**

7.2.4.8 Work camps and lay-down site requirements 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.	**Significant**
7.2.4.9 Relations between workers and the staff / people living in the vicinity of the site and possibility of disputes 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 workers of the and the public and the residents in nearby houses. Although the workers who would engage in such issues will be rare, even few possibilities cannot be ignored.	**Highly Significant**
7.2.4.10 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 highly significant at this site. Specials the risks of train accidents are highly significant. Contractor may engage under age workers (children) for construction work, which is risky and can results serious accidents and injuries.	**Highly Significant**
7.2.4.11 Safety to the public from construction activities: High risk for commuters The Penrose railway platform is a public place where people from different ages and backgrounds with poor knowledge on construction risk, use for transportation purposes. As the site is located on a land section with a railway tracks, the safety of commuters will be highly significant due to some heavy locomotives such as excavators, rollers, water bowsers, trucks and lorries carrying material, water etc. on railway may pose risk of accidents as the station is frequently used by people for travelling.	**Highly Significant**
7.2.4.12 Impacts on transport infrastructure (especially temporary loss of road or rail access, risks of traffic congestion) Machinery and material transportation will interrupt the vehicles, commuters and pedestrians of Pendrose platform and the access road of the village during construction period. This will cause nuisance to pedestrians and commuters. Further, material & machinery transportation to the proposed mitigatory site may affect to the railway transportation.	**Highly Significant**
7.2.4.13 Households/commercial buildings in high-risk or medium-risk areas adjacent or near to the site (up-slope, down-slope, downstream, etc.) The construction poses high risk on railway passengers safety, public safety, noise and vibration impacts, and cracks in upslope houses.	**Significant**
7.2.4.13 Areas used for businesses, agriculture or other within the area to be remediated There are no areas used for business, specific agriculture practices or other within the area to be remediated.	**Insignificant**
7.2.4.14 Areas used for businesses, agriculture or other immediately adjacent to the site There are no areas used for business, specific agriculture practices or other commercial activities immediately adjacent to the site hence has no significant impact.	**Insignificant**
7.2.4.15 Need for people to enter or cross the site Excavation machineries, loaders, trucks etc. will be used in or near the railway track where railway staff are moving. There is no special need for commuters and the railway staff 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,	**Significant**

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.	

8. Site Specific Risk Analysis

Table 2: Site specific risk analysis

Risk	Affected group	Risk level
1. Facing railway accidents when working / shifting in between railway tracks.	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 of trains.	Workers	Very high
4. Facing railway accidents during constructions at night time	Workers	Very high
5. Accidents from the construction activities and materials on the site	Workers Railway commuters	Very high
6. Water inundation in the unstable area	Workers	Low
7. The wasps attacks/snake bites during the construction phase	Railway commuters Workers	High
8. Injuries due to rock particles due to explosions/ blasting	Workers Railway commuters	High
9. Work adjacent to electrified lines, signal lines	Workers	High
10. Site Working – Working in poor visibility	Workers Railway commuters	High
11. Lone Working	Workers	High
12. Emergency evacuation	Workers	High
13. Extreme weather conditions (wind, rain etc.)	Workers	High

9. 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 almost vertical unstable slope with a risk of slope collapse. 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.

10. 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. The upslope houses may have some impacts in the form of structural damage during the project actions due to ground vibration induced by heavy machinery operation. (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.

10.2 Evacuation of people

Project based evacuations are not required for this site.

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

It may require to compensate for the loss occurred due to project actions.

10.5 Public awareness and education - needed for following areas

i. Programs to inform and educate people in the vicinity about the risks posed by unstable land section located within the railway premises specially the occupants of the households in the downslope area and commuters using the railway station.
ii. Requirement for special awareness for commuters, railway station users and the people passing through the station with potentially high risk during construction phase and early warning.

10.6 Design based Environmental/ Social Management considerations

The site is located in 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
i. Natural resource management and resource optimized designs 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.	High
ii. Site Planning During site planning it is necessary to be cautious on possible re-activation of creep ground subsidence. Also, the site is located in a very limited space of a railway platform. 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	Very High

trained flagman or safety officer of SLR during the construction period and proper communication between contractor's workforce, railway station and PMU must be built. The SLR buildings within the close proximity can be used as camping sites or storage houses under the permission of the Railway Department.	
iii. Habitat connectivity and animal trails 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.	Moderate
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 upslope and downslope houses.	High
v. Interruption to water supplies The seasonally recharging water streams and other natural stream would be affected due to water table draw down. In such instances the design of surface and subsurface drains should consider possible drying up of existing community water supply sources and to consider suitable design based mitigation measures. eg- Sub surface drains can be introduced for drainage management at strategic points. The extracting water is in high quality and can be used as an alternative supply to satisfy long term domestic water requirements.	High
vi. Aesthetically compatible design considerations 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..	High
vii. Consideration of green environmental features 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.	Moderate
i. Conservation of social and Cultural features 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.	Low
ii. Workers/ commuters and community safety Due to the close proximity to the railway tracks people may face railroad 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, occupants of the downslope houses and commuters. Therefore, design-based safety consideration such as berms, safety nets etc. should be considered.	Very high
iii. Erosion control structures 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.	Very High

iv. 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

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 2) 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 contractors obligation to ESMP	**Item**	**Relevant to the project**
2002. Environmental and Social Monitoring		
2002.2 1)	Storage on site	Highly Relevant (railway line)
2002.2 2)	Noise and Vibration	Highly relevant (railway line, upslope houses, railway commuters)
2002.2 3)	Cracks and damages to the buildings	Highly relevant (railway line, upslope houses)
2002.2 4)	Disposal of waste	Relevant (railway line, commuters)
2002.2 5)	Disposal of refuse	Highly relevant (railway line, commuters)
2002.2 6)	Dust control	Highly relevant (railway line, commuters)
2002.2 7)	Transport of Construction materials and waste	Highly relevant (railway line, commuters)
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	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	Highly relevant (railway line, commuters)
2002.2 16)	Disruption to public	Highly relevant (community nearby, commuters)
2002.2 17)	Utilities and roadside amenities	Highly relevant (railway line, commuters))
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 (unsafe slope, 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
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***		

10.7.2 Site Specific mitigation

Given below is 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
i. Avoid train accidents / possible emergency situations during construction Safety officers and flag men of SLR are highly recommended to each mitigation location. At least three flagmen should be kept in a site. Flag man or the safety officer has all the responsibilities of the train schedules and stop train in emergency situations. Always be alert on the signals and instructions given by the safety officers of SLR An awareness and training programme on railway safety for the construction workforce, railway station staff and users are compulsory.	Site preparation & construction	PMU Construction Contractor Railway Department
ii. Traffic management and safety Traffic management system should be in place day and night. A good traffic management plan should be prepared with the concurrence of Sri Lanka Railway Department as this is a railway track situated within the railway station premises. Proper rail road safety measures should be included with warning signs and permanent trained watchmen, luminous sign boards indicating instability risk and road obstruction signs, night lamps etc. are strongly recommended at this site. Flagman of the Railway Department is responsible signaling the in and out trains through the stations according to the requirements of the construction activities. And should be approved by the PMU.	Construction	Construction Contractor and Railway Department
iii. 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	Construction	PMU Construction Contractor Railway Department

followed carefully in a proper organization and safety monitoring system. iv. Prepare a special Occupational Health and Safety Management Plan prior to commencement of construction activities v. A good warning system, watchman and fulltime flagman of the Railway Department is highly recommended for this site for both worker and commuter safety. vi. Adoption of standard worker safety methods vii. Provision of personal protective equipment (PPE) such as safety boots, helmets, protective clothing goggle etc. viii. Provision of trainings and awareness programs to employees ix. Conducting hazard analysis and plan/provide adequate mitigation measures for such hazards identified, prior to carrying out major construction activities x. If the wasp nest is in the vicinity, it is mandatory to use Evacuation Centres for ensure of workers' safety xi. 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.		
iv.Transporting materials and machineries Inform and take permission from the authorized person of SLR before any material and machineries transportation through / along the railway tracks running very close to the affected area. The commuters and the workers should be informed about the material and machineries transportation schedule. The railway station platform or the railway trucks must not be damage due to the material and machineries transportation.	Construction	PMU Construction Contractor Railway Department
v. Impacts on railway transport infrastructure (especially temporary loss of road or rail access, risks of traffic congestion) A good traffic control should be implemented in the construction stage. As there are rail road bends on the tracks close to the site proper safety measures should be included with warning signs and permanent trained watchmen, flagman, luminous sign boards indicating slope instability risk and rail road obstruction signs, night lamps etc. are strongly recommended at this site. All the safety sign boards must be used under the supervision of SLR and according to the railway transportation. The foot path with steps from the station to the upslope households should not be blocked during construction causing a temporary loss of road access. Any deformities in the railway tracks due to construction activities should be monitored day and night by the watchman placed in the proposed mitigation site.	Construction	Construction Contractor and Railway Department
vi. Throw out disposals (litter, bottles, and food) to the construction site from the commuters of trains. Put up the safety sign boards prior to the construction site indicating people at work. The train commuters should be aware about the construction activities through railway announcements from previous railway station before reaching the proposed mitigation site.	Site preparation & construction	Railway Department
vii. Injuries due to rock particles due to explosions/ blasting Inform and take permission from the authorized person of SLR before blasting. Stop all blasting activities during train transport times and making awareness announcements through the nearby railway station.	Construction	Construction Contractor Railway Department

Establish an emergency accidents preparedness plan for the injuries due to rock particles due to explosions/ blasting.		
viii. Inundation of the railway tracks During the construction, the water inundation of the railway tracks will be expected. To mitigate this impact, contractor should construct temporary surface and sub surface drainage network directing excess water to nearby stream or canal before start of the construction.	Site preparation & construction	Construction Contractor
ix. 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 slope mitigation are carried out in the dry season and avoid such activities on slope 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
x. Invasive species 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 relevant authorities.	Construction	Construction Contractor
xi. Noise and vibration control The noise and vibration generating activities may disturb the smooth flow of activities of the upslope houses with occupants. Vibration generating activities should be done within the prescribed limits to avoid damage to structures. Cracks in the railway station building and signal controlling building should be monitored before, during and after completion of the project. Suitable compensation should be made if damage cracks due to construction work occur in the houses and the station buildings.	Construction	Construction Contractor
xii. Disposal of construction waste The contractor should pay special attention with respect to disposal of construction waste. This site is located within a public place in a rural landscape with a pleasing environment. Also, few households with occupants are located in the upslope area. 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 railway tracks or nearby water streams.	Site preparation & construction	Construction Contractor
xiii. Impact on downslope water users Ground water table may be drawdown in downslope wells. The constructor should provide temporary or permeant alternative water source for the residents.	Site preparation & construction	Construction Contractor
xiv. Onsite sanitary facilities for the workers The contractor should prepare temporary sanitary facilities for the workforce within the site, to mitigate open defecation of the workers.	Site preparation & construction	Construction Contractor
xv. Dust and aerosol control screens Dust particles generated during the construction period can influence the commuters, tourists and staff of the site. The houses in the upslope area with occupants could be affected from generated dust particles. Special screens etc. should be used if heavy dust or aerosol generating activities are envisaged.	Site preparation & construction	Construction Contractor

xvi. Water for construction Water for construction works should be obtained only from the approved sites. If contractor intends to use water from the nearby streams, it should be done through the consent of relevant institutions and according to their conditions.	Construction	Construction Contractor
xvii. Working hours The construction activities can be carried out at both day and night time. Working after 6.p.m. could be done after with the consent from relevant authorities due to safety issues.	Construction	Construction Contractor Railway Department
xviii. Impact on service infrastructure Telecommunication, electricity, water lines should be relocated before construction starts on per the approval of PMU.	Construction	Construction Contractor
xix. During construction good housekeeping should be maintained to minimize visual pollution	Site preparation & construction	Construction Contractor
xx. Workers code of conduct Possible disputes between the labor force and the villagers, staff of the station, commuters and tourists should be prevented by maintaining the agreed code of conduct by the contractor. Possible disputes between workforce and villagers should be avoided especially when using shared resources such as common bathing and washing places etc.	Construction	Construction Contractor
xxi. 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.	Construction	E & S Unit of PMU 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; construction phase

Monitoring requirement	Parameters	Frequency
i. Baseline monitoring	Water quality (stream)	Once*
	Pre crack survey for the houses	Once*
	Ground vibration	Once*
	Air quality: particulate matter	Once*
	Background noise measurement	Once*
ii. During construction	Water quality	Once*
	Crack survey for the risk houses	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	**Stream water quality** – Comparison with ambient water quality standards published by the CEA, 2017 **Pre crack survey of the risk houses** -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.	

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

11.1 Public Consultations

The occupants of upslope estate houses were consulted during the field visit. Owner of the grocery, which close to the platform, Mr. W.Subaweera was made aware about the project. They were made aware of landslide early warning alerts, the mitigation project and the funding mechanism. The occupants expressed their willingness to the project and to give full support to the project.
Mr. Saman Priyadarshana, the station master of the Inguru Oya railway station was consulted and made aware of the mitigation project and the funding mechanism. He stated that the mitigation works are appreciable and expressed his willingness to the project with the full support of the staff.

11.2 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 informed about the project works and got 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.

Mr. H.M.K.W. Bandara, Deputy Chief Engineer (Project), Mr. E.M.S.P.K. Deegala, Deputy Chief Engineer (Track) and Mr. D.W.N.Amarasena, Superintend Engineer (Design) of Way and Works Railway Department were consulted during the group discussion about the project activities of the railway sites. They discussed about the procedures to be followed during construction phase and how to carry them without disturbing the railway transportation.

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

Table 7: Clearances, no objection, consent and approvals

Requirement / Approval / Institution	Relevance to the project
12.1 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 Pasbage Korale Pradeeshiya Sabha
12.2 Approval from the state land owners relevant to the project	
Central Environmental Authority	Consent from District Central Environmental Authority is required as Kandy District is under the sensitive area under Soil Conservation Act 25 of 1951.
Department of Forest Department of Wildlife Conservation	As there are 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 for extraction of materials, transportation and disposal of earth, rocks and mineral debris. (If necessary, only).
Pasbage Korale DS Division	Necessary agreement will be made between NBRO and Pasbage Korale DS Division to carry out construction work, material transportation through the cemetery and 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.
12.3 Consent/ no objection/ legally bound agreement from the private land ownerships	
Land owner (Department of Sri Lankan Railway)	Signing a legally bound agreement between the land owners (Department of Sri Lankan Railway and Pendrose Estate Management) 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 8.

Table 8: 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								
Approval from SLR Submission of application Respond to comments Approvals								
Other approvals GSMB Ministry of Defense (Depends on the requirement)								
Consent/ no objection from the private land ownership (SLR and Pendrose Estate)								

13. 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).*

14. 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 9: 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, SLR, 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, SLR,AIIB	Meetings, District Coordination Committee, submission of relevant report to sign agreements, approvals and consents
iii. Monitoring reports (baseline and during construction)	District CEA, SLR, 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, SLR, 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, Divisional secretary, SLR, 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 10: 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
03/02/2020 @ 13.00 hrs	Way and Works Railway Department	Mr. H.M.K.W. Bandara, Deputy Chief Engineer (Project) Mr. E.M.S.P.K. Deegala, Deputy Chief Engineer (Track) Mr. D.W.N.Amarasena, Superintend Engineer (Design)

Annexure I: Images of the site condition and the consultation

	
Consultation with upslope estate workers house residents	*A house in the upslope unstable area*
	
Mr. W.Subaweera was made aware about the project – grocery owner	*Discussion at the Way and Works Railway Department*

Annexure II: Report on the Stakeholder Consultation: Kandy 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.	✓ Under the Soil Conservation Act 25 of 1951. of National Resource Management Centre, Kandy 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.
Way and Works Railway Department	Mr. H.M.K.W. Bandara, Mr. E.M.S.P.K. Deegala, Deputy Chief Engineer (Track) Mr. D.W.N.Amarasena, Superintend Engineer (Design)	✓ This area is under the jurisdiction of the Department of Sri Lanka Railway. ✓ The SLR has no objection and states the mitigation is very much needed. ✓ Detailed work plan and time schedules must be provided to the SLR by contractor before starting construction activities and keep good relationship between contractor, PMU and SLR. ✓ Other concerns raised • A safety officer or flag man of SLR is provided to each mitigation location by SLR. • Safety structures and sign boards will be provided by SLR. • He has all the responsibilities of the train schedules and stop train in emergency situations. • Workers must be followed his advices and guidance for safety issues. • Material transportation for locations which haven't other road access will be done by the according to the requests of the contractor • All the cost including railway material transportation, wages of the flagman and other resources from SLR should be bearded by the construction contractor. • A proper handing over of the project is required after the mitigation. • SLR will do the maintenance after mitigation. • It is emphasised that during the construction the contractor should use Personal Protective Equipment • At all times, the contractor shall provide safe and convenient passage for train transportation, 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 SLR for approval for implementation of landslide mitigation projects in SLR reservation areas**
   i. The design to be accepted by the SLR: The project implementing agency should submit detailed design report to SLR with a formal request on nature of approvals required. PMU should prepare above documents and should submit the documents to Way and Works of Railway Department.
   ii. Way and Works Railway Department will evaluate the proposal and may call for project briefing. The PMU should provide necessary briefing as appropriate
   iii. On the approval by SLR an agreement will be signed between SLR and Project implementing agency to access the site, erect structures, and implement mitigation works.
   iv. The conditions that would include is

   - A safety officer or flag man of SLR is provided to each mitigation location by SLR and safety structures and sign boards will be provided by SLR.
   - Material transportation for locations which haven't other road access will be done by the according to the requests of the contractor
   - All the cost including railway material transportation, wages of the flagman and other resources from SLR should be bearded by the construction contractor.
   - A proper handing over of the project is required after the mitigation
   - SLR will do the maintenance after mitigation
   - It is emphasised that during the construction the contractor should use Personal Protective Equipment
   - At all times, the contractor shall provide safe and convenient passage for trains, 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
TDSV Dias	Director/ ESSD/NBRO	Team leader
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
TGLA Chandrarathna	Technical Officer/ESSD/NBRO	Report Preparation

Annexure V: 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. Final list of total sites under group no 01 (Phase II – 120 landslide mitigation sites for Reduction of Landslide Vulnerability by Mitigation Measures Project (RLVMMP) – AIIB
6. Census and Statistical Report (2012), Department of Census and Statistics