REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES PROJECT

Site Specific Environmental and Social Management Plan

Site No. 44
Ginigathhena Town
Nuwara Eliya District

October 2019

Prepared for:

ASIAN INFRASTRUCTURE INVESTMENT BANK

Prepared by:

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Abbreviations

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

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 06 provinces of the country. The project requires to be implemented in accordance with environmental and social safeguards and mandates of the AIIB and that of Sri Lanka. Considering the nature of project actions and its implementation, an environmental and social management framework (ESMF) has been prepared as required by the AIIB environmental and social safeguard policy.

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

During the scoping exercise it was revealed that the environmental & social setting, and health & safety conditions are more site specific, and require to be addressed specific to site conditions. Therefore, the ESMF has recommended a site specific environmental and social assessments followed by Site Specific Environmental and Social Management Plans (SSE&SMP) for each site. The SSE&SMP gives planning, design, construction 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 **Ginigathhena Town** landslide mitigation site. This plan has been prepared by an in-depth environmental and social assessment to:

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

1.2 Intended users

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

2. Description of the project and site descriptions

2.1 Name of the project

Rectification of Site No 44, Nuwara Eliya District, Ginigathhena Town

2.2 Location details

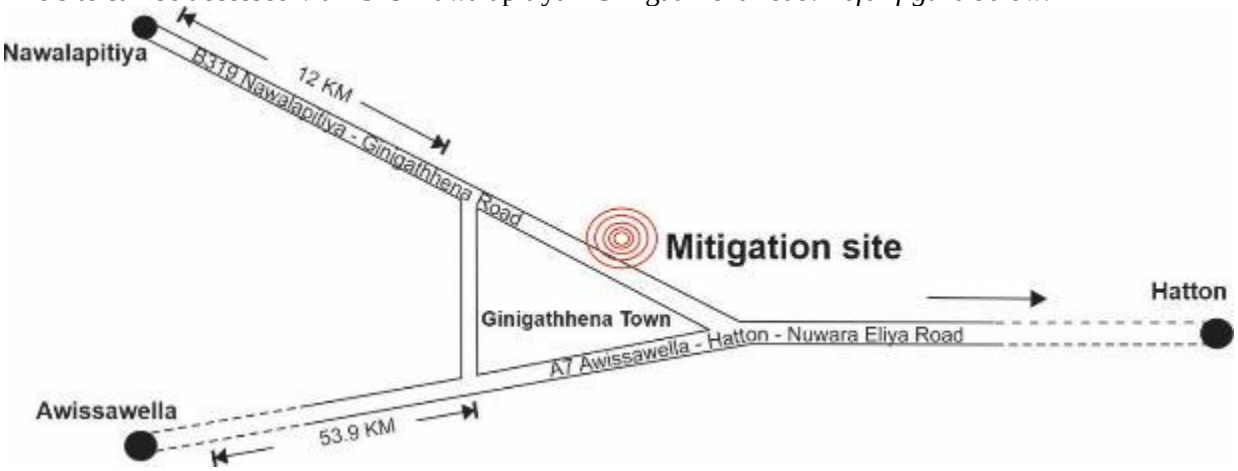
The proposed mitigation site falls under Ginigathhena GN division of Ambagamuwa DS division in Nuwara Eliya District of Central Province.

GPS references of the site – 6.984916667N and 80.48806E

Nearest town to the site – The site is located within the Ginigathhena Municipal Council limits. The next nearest town is Watawala, located 8.7 km away from the city.

Accessibility to the location

The site can be accessed via B319 Nawalapitiya - Ginigathhena road. *Refer figure below.*



2.3 Topography and land ownership

The proposed mitigation site is located at the left-hand side of the Nawalapitiya -Ginigathhena road, at the center of Ginigathhena town. The extent of the unstable slope area is about 1 acre with an inclination of about 30^0 -40^0. The land ownership of the proposed mitigatory site is RDA (reservation) and private.
Ref. Fig 1 for Google image of the proposed landslide mitgation site and sorrounding features and service infrastructure.

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

2.4 Meteorology of the area

Annual average rainfall – 3677 mm
Annual average temperature – 23.5 ^{0}C

3. Landslide hazard incident details

3.1 Account of incident

According to the information provided by the owner of the collapsed building, a landslide had occurred on 19th July 2019 with the heavy rainfall in the area. The main cause of the slope movement is poor drainage management resulted during the road expansion activity and congested development of town center with inadequate passages for conveying surface runoff. Further, the infiltrated rainwater from the upslope area of the road drain towards the retaining wall located at right hand side of the road. However, since the weep holes were closed by the building owner, no ways to drain infiltrated rain water. This also contributes into in collapsing two storied building. Total area affected by the landslide is about 6700$m^{2.}$ In the year 2004, a road failure had happened close to this failure while collapsing a wine store and reported a death. *Refer Fig 2: cross sections, land use, risk elements and the photographs of damages of the location.*

3.2 Effects and consequences of landslide

The recent incident (July 2019) had caused Mohamed Jamaldeen, 64 years old stationery shop owner, buried under the rubbles of smashed shop. Several grocery stores, vegetable stalls, two restaurants, a salon and shops were covered with earth following the landslide. The water supply lines were also damaged due to the incident. The movement had subsided, cracked the left-hand side of Ginigathhena –Nawalapitiya road. The Daily News on 19.07.09 reported the Ginigathhena - Kandy Road close to Ginigathhena Police and bus stand, had been completely closed after the incident for several days.

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

In 2016, the landslide expertise of the LRRMD of NBRO had inspected the site and categorized 58 shops and 5 houses at downslope are at risk condition and recommended immediate evacuation during rainy days. After the incident a bitumen tayer was applied on to the damaged road section as a temporary remediation.

3.4 Evacuations

The shop vendors of the damaged buildings were evacuated to another building after the incident

3.5 Resettlement (progress)

A resettlement plan has not been prepared for the households at the risk condition.

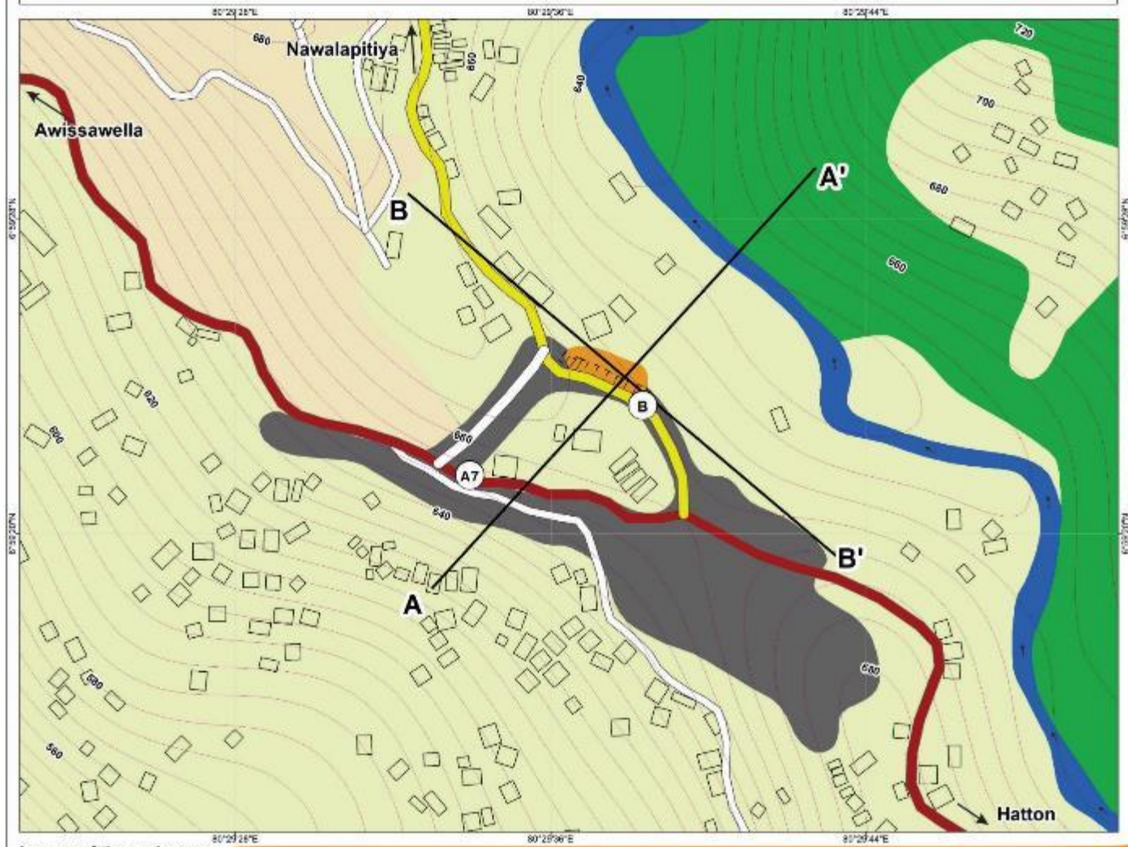
Location : Site No. 44, Ginigathhena town

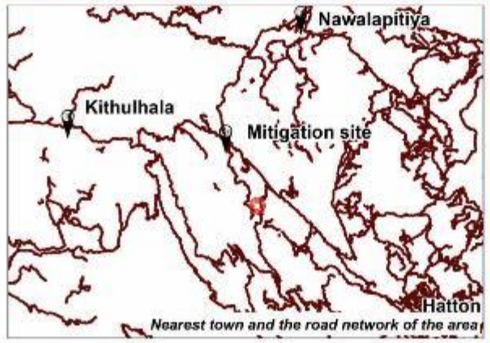
Location details

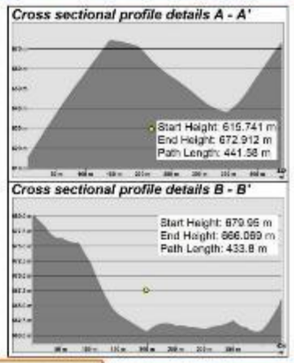
- GN Division : Helbodda
- DS Division : Kothmale
- District : Nuwara Eliya
- Province : Central Province

Landslide hazard infomation and terrain features

- Type of Failure : Cutting failur/slope failure
- Average area : 1 acre
- Potential damages : Building and road (58 shop and 5 houses)
- Land Use : Commercial buildings and residential area
- Natural fetures : Stream
- Land ownership : Privat







Images of the project area

Damaged commercial building and downslope area | Cracked road section | Another building (under construction) at downslope | Temporary constructed barrier to prevent water flowing | Upslope area of the road | Damaged road section

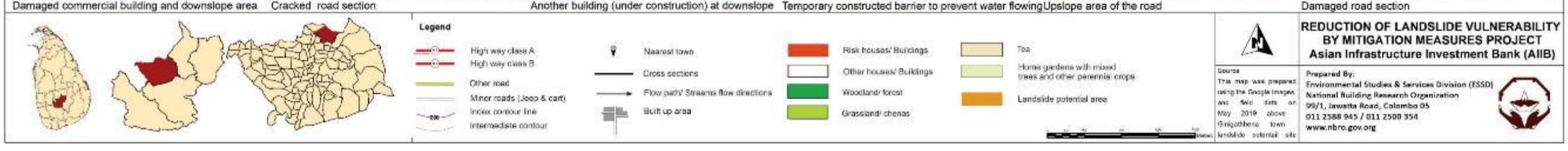


Figure 2: Google image, cross sections, land use, risk elements and the photographs of special features of the location

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 slope failure

The road subsidence and the building failure had happened in the Gingathhena city at the LHS of Ginigathhena- Nawalapitiya road. There were about 53 retail and business shops occupy either side of the road. They have been constructed in a limited congested space in a sloppy area. There were no storm water drainage lines. There are houses in the downslope area. Upslope of the road is a small hillock and the police station is located on that hillock. The water supply lines which supply water to the commercial buildings and downslope houses are laid along the subsided road. Sewerage lines are also laid under the unstable commercial buildings.

Figure 3: Appearce of the area before the incident. (source:Google street view)

Figure 4: Apperence of collapsed building complex before the incident (source: Google street view)

Figure 5: Area after the road failure (Source:Dailymirror on 19.07.2019)

4.2 Areas adjacent to the slope failure

The area adjacent to the road failure is a heavy buildup and a commercial area. Several public service utilities such as Ginigathhena bus station, police station, the market building complex, banks, supermarkets, tyre service station and small boutiques etc. are located within 100 m boundary to the failed location. There are several houses at downslope area and Mahaweli river is flowing at the toe area of the sope.
Refer Fig 2: Google image, cross sections, land use, risk elements and the photographs of special features of the location

4.3 Current level of risk

The experts of LRRMD/ NBRO has identified 58 shops located either side of the road as risk. If the area is not rectified to prevent future landslide;

- The occupants of the risk shops, their business activities and life would be at risk during rainy periods.
- It can affect the community living at downslope area.
- This may pose risks on the life of commuters and the people living in the area. As this is the connectivity road between Ginigathhena and Nawalapitiya the obstruction to traffic fleet may pose a significant impact on life line facilities, services and related economic activities and the transactions among these towns.
- Further subsidence may result sizable damage to the road and cost of remediation would be high.

5. Description of the works envisaged under the project

The proposed project aimed to ensure that the future landslides are prevented. The proposed mitigation works will be largely concentrated on already failed area and road reservation area. Therefore, construction of a retaining wall, soil nailing, surface and sub-surface drainage improvement will be implemented as the mitigation.

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

Following sensitive elements will be at risk due to project actions;

i. The people in the risk shops besides the road, their properties and the business activities
ii. Ginigathhena Nawalapitiya hatton road and its users
iii. Water supply, sewerage and waste water lines
iv. Houses, residents and their livelihood activities in downslope area

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

Figure 6a: Risk shops besides the road

Figure 6b:Downslope area and risk houses

Figure 6c: Ginigathhena-Nawalapitiya road section

Figure 6d: Water supply lines (alredy damaged due to the incident)

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

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

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

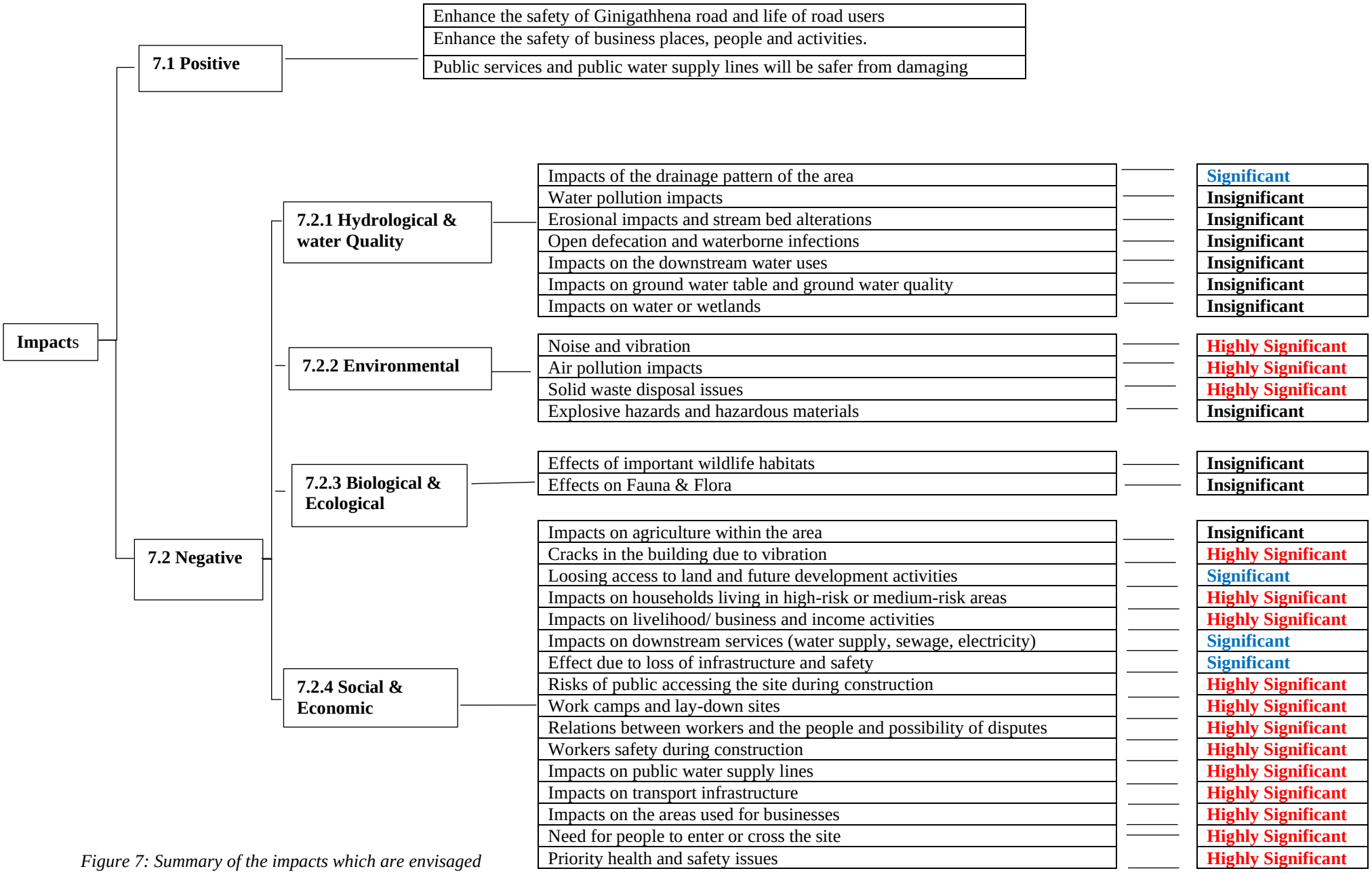


Figure 7: Summary of the impacts which are envisaged during project

7.1 Positive impacts

- The Ginigathhena Nawalapitiya road is the only access road between Ginigathhena and Nawalapitiya area and it is highly utilized for transport good and also local and foreign tourists. The mitigation work will ensure the safety of road users and tourists during rainy season.

- The objective of this project is to ensure that further failure of buildings and road subsidence in Ginigathhena Nawalapitiya road are prevented to an acceptable level. The improved slope stability with the proposed structural mitigation will enhance significantly the safety of neighboring business places and their business activities currently at risk.

- The water supply lines running along the road will be safe from getting damaged and discontinuing supply by future failures.

7.2 Negative impacts

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

Table 1: Negative impacts and their level of significance

Impacts during construction period	**Level of Significance**
7.2.1 Hydrological and water quality impacts	
7.2.1.1 Impacts of the drainage pattern along the road Disruption of existing surface and sub-surface drainage pattern along the road is envisaged due to the removal of soils and diversions of existing drainage and surface runoff flow paths. Concreted paved small drainage network is existing along the road specially in mitigation area. Due to diversions, cut-off drains and increased sub-surface drainage, the downslope area will have increased flows at higher velocities in rainy periods.	**Significant**
7.2.1.2 Water pollution impacts There are no water streams within the 100m boundary to the mitigation site, however, construction during rainy periods may carry storm water with contaminants to Mahaweli River located further downstream.	Insignificant
7.2.1.3 Erosional impacts and stream bed alterations Erosional impacts and stream bed alteration**s** are not significant as there are no water streams very close to the mitigation site.	Insignificant
7.2.1.4 Open defecation and waterborne infections As the site is located within a highly congested urban area possibility of open defecation is low.	Insignificant
7.2.1.5 Impacts on the downstream water uses There are no water streams close to the mitigation site	Insignificant
7.2.1.6 Impacts on ground water table and ground water quality Due to the mitigatory activities carried out in the slope area, the ground water table will not be tended to draw down.	Insignificant
7.2.1.7 Impacts on water or wetlands There are no water streams close to the mitigation site	Insignificant
7.2.2 Environmental Impacts	

7.2.2.1 Noise and vibration impacts The noise generated from the machinery will disturb the nearby business community, commuters and pedestrians. If heavy machinery is operated the vibration can affect the buildings. As a result, structural deformations such as cracks and collapse of walls etc. may happen.	**Highly Significant**
7.2.2.2 Air pollution impacts Potential impacts on the air quality will be due to the fugitive dust and the exhaust gases generated in and around the construction site due to vehicular movement and site clearance, storage and handling of construction materials such as sand, cement, etc. As shops and moving vehicles with passengers and pedestrians are in the close proximity to the mitigation location, the effect is highly significant to them if heavy air polluting activities are carried out during construction phase.	**Highly Significant**
7.2.2.3 Solid waste disposal issues Poor management of solid waste such as litter, food waste, and construction waste during the construction phase may lead to create inconveniences to shop owners, pedestrians and commuters. They can block the drains to make breeding grounds for water borne refection vectors and pathogens peril. Waste can pollute the soil, and leave various environmental impacts if proper disposal mechanism is not in place during the construction period.	**Highly Significant**
7.2.2.4 Explosive hazards and hazardous materials The area has no large rock boulders, explosives may not be used for rock blasting.	Insignificant
7.2.3 Biological / Ecological Impacts	
7.2.3.1 Effects of important wildlife habitats There are no forested/ wild-life reservation areas within the project influence area with high biodiversity, or habitat fragmentation.	Insignificant
7.2.3.2 Effects on Fauna & Flora There are no fauna and flora which are endemic, threatened and identified in the red list of IUCN within the project influence area.	Insignificant
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 Several commercial buildings are located in the proximity of the mitigation site. It includes restaurants, groceries, fruits and vegetable shops, saloons and other commercial buildings. During the construction heavy machinery will be used and the vibration can cause cracks in these buildings**.** Vibration can affect the stability of the nearby buildings immediate to the mitigation site.	**Highly Significant**
7.2.4.3 Loosing access to land and future development activities There will be impacts to the land owner Mr. Fernando with regard to loosing access to his house, future development activities or loss to valuable uses due to moving machinery, material storage and construction activities.	**Significant**
7.2.4.4 Impacts on livelihood/ business and income activities There is a significant impact on livelihood, business and income activities of the nearby shops during the construction period.	**Highly Significant**
7.2.4.5 Impacts on service provision (water supply, sewage, electricity) The public water supply lines are laid along the subsidised road. The construction works, moving machinery will certainly damage these lines.	**Significant**

7.2.4.6 Effect due to loss of infrastructure and safety During construction phase, the access road of the downslope houses will be obstructed by frequently moving machinery, loaders, trucks etc. as the access road is narrow. This can obstruct the road and create traffic congestion.	**Significant**
7.2.4.7 Risks of public accessing the site during construction Excavation machineries, loaders, trucks etc. will be used in the mitigation area where pedestrians are moving. Site may use high voltage power for operation of certain machinery. Construction may use materials such as metal aggregates, steel etc. which can be injurious under improper storage and handling. The public will be attracted to these machineries, materials and may even enter the site without proper awareness of the site staff. Ignorance of entry of public and careless operation of machinery can cause fatal injuries and accidents to public.	**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 pedestrians / commuters/ business community/ 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 nearby business community and road users as indicated below. • Cause nuisance to smooth operation of business activities • Unauthorised entry into mitigation site • Tempting nearby persons towards offensive deals • Informal form of child labour • Use of sanitary facilities of business places the workforce Further, the proposed mitigating sites are located close to the road reservation there will be labour nuisance form construction activities. 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. 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 Exposure of public to noise and dust pollution Noise impact is significant as the construction is carried in the proximity of the town. General public may get expose of high noise as well as dust environment during machinery operation. The exposure on public to noise and at site if the noise and dust generation activities are carried out during school hours.	**Highly Significant**
7.2.4.12 Impacts on public water supply lines due to construction During the construction period, the public water supply lines may be affected because they are running along the road section to be mitigate. Introduction of surface drains and sub-surface drains may result the dislocation of water supply lines path.	**Highly Significant**
7.2.4.13 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 passengers of Ginigathhena Nawalapitiya road during the construction period. The traffic due to full/partial road closure may obstruct the smooth flow of vehicles during the week days and peak hours (in morning, day time and evening). This will cause nuisance to pedestrians and commuters. This is a short-term impact which only for construction phase.	**Highly Significant**

7.2.4.14 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 public safety, noise and vibration impacts, and cracks in buildings. Mainly houses are not located within the mitigated area, but there are houses at the downslope area of the road. The shops and commercial buildings are located adjacent to the site. The occupants of them would be affected by noise and vibration during the construction phase.	**Highly Significant**
7.2.4.15 Areas used for businesses, agriculture or other within the area to be remediated or immediately adjacent to the site There were shops used for business, within the area to be remediated. During the construction phase, all the unstable buildings will be removed. There will be a significant impact to the building owner and shop owners due to lose of their income source. There are areas used for business and other commercial activities immediately adjacent to the hence has significant impact during the construction phase. But specific agriculture practices are not in the nearby area.	**Highly Significant**
7.2.4.17 Need for people to enter or cross the site There is no special need for children and the staff to enter the site for other purposes. However, unauthorised entry of students and 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.	**Highly Significant**

8. Significant Environmental and Social Impacts

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

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

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

8.2Child labour & forced labour

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

9. Environmental Social Management Plan (ESMP)

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

9.1 Resettlement action plan

There is no project-based resettlement in this site. There are occupied houses in the downslope area continue living in the same location. These 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.

9.2 Evacuation of people

There are occupied houses located in the downslope area of the affected road and other business places are located within 100m boundary of the mitigation area. If there can be a possible risk of staying in houses and shops during construction phase. Therefore, temporary evacuation is recommended only during the construction phase.

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

There are damaged structures of the building and water supply lines must be removed. The consent from the owners and national water supply board for removed or relocated them safely.

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

It may require to compensate for the losses occurred due to damaging the water supply lines due to project actions. Also, it may require to provide alternative water sources to maintain discontinuous water supply of the residents of the houses in the downslope area and business places nearby.

9.5 Public awareness and education- needed for following areas

Programs to inform and educate people in the vicinity about the risks posed by landslide specially the occupants of the risk houses in the area and the users of the playground.

9.6 Design based Environmental/ Social Management considerations

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

Table 2: Design stage Environmental & Social considerations

Design feature	Recommended level of consideration for this site
i. Natural resource management and resource optimized designs Project specific designs should be considered 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.	Low
ii. Site Planning During site planning it is necessary to be cautious on possible re-activation of slope failures or road subsidence and generation of debris. Hence vehicle parking sites, material storage and temporary shelters etc. should not be installed in the danger zones of the slides.	High
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.	Low
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 houses at downslope area.	High
v. Interruption to water supplies The public water supply lines running in the mitigated area supply water to downslope houses and business places. The chance the water lines can be affected by the mitigation work is high due to possibility of damaging the water lines during mitigatory activities. 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.	Very High

vi. Aesthetically compatible design considerations The designs in aesthetically sensitive environments should consider structures that blend the road reservation with hilly landscape with natural environment to improve the aesthetic appearance by keeping the visual pollution to minimum. Service of landscape architect may be important for the design of suitable mitigation structures.	High
vii. Consideration of green environmental features It is recommended to consider green environmental designs as much as possible in the designs e.g. use of local vegetation species for erosion control, combination of plants to sustain species diversity in the environment, avoiding inclusion of potentially invasive species & etc.	High
viii. Workers/ commuters and community safety Activation of slide may occur during construction phase and may pose threat to workers, occupants of the risk houses, business community and road users. Therefore, design-based safety consideration such as berms, safety nets etc. should be considered.	Very high
ix. 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.	Low
x. Low post maintenance and operation designs The mitigation should consider passive techniques such as gravity drains for drainage management. Correct pipe diameters, pore diameters and laying angles should be considered to avoid clogging of drains. Low maintenance structures and designs such as designs to withstand erosive forces, sediment trapping systems etch should be considered if drain water is expected be directed to natural streams. The materials used for structures and should be chosen carefully so as to withstand weather conditions with high durability. Designs should specially consider corrosion prevention techniques if steel structures are used.	High

9.7 Mitigation of impacts during the construction phase

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

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

Table 3: Contractor requirement to comply with ES & HS

Reference No. as per construction contractors 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 (road reservation, community nearby)

2002.2 3)	Cracks and damages to the buildings	Highly relevant (risk houses, buildings)
2002.2 4)	Disposal of waste	Relevant (road reservation)
2002.2 5)	Disposal of refuse	Highly relevant (road reservation)
2002.2 6)	Dust control	Highly relevant (road users, community nearby)
2002.2 7)	Transport of construction materials and waste	Highly relevant (pedestrians, commuters, road reservation)
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	Relevant
2002.2 16)	Disruption to public	Highly relevant (road users, community nearby)
2002.2 17)	Utilities and roadside amenities	Highly relevant (shops, water supply lines)
2002.2 18)	Visual environment enhancement	Highly relevant (road reservation)
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 (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

9.7.2 Site Specific mitigation

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

Table 4: Site specific ES & HS mitigation measures

Mitigation item	**Project implementation phase**	**Responsibility**

i. Minimize erosional impacts during construction It is recommended that mitigation works involved with site clearance, slope reshaping, removal of debris etc. are avoided during rainy season. Therefore, it is imperative that site works in mitigation are carried out in the dry season and avoid such activities on unstable area in the wet season as much as possible. This should be considered in project planning stage. Silt traps should be introduced to cut down sediment laden runoff.	Site preparation & construction	Construction Contractor
ii. Planning project activities As contractor has to operate some mitigation actions within the road reservation area, he should carefully prepare a plan for management of construction activities. This should include careful selection of material storage as vehicle parking, mixing of concrete, cleaning activities etc. which considering the safety and optimization of the road reservation. The contractor should discuss scales of project operations with a time plan and should make the RDA and Ginigthhena Police adequately aware on the construction plan. Necessary adjustments to the plan should be made after discussing with the RDA in order to minimize the disruption to transport activities of the road with special attention to minimizing nuisance to during peak hours etc.	Site preparation & construction	Construction Contractor
iii. 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
iv. No Entry Zone The PMU should make a detailed assessment on possible risk of slope destabilization in the site during construction phase. No entry zones may require to be declared. This should be made adequately documented and communicated to the contractor. Also mitigate the risk of accidents from moving vehicles operational machinery construction activities, electrical leakages etc. should be given high priority in the health and safety management plan especially considering potential high risk on using the road. Proper safety measures should be included with warning signs and permanent trained watchmen. Sign boards indicating road instability risk are strongly recommended at this site.	Construction	E & S Unit of PMU contractor
v. Noise and vibration control The noise and vibration generating activities may disturb to the smooth flow of the activities of the road and other activities of the town. Vibration generating activities should be done within the prescribed limits to avoid damage to structures. Cracks in the buildings should be monitored before, during and after completion of the project. Suitable compensation should be made if damage cracks due to construction work occur in the buildings.	Construction	Construction Contractor
vi. Disposal of construction waste The contractor should pay special attention with respect to disposal of construction waste. This site is located within a road reservation area very close to an urban center. 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 road sides or downslope residential areas.	Site preparation & construction	Construction Contractor

vii. Dust and aerosol control screens The Ginigathhena town center is located adjacent to the proposed mitigatory site and Ginigathhena Nawalapitiya road is running through the mitigation area. Therefore, dust particles generated during the construction period can influence the users of the road. The risk business places and houses at downslope in the affected 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
viii. Water for construction Water for construction works should be obtained only from the approved sites.	Construction	Construction Contractor
ix. Priority Health and Safety Issues As the workers in the site have to work in high risk conditions, it is imperative to implement recommendations given in section 2003 of contractors' obligation on ESMP under "working conditions and community health and safety". These recommendations should be followed carefully in a proper organization and safety monitoring system. i. Additionally, work should be discontinued for sufficient time period during rainy period as working on unstable slopes will be highly risky in the rainy season. ii. A good warning system and fulltime watchmen is highly recommended for this site for both worker and commuter safety.	Construction	Construction Contractor
x. Interruption to community water supply lines There is main public water line currently running along the damaged road and it was also damaged. They need to be installed properly without being affected during the construction phase. Necessary arrangements should be taken to provide alternative water supply in case of an interruption to water supply. The water users should be consulted during project mobilization to inform the requirement to shift the water lines to a safe location.	Construction	Construction Contractor
xi. Impacts on 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 the road is busy road, 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.	Construction	Construction Contractor
xii. Working hours 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.	Construction	Construction Contractor
xiii. Need for people to enter or cross the site Possible unauthorized access to the site should be avoided by awareness, warning signs and vigilance by the contractor's full time watchmen.	Construction	Construction Contractor
xiv. During construction good housekeeping should be maintained to minimize visual pollution	Site preparation & construction	Construction Contractor

xv. Workers code of conduct Possible disputes between the labor force and the neighboring community 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

9.7.3 Monitoring requirements specific to the site

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

Table 4: Environmental and Social monitoring plan; construction phase

Monitoring requirement	**Parameters**	**Frequency**
i. Baseline monitoring	Water quality	-
	Pre crack survey for the neighbouring buildings	Once*
	Ground vibration	Once*
	Air quality: particulate matter	Once*
	Background noise measurement	Once*
ii. During construction	Water quality	-
	Crack survey for the neighbouring 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	**Stream water quality** – Comparison with ambient water quality standards published by the CEA, 2017 **Pre crack survey of the risk buildings**-Professional report **Ground vibration**-as per The interim standards on vibration for the Machinery, Construction activities and Vehicular movements, CEA **Background noise measurement** –Extraordinary Gazette No.924.1, May 23,1996, CEA **Air quality particulate matter**- The National Ambient Air Quality standards stipulated under the Extraordinary Gazette, No. 1562/22 August 15, 2008 -Central Environmental Authority of Sri Lanka.	

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

10.1 Public Consultations

Mr.M.B.S. Fernando, the owner of the collapsed building, was consulted during the field visit. He explained previous incident, deaths, damages and the current situation of the incident. He was made aware of the mitigation project and the funding mechanism. He expressed his willingness to the project and to give full support to the project.

10.2 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 mitigation project and he explained the regulatory mechanism related to environmental regulations for the project.

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

Requirement / Approval / Institution	Relevance to the project
11.1 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 project will obtain the approval from the planning committee of the Ginigathhena Municipal Council
11.2 Approval from the state lands owners relevant to the project	
Road Development Authority	The relevant agency is RDA as part of the project actions (machinery transportation, parking) are taking place on the road. Necessary agreement will be made between NBRO and the RDA to carry out construction work.
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 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).
Ginigathhena Municipal Council	Approvals from Ginigathhena Municipal Council 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.

11.3 Consent/ no objection/ legally bound agreement from the private land ownerships	
Land owner (RDA/Private owners)	Signing a legally bound agreement between the land owners (RDA and Mr.M.B.S. Fernando) 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 5.

Table 5: 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 of Ginigathhena Municipal council Submission of application Project briefing Respond to comments Approvals								
Approval from RDA Submission of application Respond to comments Approvals								
Other approvals GSMB Ministry of Defense (Depends on the requirement)								
Consent/ no objection from the land ownership								

12. Grievance redress mechanism for this site

The PMU ES officer is responsible for establishing the grievance redress mechanism for this site for impact communities; occupants of the neighbouring business places, commuters and pedestrians of Ginigathhena Nawalapitiya road *(Reference: Environmental and Social Management Framework for recommended procedure for establishment of grievance redress mechanism).*

13. 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 6: 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, Divisional secretary, Police, 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, Police, 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 7: 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 Environmentl Authority Central Province

Annexure I: Images of the site condition and the consultation

Consultation with Mr. Fernando; collapsed building owner

Consultation with fruit stole owner near to the mitigation site

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

Landslide specialists of NBRO inspecting the site

Annexure II: Report on the Stakeholder Consultation: Nuwaraeliya 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.	✓ Landslide mitigation projects are not considered as prescribed projects in the Gazette Extra-ordinary No. 772/22 of 24th June 1993 and its subsequent amendments ✓ As the project intends to reduce the risk from landslides for an emergency action, CEA approval is not needed considering the priority of the project ✓ The Basic Information Questionnaire (BIQ) is needed to fill for the project and submit the application ✓ Before project commence request indicating the list of mitigation sites needed to be submitted to CEA and CEA inspects the sites and consent will be given ✓ Under the Soil Conservation Act 25 of 1951 of National Resource Management Centre, Kandy District has been gazetted as a sensitive area ✓ If the project is carried out in a sensitive area, even not a prescribed project, the sensitive area will govern the process.

Annexure III: Study team

Name	Designation	Position in the study
TDSV Dias	Director/ ESSD/NBRO	Team leader
SAMS Dissanayake	Senior Scientist/ESSD/NBRO	Senior Environmental Scientist
P 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 IV: List of references

1. NBRO – LRRMD landslide hazard investigation report on Ginigathhena
2. Contractor's obligations for Generic Environmental and Social Management Plan- Sri Lanka Landslide Mitigation Project-AIIB
3. Environmental and Social Management 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. Resettlement Planning Framework- Sri Lanka Landslide Mitigation Project –AIIB
7. http://www.dailymirror.lk/ One-killed-in-landslide-in-Ginigatthena:-10-Shops-destroyed/108-171384