REDUCTION OF LANDSLIDE VULNERABILITY BY MITIGATION MEASURES PROJECT

Site Specific Environmental and Social Management Plan

Site No. 177
Maternity Clinic Premises - Bambaragama
Kegalle District

December 2024

Prepared for:

ASIAN INFRASTRUCTURE INVESTMENT BANK

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Abbreviations

AIIB	Asian Infrastructure Investment Bank
CEA	Central Environmental Authority
DFC	Department of Forest Conservation
DS	Divisional Secretary
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
RHS	Right Hand Side
LHS	Left Hand Side

1. Introduction

1.1 Project overview

The Government of Sri Lanka has received a loan from the Asian Infrastructure Investment Bank (AIIB) for mitigating/rectifying unstable slopes in high-risk areas especially in 13 districts of 06 provinces of the country under the Reduction of Landslide Vulnerability by Mitigation Measures Project (RLVMMP). 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 the 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 minimal.

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

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This is the site specific environmental and social management plan for **Maternity Clinic Premises - Bambaragama** mitigation site under the RLVMMP project. 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 the landslide mitigation design team, the PMU, and the contractor in the implementation of the Environmental and Social Management component of the project. The SSE&SMP is published on the project website (https://rlvmmp.lk/) and can be viewed by a 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. 177, Kegalle District, for **Maternity Clinic Premises - Bambaragama**

2.2 Location details

The proposed mitigation site falls under 66-A Bambaragama GN division of Galigamuwa DS division, Kegalle District, Sabaragamuwa Province.

GPS references of the site – 7.2005175°N and 80.3138164°E

Nearest town – Galigamuwa
Accessibility to the site – Galigamuwa town is about 6.1 km from the site. The mitigation site can be accessed via Galigamuwa Ruwanwella road *(Ref. fig. 1).*

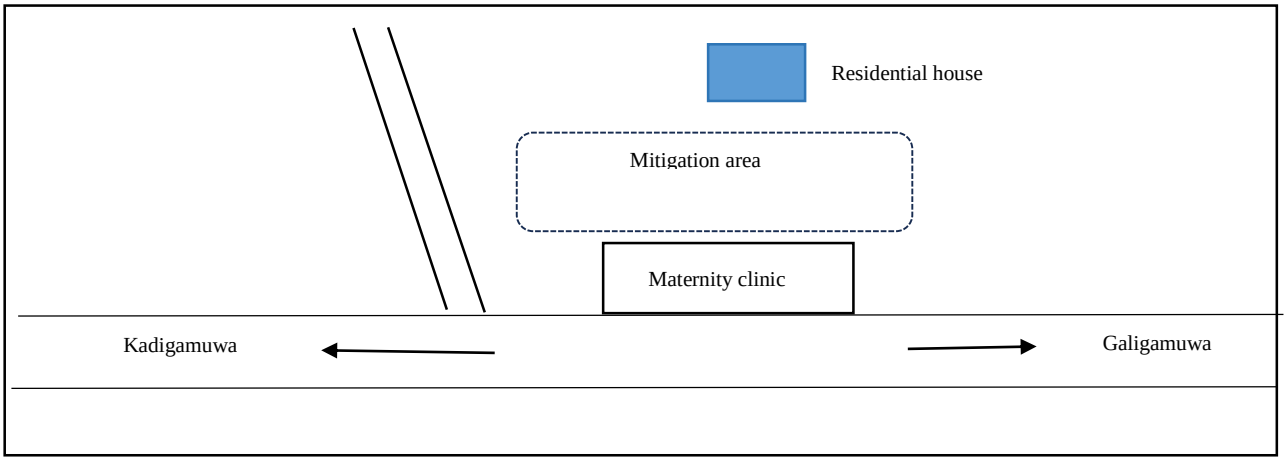

Figure 1:Road map showing the accessibility to the site

2.3 Topography and land ownership

The proposed mitigation site is located within the maternity clinic premises and neighbouring home gardens in Bambaragama village. The elevation of the area is 217 m (Source: https://mapcarta.com). The extent of site proposed to be mitigated is about 245 m^2. The unstable areas are located in sloppy terrains where the natural slopes have been cut for the construction of maternity clinic building and nearby houses. The land ownership of the maternity clinic premises is Ministry of Health and other lands are belonging to private owners. *Refer figure 2; Google image of the proposed landslide mitigation site, the surrounding environmental features and service infrastructure.*

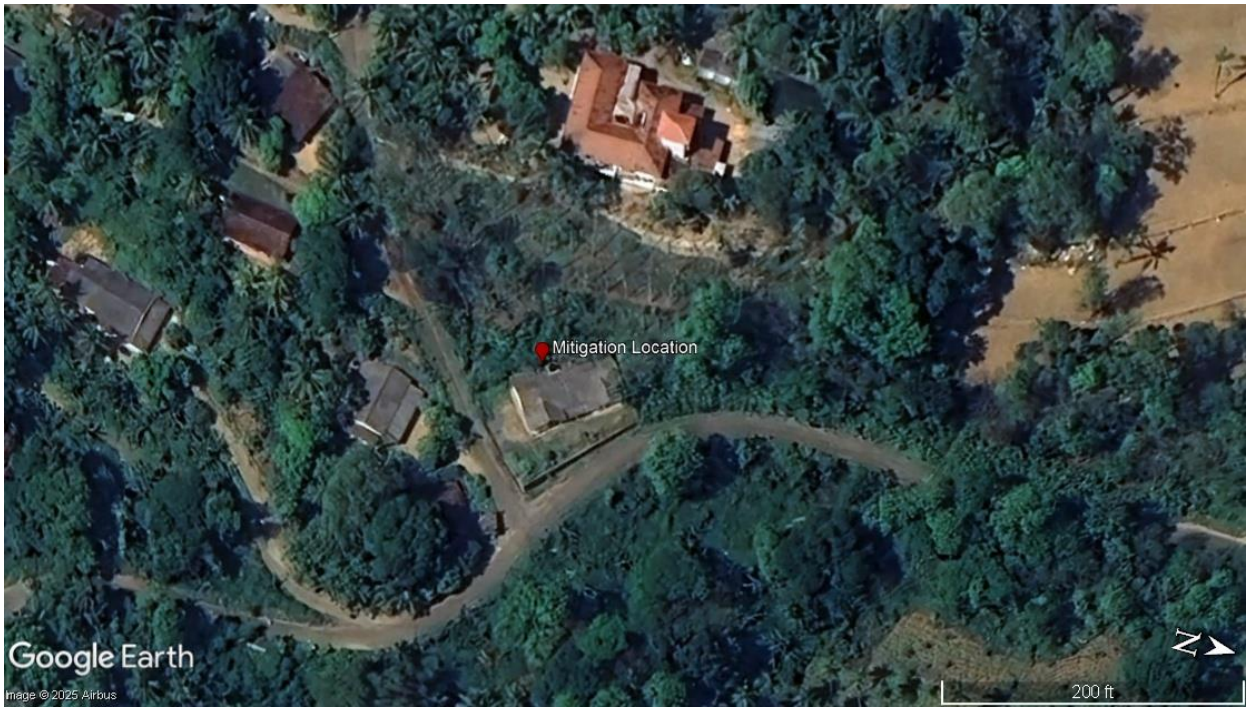

Figure 2: Google image of the proposed landslide mitigation site, the surrounding environmental features and service infrastructure.

2.4 Meteorology of the area

Annual low rainfall - 76 mm
Annual high rainfall - 370 mm
Annual high temperature - 34ºC
Annual low temperature - 30ºC
(Source: https://weatherandclimate.com)

3. Landslide hazard incident details

3.1 Account of incident

A ground instability and the slope failures have reported in year 2021 and latest incident was reported in March, 2024 with the heavy rain fall to the area. With the slope failure, areas adjacent to the maternity clinic building and some neighboring houses had damaged. The dislodged soil mass and rock boulders had accumulated towards the maternity clinic building. According to the villagers, the main reason of the earth instability was cutoff and removed the rubber plantation in the up slope private land area and this caused the rainwater drained on the ground directly (*Refer Fig 3: cross sections, land use, risk elements and the photographs of special features of the location*).

3.2 Effects and consequences of landslide/ slope failure

Pieces of rocks and soil mass had moved down and collapsed rocks, soils/debris had extended towards rear side of the maternity clinic building. At present, a large block of moved soil mass is resting at the rear side of the maternity clinic building.
The windows and the roof of the building were broken due to the incident. There were no causalities, injuries to the people. NBRO preliminary field investigation report (NBRO/LRRMD/KG/GLP/LI/2021/00033) has identified two medium risk houses and four low risk houses with the slope instability. Minor damages were recorded for low risk houses while the damages in medium risk houses were somewhat higher. The names and the contact details of the risk house owners were recorded in the report.

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

According to the request of the Galigamuwa Divisional Secretary, a preliminary field study by the Scientists of the National Building Research Organisation was conducted in July 2021. Accordingly, taking into account the risk situation and the emergency situation at the place, recommendations for emergency response were issued through NBRO report No.NBRO/LRRMD/KG/GLP/LI/2021/00033 dated July, 2021. This preliminary geotechnical report presents the long-term and short-term recommendations to minimize the risk condition to this location.

3.4 Evacuations

All the health related services and programmes had been stopped at this maternity clinic building due to the risk since 2021.03.18. The building was abandoned and the residents of the risk households were not evacuated. The programs of the clinic center has been transfer to Harigala clinic center and Dematanpitiya central dispensary. Samurdhi bank has been move to Pitagal deniya bank building and other office have been moved to GS office, Bambaragama.

3.5 Resettlement (progress)

There is no requirement of project-based resettlement programme for this site.

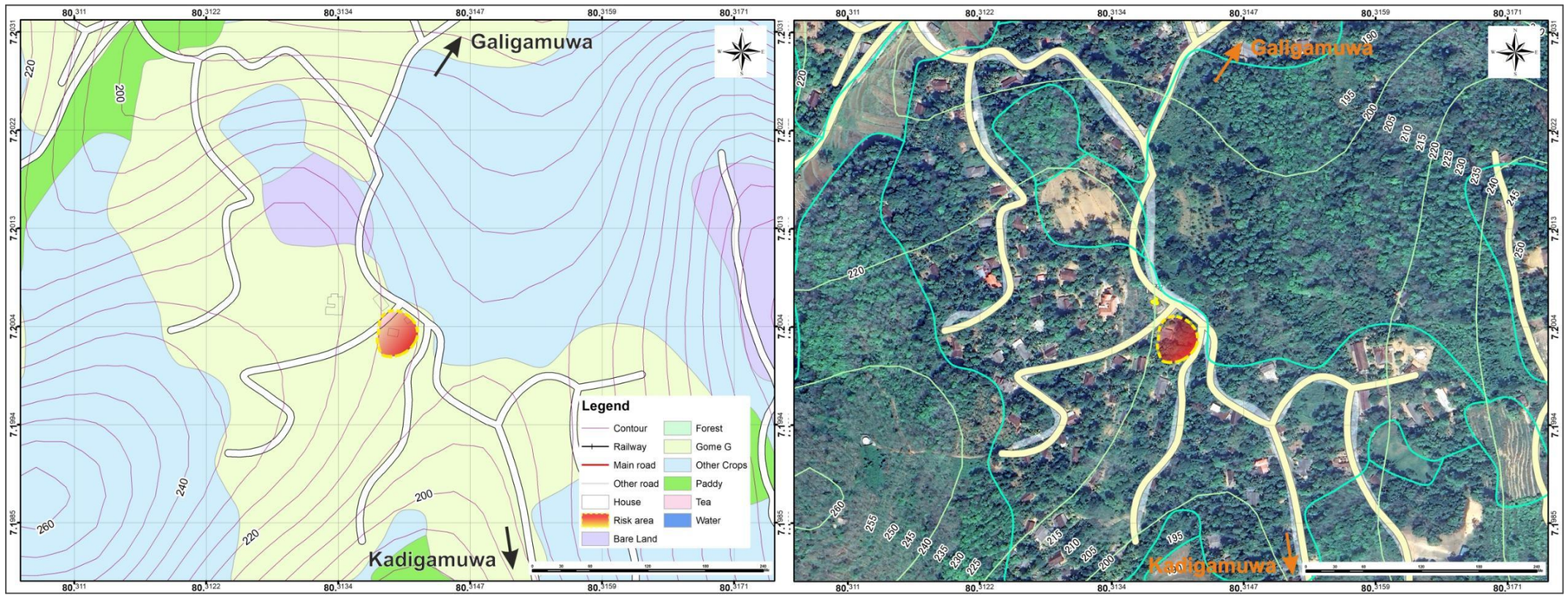

Figure 3: Google image, cross sections, land use, risk elements and the photographs of special features of the location

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 / slope failure

The areas of the slope failures and potential cut slope failures are located in the village named Kadigamuwa, Pitagaldeiya in Bambaagama GN division in Galigamuwa Divisional Secretariat area in Kegalle District. The slopes had been cut to provide space to build a government building. The building is one storied building, made of bricks and roof is made by asbestos roofing sheet.
The government building had provided room to function government offices in the village. The Grama Niladhari office, Development officer's office, Samurdhi Bank and village Information Technology center called "Nanasala" were not functioned in this building.

The maternity clinic building at Bambaragama village was established on 14th of November 2014 and the first maternity clinic was conducted on 24th of February 2015. A population of Bambaragama GN division (1333) and people from nearby villages such as Monaragala, Kadigamuwa, Bambaragama, Atugoda, and Pahalagama were the beneficiaries of this building. Monthly maternity clinics, Child weight measuring clinic, Vaccination programs, Heath promotion and awareness programs were conducted at this building. Further, the other government offices provided all the government related functions to the villagers. These functions are currently not operating in the building and it shows broken down and neglected condition and only.
(Refer Fig.3 Google image, cross sections, land use, risk elements and the photographs of special features of the location)

4.2 Areas adjacent to the slope failure

The up slope of the unstable area was initially a coconut plantation and then it was converted into a rubber plantation. Then the building was built after uprooting the rubber trees. The down slope area is consisted with a road and homestead-gardens. Home garden tree species like jack, mango, Arica-nut, pepper, coconut can be seen in the down slope area.

The surrounding area of the unstable slope section contains homestead gardens and abandoned lands. The house of Mr. Saman Jayasinghe is located adjacent to the slope failure to the up slope. The further up slope area of the unstable area is consisted with dense vegetation area. Down-slope area of the school premises is bounded by Galigamuwa – Waduradeniya road (*Refer Fig 3: Google image, cross sections, land use, risk elements and the photographs of special features of the location*).

4.3 Current level of risk

The unstable slope section which has already failed will be at risk of future failure due to recurring extreme precipitation events. If the maternity clinic building is function, it imposes a high risk on the pregnant mothers, infants, children, and staff of the health sector and other government officers, their beneficiary peoples and also nearby residents of the area. Further, the neighboring houses and people will be at risk with the future failures.

If the site is not rectified to prevent future failures, the slope failure with soil masses would disturb all functions of the clinic and government institutions. As this is important government office complex and health clinic in the area, the risk of slope failures may pose a significant impact to the area.

5. Description of the works envisaged under the project

The proposed project aims to ensure further progressive slope failures are prevented. Therefore, preventive measures such as removal of soil mass and rock boulders, reshaping, construction of retaining walls, soil nailing, surface and subsurface drainage improvements will be used.

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. Maternity clinic building and furniture
ii. Households with residents nearby
iii. Galigamuwa – Waduradeniya road
iv. Current services and economic activities of the area
v. Floral characteristics of the site

(Ref. Fig.4 Sensitive elements that may be affected by the project actions)

Figure 4a: Abandoned maternity clinic building

Figure 4b: Fallen rocks and soil debris to the rear side of the building

Figure 4c: Damaged roof of the building

Figure 4d: Up slope of the maternity house viewed from Saman's house

Figure 4e: Up slope of the building and Mr Saman's house located in up slope

Figure 4f: In-front of the Maternity house and adjacent road

Figure 4: Sensitive elements that may be affected by the project actions

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

7.1 Positive impacts

- The objective of this project is to ensure that further slope failure in this area are prevented to an acceptable level.
- The maternity clinic, GN office, DO office and Samurdhi bank are operated in different locations under the Galigamuwa divisional secretariat office. Therefore peoples who are get the services from those office have to travel more distance than previous to get there services.
- With this project, the slope stability will be ensured and no slope failure would occur during high rainfalls.
- The maternity building can be occupied and can be functioned for maternity clinic, GN office, DO office, Samurdhi bank after repairing the damaged windows, roof of the building, and confirming the structural stability of the building for safe use.
- This will reduce the people facing in difficulty in walking distances for getting the services
- Further, pregnant mothers, infant children, heath sector and government institutions staff and their beneficiaries will be safe by this mitigation project.
- Houses identified as moderate risk will be safe, their home gardens and their cultivation will be protected.
- Additionally, Galigamuwa – Waduradeniya Road will be protected. Moreover, it will enhance the safety of pedestrians, commuters and vehicles who use the road.
- Minimize the soil degradation and siltation from future landslides and slope failures
- Prevent the interruption to day today activities of the occupants, travelers and government institutions of this area

7.2 Negative impacts

The mitigation works are generally confined to already failed land areas and unstable areas. 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 Disruption to existing surface and sub-surface drainage pattern in the area is envisaged with the project implementation. The mitigation works in this site will focus on the drainage improvement. Therefore, during rainy season heavy flow of water is expected to be generated and would be accumulated between the building and the slope. The water inundation of the existing drainage may be expected. Increase of water through the unstable slope may intensify the risk of slope failures of the unstable section.	**Significant**

7.2.1.2 Water pollution and impacts on surface water quality During the slope excavation, removal of debris can generate high sediment laden runoff there could be a possibility that contaminated runoff may pollute the water within the drains and the streams. Improper disposal of oils and other harmful substances/contaminants from machinery, leakages from temporary storage tanks, solid waste and wastewater disposal/dumping could occur causing adverse impacts on quality of the water. However, during rainy season, the rainwater running through the disturbed slope tends to pick up sediment, oil and other pollutants generated during construction can contaminate the water in the streams. Since there are no water streams close to the site, water pollution impact will be insignificant.	Insignificant
7.2.1.3 Erosional impacts and stream bed alterations The project activities will open the slope for surface erosion during the construction phase. The existing surface and sub-surface drainage pattern in the area will be disrupted during construction phase. Therefore, the erosional impacts are significant. The mitigation works in this site will focus largely on the drainage improvement. Therefore, during rainy season heavy flow of water is expected to be generated to enter the natural stream either through a culvert or directly the streams through step drains etc. There are no streams nearby hence the effect on bank erosion, stream bed scouring will not be significant.	Insignificant
7.2.1.4 Open defecation and waterborne infections As site is located within a government building premises, possibility of open defecation is less. But there is a thick vegetation cover in up slope area.	Insignificant
7.2.1.5 Impacts on the downstream water uses Since there are no water streams close to the site, impact will be insignificant.	Insignificant
7.2.1.6 Impacts on ground water table and ground 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 quality.	**Significant**
7.2.1.7 Impacts on water or wetlands Since there are no water streams or wetlands close to the site, impact will be insignificant.	Insignificant
7.2.2 Environmental Impacts	
7.2.2.1 Noise and vibration impacts Noise is expected from construction equipment. Noise and vibration impacts are significant. Since the maternity clinic building is evacuated, there will not be impacted on its functions and people. Vibration during construction would impact on the already damaged building, the cracks would expand or new cracks would be formed. The up slope houses and people will be impacted by noise & vibration. ~~T~~he pedestrians and commuters on roads will also have an effect from noise and vibration.	**Low Significant**

7.2.2.2 Air pollution impacts Construction activities that contribute to air pollution include: land clearing, operation of diesel engines, demolition and burning. Operating vehicles at high speed under dry weather conditions can increase such pollution. Improper handling and transferring of materials can also generate dust. Improper storage of materials can potentially generate dust if not properly covered. During construction, it generates high levels of dust typically from concrete, cement, wood, stone, and silica. As the premises of building is located within the site the effects are highly significant. The Galigamuwa – Waduradeniya road is used heavily for vehicles moving (buses, bicycles, lorries, trucks, tippers, three wheels). The air pollution may have significant impact on the commuters and pedestrians. The air pollution impacts from the construction are locally significant during dry periods for the nearby residents.,	**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 hazard storage and disposal of solid waste in and around the site will block the drainage 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 rock boulders, explosives may be used if the rock blasting is envisaged. This may pose risk due to unsafe use. As these operations are to be done on affected slopes and close to the building the risk of improper use of explosive and accidents from rock fragments are highly significant.	**Highly Significant**
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.	Insignificant
7.2.3.2 Effects on Fauna & Flora The trees found in the area are not endemic, threatened and identified in the red list of IUCN.	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 is a no agricultural activity within the area to be remediated / immediately to the site.	Insignificant
7.2.4.2 Cracks in the building due to vibration impacts The unstable slopes are located within a government institutions premises. And there are neighbouring houses.Therefore, vibration impact on the buildings are highly significant. During the construction heavy machinery will be used and the vibration can widen the existing cracks and may create new ones in the building. Also, vibration can affect the stability of the building and houses.	**Significant**

7.2.4.3 Loosing access to land and future development activities The land where the project activities are envisaged belongs to Ministry of Health. During construction they are will be restricted for access and use. With the mitigation, the unstable slope will increase the stability of the building and protect the land from future failures.	**Significant**
7.2.4.4 Impacts on livelihood/ business and income activities There is no income generating or business activity in the proposed mitigation area.	Insignificant
7.2.4.5 Impacts on service provision (water supply, sewage, electricity) There are no water supply lines, sewage lines or electricity supply lines running close to the unstable slopes.	Insignificant
7.2.4.6 Effect due to loss of infrastructure and safety During the construction phase, Galigamuwa - Waduradeniya road will be obstructed by frequently moving machinery, loaders, trucks etc. Therefore, most of the heavy machinery, trucks and loaders can obstruct the pedestrian passage and cause traffic.	**Significant**
7.2.4.7 Work camps and lay-down site requirements The work camps will be established closer to the site. Often the contractor rent out houses in the proximity. 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. Therefore, the effects are significant.	**Significant**
7.2.4.8 Relations between workers, residents, commuters and pedestrians and possibility of disputes Construction workers at this site will from different social backgrounds and from different geographical areas often under poverty. Usually, they are with poor educational and social background. Such communities may have a wide range of social issues to cause dis-stress on the neighboring community. Although the workers who would engage in such issues will be rare, even few possibilities cannot be ignored. Therefore, social and community issues at this site will be considered significant. Further, the site is located adjacent to houses, and Galigamuwa - Waduradeniya Road, there will be disputes with people, pedestrians and commuters with workers due to full/partial road closure during construction period.	**Significant**
7.2.4.9 Workers safety during construction The workers may be exposed to risk from falling. Fatal injuries may occur if the slope fails. The risk of slope failure is aggravated during the rainy season. This risk is highly significant. Risk of hazard from vehicle and construction machinery accidents is highly significant at this site. Contractor may engage under age workers (children) for construction work, which is risky and can results serious accidents and injuries.	**Highly Significant**

7.2.4.10 Safety to the public from construction activities: During construction phase the maternity clinic premises will be obstructed by the frequently moving machinery, loaders, trucks etc. As most of the mitigation works are to be carried out in limited space on slopes the heavy machinery, the trucks and loaders etc. can obstruct the access.	**Low significant**
7.2.4.11 Impacts on transport infrastructure (especially temporary loss of road access, risks of traffic congestion) The traffic of the road due to full/partial road closure during the material transportation may obstruct the smooth flow of vehicles during the week days, in office hours or holy days. This will cause nuisance to pedestrians and commuters.	**Significant**
7.2.4.12 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
7.2.4.13 Areas used for businesses, agriculture or other immediately adjacent to the site There are no areas used for business, specific agriculture practices or other immediately adjacent to the site.	Insignificant
7.2.4.14 Need for public to enter or cross the site Excavation machinery, loaders, trucks etc. will be used in the clinic premises where public and staff are moving. There is no special need for public 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, unauthorized 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.	**Highly Significant**

8. Site Specific Risk Analysis

Table 2: Site specific risk analysis

Risk	Affected group	Risk level
1. Facing accidents when working in a limited space	Workers	Very high
2. Transporting materials and machineries	Workers/ commuters/ pedestrians	Very high
3. Throw out disposals (litter, bottles, and food) to the clinic premises from the construction site	General public/ government staff	Very high
4. Facing accidents during constructions at night time	Workers	Very high
5. Accidents from the construction activities and materials placed in the limited space	Workers/ general public/ government staff	Very high
6. Injuries due to rock particles due to explosions/ blasting	Workers/ general public/ government staff	Very High
7. Rock fall from the unstable area	Workers/ general public/ government staff	Very High
8. Site Working – Working in poor visibility	Workers	High

9. Lone Working	Workers	High
10. Emergency evacuation	Workers/ general public/ government staff	High
11. 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 a unstable slope with a risk of falling. Such common E & HS issues have been discussed in the **ESMF**. Worker safety requirement in the construction site is more detailed under 2003 5: Safety equipment and clothing in the section 2003: Working conditions and community health and safety in the Bidding document.

9.2 Child labour & forced labour

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

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 buildings 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.

10.2Evacuation of people

Project based evacuations are not required for this site. Until the construction is over, the building should not be occupied.

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

Project planning should consider to avoid intervening with the structure of the building as much as possible.

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

This will not be triggered.

10.5 Public awareness and education- needed for following areas

i. Programs to inform and educate about the risks posed by landslide to specially the nearby residents and the government officers of the relevant institutions.

ii. Requirement for special awareness for commuters and the people passing through the area using the road with potentially high-risk during construction phase and early warning.

10.6 Design based Environmental/ Social Management considerations

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

Table 3: Design stage Environmental & Social considerations

Design feature	Recommended level of consideration for this site
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.	Moderate
ii. Site Planning During site planning it is necessary to be cautious on possible re-activation of slope failures and movements of soil masses. Also, the site is located in a very limited space of a slope with other buildings. The vehicle parking sites, material storage and temporary shelters etc. should not be installed in the danger zones of the slides. It is very necessary to keep trained flagman or safety officer during the construction period and proper communication between contractor's workforce and the other responsible officials should be maintained.	Very 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 nearby community usage such as gardening and sanitary activities.	Low
v. Interruption to water supplies If the water in the mitigated slope is used as a source for water supply, the chance the water source can be affected by the mitigation work is high due to water table draw down. In such instances the design should include alternative source of water for the community (temporary/or permanent).	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 proposed mitigation site is located in a maternity clinic premise, greening could be used in construction activities to develop the area as an aesthetically pleasant environment. 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 migratory works are carried out in well maintained the premises with green landscape, 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.	Very High

viii. 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
ix. Workers/ staff and community safety Due to the limited space in the proposed mitigatory site people may face accidents specially the workforce during the construction phase. Unauthorized entry and ignorance may cause severe accidents around the site. Activation of slides or ground subsidence may occur during construction phase and may pose threat to nearby residents and staff. Therefore, design-based safety consideration such as beams, safety nets etc. should be considered specific to safety of public should be considered.	Very high
x. Erosion control structures During rainy season the flow in these drainage structures can be significantly high. During rainy season the heavy flow of surface runoff can be expected through the unstable slopes. This water should be conveyed to nearby storm water drains. Hence the design should adequately consider flow speed breakers to reduce erosive flows of slopes.	High
xi. 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.	Very High

10.7 Mitigation of impacts during the construction phase

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

Measures to manage and to mitigate the environmental and social impacts are generally common to all landslide mitigation sites. Such impacts are largely attributed to activities in the construction phase. The mitigation of impacts therefore becomes an obligation of construction contractor. NBRO has prepared a comprehensive document on "***contractors' requirement to comply with Environmental and Social Health and Safety (ES & HS) management during the construction phase"*** to be included in construction contractors' bid document. The main sections are summarized below (Table 4) indicating the degree of relevancy for this site. For details ESMP for construction contractors should be referred.

Table 4: Contractor requirement to comply with ES & HS

Reference No. as per construction contractor's obligation to ESMP	**Item**	**Relevant to the project**
2002. Environmental and Social Monitoring		
2002.2 1)	Storage on site	Relevant
2002.2 2)	Noise and Vibration	Highly Relevant (residents nearby)
2002.2 3)	Cracks and damages to the buildings	Highly Relevant (buildings)
2002.2 4)	Disposal of waste	Highly Relevant (maternity clinic premises)
2002.2 5)	Disposal of refuse	Highly Relevant (maternity clinic premises)

2002.2 6)	Dust control	Highly Relevant (maternity clinic premises)
2002.2 7)	Transport of Construction materials and waste	Highly Relevant (commuters, pedestrians)
2002.2 8)	Water	Relevance
2002.2 9)	Flora and Fauna	Low Relevance
2002.2 10)	Physical and cultural resources	Relevant
2002.2 11)	Soil Erosion	Highly Relevant
2002.2 12)	Soil Contamination	Relevant
2002.2 13)	Borrowing Earth	Relevant
2002.2 14)	Quarry Operations	Not Relevant
2002.2 15)	Maintenance vehicles and Machinery	Highly Relevant
2002.2 16)	Disruption to public	Highly Relevant
2002.2 17)	Utilities and roadside amenities	Highly Relevant
2002.2 18)	Visual environment enhancement	Highly 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 (general public, workers)
2003.3	Child labor and forced labor	Relevant
2003.4	Safety reports and notification of accidents	Highly Relevant (general public, workers)
2003.5	Safety Equipment and Clothing	Highly Relevant (general public, workers)
2003.6	Safety inspections	Highly Relevant (general public, workers)
2003.7	First Aid Facilities	Highly Relevant (general public, workers)
2003.8	Health and safety information and training	Highly Relevant (general public, workers)
2003.9	Plant equipment and qualified personnel	Highly Relevant (general public, workers)

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

Table 5: Site specific ES & HS mitigation measures

Mitigation item	Project implementation phase	Responsibility
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 up slope mitigation are carried out in the dry season and avoid such activities on up 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
iii. **No Entry Zone** The PMU should make a detailed assessment on possible risk of slope destabilization in the site during construction phase. No entry zones may require to be declared. Also mitigate the risk of accidents from moving vehicles operational machinery construction activities, electrical leakages etc. should be given high priority in the health and safety management plan. Sign boards indicating slope instability risk are strongly recommended at this site.	Construction	E & S Unit of PMU contractor
iv. Machinery and material transportation The Galigamuwa - Waduradeniya Road and other minor roads will require to use for machinery, materials and vehicle transportation during construction phase. Therefore, extreme care should be taken as possible accidents and damages to the road are high. If damages happen to the road or elements of the road should be rectified after the project..	Construction	Construction Contractor
vi. 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 Department of Wildlife Conservation & Department of Forest.	Construction	Construction Contractor
vi. Noise and vibration control The noise and vibration generating activities may disturb the smooth flow of residents nearby and users of the Galigamuwa - Waduradeniya Road. Vibration generating activities should be done within the prescribed limits to avoid damage to structures. Cracks in the buildings should be monitored before, during and after completion of the project. Suitable compensation should be made if cracks from the damages or cracks enlarge due to construction work.	Construction	Construction Contractor
viii. 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.	Construction	PMU Construction Contractor

i. Prepare a special Occupational Health and Safety Management Plan prior to commencement of construction activities ii. A good warning system and full time watchmen is highly recommended for this site for both worker and commuter safety. iii. Safety barriers and safety nets should be installed at places of risk to protect workers and commuters from boulder falling risk Adoption of standard worker safety methods iv. Provision of personal protective equipment (PPE) such as safety boots, helmets, protective clothing goggle etc. v. Provision of trainings and awareness programs to employees vi. Conducting hazard analysis and plan/provide adequate mitigation measures for such hazards identified, prior to carrying out major construction activities vii. If the wasp nest is in the vicinity, it is mandatory to use Evacuation Centres for ensure of workers' safety viii. Additionally, work should be discontinued for sufficient time period during rainy period as working on unstable land will be highly risky in the rainy season		
ix. Injuries due to rock particles due to explosions/ blasting Minimize all blasting activities during visiting hours and making awareness announcements through the blasting period. Establish an emergency accidents preparedness plan for their injuries due to rock particles due to explosions/ blasting.	Construction	Construction Contractor
x. Disposal of construction waste The contractor should pay special attention with respect to disposal of construction waste. This site is located within a maternity clinic premises with a pleasing and clean environment. 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 within the maternity clinic premises or along the road.	Site preparation & construction	Construction Contractor
xi. Onsite sanitary facilities for the workers The contractor should prepare temporary sanitary facilities for the workforce within the site. Workers should not use the wash rooms or toilets of the maternity clinic with out the permission of relevant authorities.	Site preparation & construction	Construction Contractor
xii. Dust and aerosol control screens The construction activities would be carried out closer to the dust particles generated during the construction period can influence the residents of the area, workers and users of the Galigamuwa - Waduradeniya Road. Special screens etc. should be used if heavy dust or aerosol generating activities are envisaged	Site preparation & construction	Construction Contractor
xiii. Water for construction Water for construction works should be obtained only from the approved sites.	Construction	Construction Contractor
XVI. Electricity for Construction Electricity for construction should be obtained only from approved places. If the Contractor intends to use electricity from CEB grid, they should be informed and the required permission should be taken.	Construction	Construction Contractor

xiv. 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
XV. Impact on service infrastructure Check this. Telecommunication, electricity, water lines should be relocated before construction starts as per the approval of PMU.	Construction	Construction Contractor
xvi. 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
xvii. During construction good housekeeping should be maintained to minimize visual pollution	Site preparation & construction	Construction Contractor
xviii. Worker's code of conduct Possible disputes between the labor force and the commuters and tourists should be prevented by maintaining the agreed code of conduct by the contractor. Possible disputes between workforce and commuters should be avoided especially when using shared resources such as common bathing and washing places etc.	Construction	Construction Contractor
xix. 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
xx. During construction good housekeeping should be maintained to minimize visual pollution	Site preparation & construction	Construction Contractor
xxi. Snake and toxic ant bites management and emergency management by accidents Proper emergency management system for snake and toxic ant 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	Construction Contractor

10.7.3 Monitoring requirements specific to the site

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

Table 6: Environmental and Social monitoring plan; construction phase

Monitoring requirement	Parameter	Frequency
	Water quality	-

i. Baseline monitoring	Pre-construction crack survey of the government building	Once*
	Ground vibration	Once*
	Air quality: particulate matter	Once*
	Background noise measurement	Once*
ii. During construction	Water quality	-
	Crack survey for the risk buildings	If noticeable displacement is observed during construction **
	Ground vibration	During operation of drilling machinery, boring works, or any works that generate ground vibrations*
	Construction noise	Once a month during heavy noise generation times *
	Air quality particulate matter	Once a month *
iii. Vehicular Emission	All machinery/vehicles operational should have the emission control test certificate as applicable - should be checked by the site ES officer of the consultant	
iv. Monitoring agency	* A competent independent monitoring agency with registration of Central Environmental Authority for all parameters except crack surveys **Crack surveys should be conducted by competent agency acceptable to PMU	
v. Reporting requirements	**Pre-construction crack survey of the high-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.	

11. Labour management

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

The Objectives are;

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

12. Preventive measures for COVID-19 that was issued by Sri Lankan national health authority ((this is applicable if Notification on Covid -19 epidemic/ endemic is issued by Health Authorities Sri Lanka)

COVID-19, the novel coronavirus infection has not been totally eradicated in the world. Therefore, to prevent/ control of the spread of infection also to prevent panic situations in the event of detecting a suspected case, all contractors are required to develop a COVID-19 Preparedness plan and need implementing in the site as per the "Health and Safety Guidelines for Sri Lankan Construction Sites to

be adopted during COVID 19 outbreak" Guidelines given by Construction Industry Development Authority CIDA 29th April 2020.

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

13.1 Public Consultations

Mr. Saman Jayasinghe, land and house owner of up slope risk house was consulted and made aware of landslide early warning alerts, 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.

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

Mr. Susantha Herath, Divisional Secretary of Galigamuwa DS Division and Mr. E.R.J.M.M Ekanayaka, Medical Officer of Galigamuwa MOH area were informed about the project works. They stated that the mitigation is highly needed and they agree to give their support.

The Provincial Director of Central Environmental Authority in Sabaragamuwa 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.

14. 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
14.1 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 Galigamuwa Local Authority
14.2 Approval from the state lands owners relevant to the project	
Department of Forest Department of Wildlife Conservation	As there is no forest reservations and wildlife habitats; Department of Forest and Department of Wildlife Conservation approvals are not needed
Geological Surveys and Mines Bureau	Approval will be obtained for extraction of materials, transportation and disposal of earth, rocks and mineral debris. (If necessary, only).
Galigamuwa Divisional Secretariat	Approvals from Galigamuwa Divisional Secretariat will be obtained for the disposal of waste and plant litter.

Ceylon Electricity Board	Approvals from regional office of Ceylon Electricity Board will be required for power supply for site operation.
National Plant Quarantine Service	Approval from Additional Director National Plant Quarantine Service Katunayake for Director General of Agriculture under the Plant Protect Act No. 35 of 1999 Plant or seed if needed for bio–Project Managed slope mitigation shall be imported into Sri Lanka under the authority and in accordance with the conditions, of a plant importation permit issued.
14.3 Consent/ no objection/ legally bound agreement from the private land ownerships	
Land owner (Ministry of Health and private)	Signing a legally bound agreement between the land owner and the project implementing authority allowing no-objection to remove the structures, access the land, implement construction works, and engage in long-term maintenance works

The tentative timeline for getting approval is given in the table 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 state land owners								
Submission of application								
Respond to comments								
Approvals								
Other approvals								
GSMB								
Ministry of Defense (Depends on the requirement)								
Consent/ no objection from the land ownership (Ministry of Health and private)								

15. 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).*

16. 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, 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, State Land Owners, Grama Niladhari, District Office NBRO, AIIB and relevant parties as appropriate	Written and verbal communications, submission of relevant reports
v. Decisions taken and progress review meetings pertinent to ES matters	District CEA, Police, State Land Owners,Grama Niladhari, District Office NBRO, AIIB and relevant parties as appropriate	Meetings, submission of relevant reports
vi. Grievance redress mechanism	Relevant parties, AIIB	Meetings, written and verbal communications

Table 10: Level of information gathered through consulting institutions

Date	Institution	Person contacted for information
28/02/2019	Central Environmental Authority	Provincial Director, Central Environmental Authority Sabaragamuwa Province.
20/09/2024	Divisional Secretariat of Galigamuwa	Mr. Susantha Herath, Divisional Secretary Galigamuwa DS Division
20/09/2024	MOH – Galigamuwa	Mr. E.R.J.M.M Ekanayaka, Medical Officer of Health Galigamuwa MOH area

Annexure I: Images of consultation of Public and Stakeholders

Consultation with Mr. Saman, upslope risk house owner

Consultation with Mr. E.R.J.M.M Ekanayaka, MOH Galigamuwa

Consultation with Mr. Susantha Herath, Divisional Secretary of Galigamuwa

Annexure II: Report on the Stakeholder Consultation: Kegalle District

Institution	Name and designation of the contact officer	Concerns raised
Central Environmental Authority	Mr. Kiriella, Provincial Director, Central Environmental Authority Sabaragamuwa Province.	✓ Under the Soil Conservation Act no 25 of 1951 and No 29 of 1953. of National Resource Management Centre, Kegalle 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 ✓ 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.

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

1. **Proposed approval procedure for Environmental Clearance form District Central Environmental Authority**
    i. In the project preparation phase, the ES & H&S unit of PMU study the Site specific ESMPs and should submit the project proposal to district office of CEA with details of the Arial extent that would be influenced by the project actions with spatial references, sections of site specific ESMP relevant to the project.
    ii. A basic information questioner (BIQ) should be completed and submitted along with the above details
    iii. CEA may call for project briefing and further information on ESMP that should be provided by the PMU
    iv. Approval will be granted subjected to site specific conditions that should be adhered by the project

Annexure IV: Study team

Name	Designation	Position in the study
SAMS Dissanayake	Senior Scientist/ESSD/NBRO	Senior Environmental Scientist
Prabath Liyanaarachchi	Scientist/ ESSD/NBRO	Environmental scientist, GIS/ Demographic data collection /survey, Report preparation
Ranil Jayawardhana	Field Assistant	Assistant - data collection for the SSESMP

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