Site Specific Environmental and Social Management Plan
(SSE & SMP)

Site No. 26
Athweltota Gangaramaya
Kalutara District - Package 8

October 2018

Prepared for:

Sri Lanka Landslide Mitigation Project
Asia Infrastructure Investment Bank
(AIIB)

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Table of Contents

List of Annexures

List of Figures

List of Tables

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
E & S & H & S unit of PMU	Environmental & Social & Health & Safety Unit of Project Management Unit
ESMF	Environmental and Social Management Framework
ESMP	Environmental Social Management Plan
SSE & SMP	Site Specific Environmental and Social Management Plan
GN	Grama Niladhari
GOSL	Government of Sri Lanka
GSMB	Geological & Mines Bureau
LRC	Land Reforms Commission
NBRO	National Building Research Organization
RDA	Road Development Authority
RHS	Right Hand Side
SSE & SMP	Site Specific Environmental and Social Management Plan

1. Introduction

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 has been (ESMF) 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; National Building Research Organization (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 Athweltota Gangaramaya Temple landslide mitigation site. **The 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 regulation and procedures to be followed during project implementation specific to the site

2. Location details and site description

Site reference: Site No.26, Package-8, Kalutara District, Landslide near Athweltota Gangaramaya

Site Details

i. The site falls administratively under Athweltota Grama Niladhari Division (GN Division) of Baduraliya Divisional Secretariat Division (DS Division), Kalutara District of Western Province. The site is located adjoining Athweltota Gangaramaya Temple by the RHS of 49 km post of B 421 Baduraliya – Kalawana main road.
ii. The nearest town to the site is Baduraliya, about 8 km from the site.
iii. GPS reference of the site is 6 .543632 N & 80· 283237 E. Ref. Fig 1.Google Map of the location.
iv. A landslide has initiated in the hill crest of Paru Pana Mukalana Kanda (Forest reserve), the debris flow path has extended over several private lands and road reservations.

Fig 1: Google image of the proposed landslide mitigation site. Ref. Drone image for details -Annex 1

3. Landslide hazard incident details

The landslide has occurred on 26th May 2017 due to heavy precipitation on May 24th, 25th and 26th 2017. About 20000 m^2 of area of land has been affected due to the incident. The landslide has initiated at two locations on the mountain crest of Paru Pana Mukulana Kanda. The dislodged earth mass had moved down as a debris flow and depositing debris on its flow path while crossing the road and finally ending in the stream running parallel to the road. According to the landslide investigation, a section of the slope had subsided earlier and the ingress of water through the intersection had initiated the slide.

The damages occurred due to incident

Due to the landslide 7 houses located left side of Baduraliya- Kalawana Road (on the debris path) were completely smashed with their property leading to 9 death of occupants. At this event, the debris from the collapsed slope had moved across the road towards the nearby river "Pelen Ganga" depositing earth, boulders, fragmented houses and property, dead bodies on the road and in the stream. The debris had completely obstructed the movement of traffic.

The debris had dammed the river while causing temporary flooding in the upstream cutting off the access from Baduraliya side. After the incident the authorities had closed the road for about several days. This has caused obstruction to commuters who use the road for various activities.

The mountain where the landslide had occurred is known as "Paru Pana Mukalana kanda which is the border of "Digana kanda" forest reservation. Part of the forested area was also collapsed due to the landslide.

	
Fig 2a: Landslide area and the Gangarama temple	*Fig 2b: Stream flowing in downslope area*
	
Fig 2c:Upslope area	*Fig 2d: Gangarama Temple, Athweltota*

Fig 2: Images of the project area

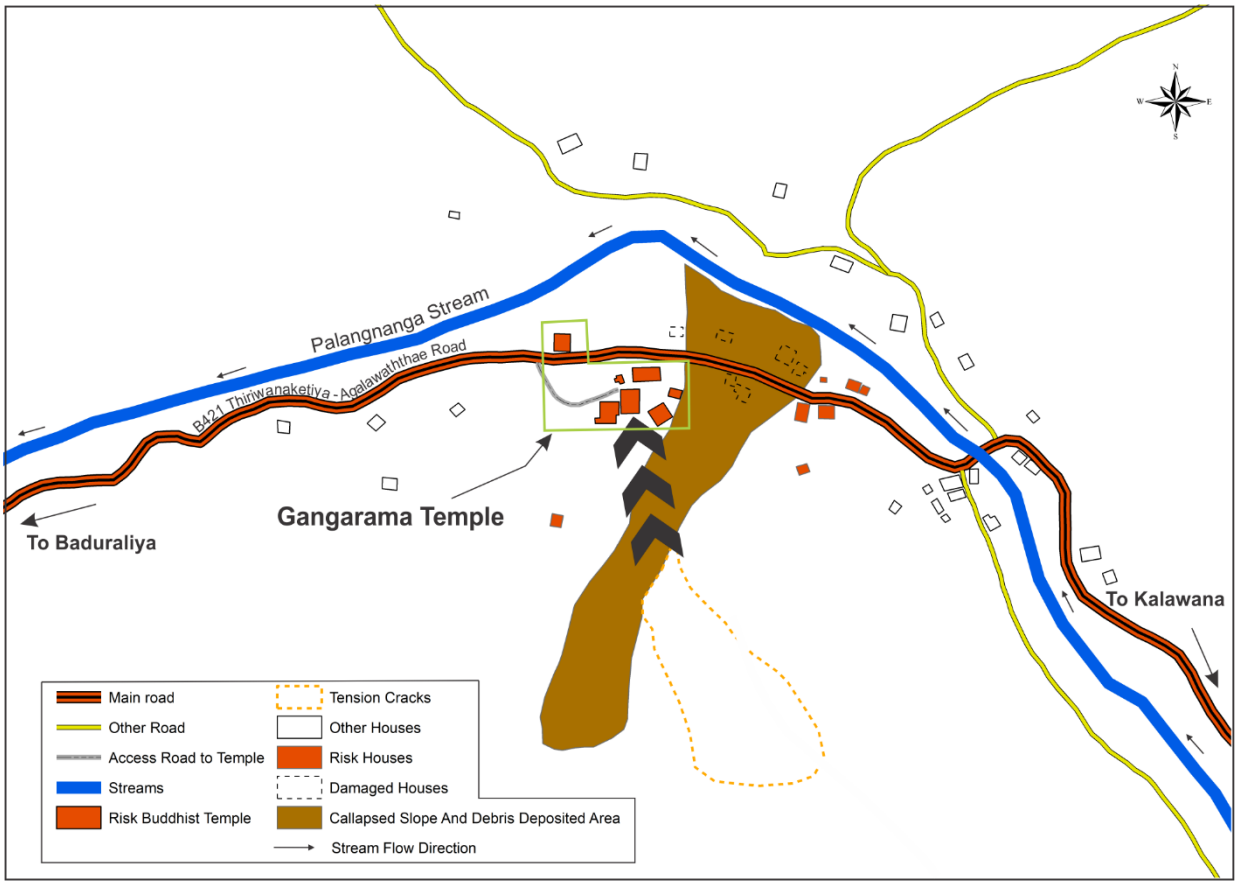

Fig 3: Diagrammatic interpretation of affected slope area and buildings due to ground movement

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

No physical remediation measures such as drainage improvement etc. taken to reduce the risk. NBRO had investigated site, demarcated the unstable slope sections, and potential risks on existing settlements and the temple were assessed. The occupants at risk were made aware of the risk and informed for immediate evacuation. Adjoining Athweltota Gangarama Temple too was found high risk and priest was informed to evacuate.

Evacuations:
Out of seventeen houses categorized as high risk, occupants in 15 houses had already evacuated. Only 2 households had not found a suitable place, hence they are living in their houses until a suitable land or house is found. Only one priest Rev. Warakagoda Kassapa thero lives in the temple. During the incident the priest had evacuated the hermitage building for a short period and later returned to the original place.

5. Description of the area of the landslide, areas adjacent to the landslide and current level of risk

The slope where the landslide had initiated is the Paru Pana Makulana Kanda, which is the border of the Diganna Kanda forest reservation. The mountain is a steep slope which is largely covered with forest. Some areas above the settlements have been cultivated with tea. In the toe area which is less steep, settlements are found alongside the road. A Buddhist temple named “Athwelthota Gangarama viharaya” is situated adjoining the debris flow path. During the landslide, the debris had moved next to the boundary of the temple, miraculously leaving the temple without harm. At the toe area a stream named “Pelan ganga” runs parallel to the road. The boulders and fragments of houses and property can be still seen in the stream.

Currently, the failed slope adjoining the temple is highly unstable and is subjected to erosion. According to NBRO investigation a tension cracks and unstable sections exist on the slope posing future landslide hazard on the temple and several settlements in down slope area.

Accordingly, 17 houses are at high risk while 06 houses are at medium risk. In addition, Athweltota Gangaramaya, an important Buddhist temple in the area is also graded under high risk category. A tension crack extending above the temple poses high risk to the priests, the devotees, religious buildings, structures, statues, shrine room of the temple

The current risks include human lives and religious structures of the temple, cutting off from lifeline facilities (access, transport, communication, etc.), long-term suspension or crippling of livelihood activities in that area, damming of the stream and temporary flooding. The potential hazard risk is very high on the occupants of the houses, the priest and the devotees, and the commuters on road. The road is an important connectivity road between Kalutara and Ratnapura Districts which is used heavily for passenger transportation between cities, transporting economic goods and plantations products such as tea and rubber.

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

As explained earlier the proposed landslide mitigation site is located in an area with steep mountain slopes. Due to this settlements are restricted to less steep down slope alongside the road. Upslope area of the mountains is a large extent of a forest reservation called Digana Kanda reserve. Tea is grown as a domestic cultivation in the area. A Buddhist temple "Athweltota Gangarama Viharaya is located adjoining the proposed mitigation site.

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

i. Road traffic and commuters of the road and pedestrians
ii. The priests, worshippers, devotees in the Buddhist temple and the religious events
iii. Important worship buildings of the temple
iv. Occupants of the houses closer to the road still not evacuated
v. The children of Sunday school
vi. River, water quality of the stream, Pelen Ganga and domestic water uses and religious water uses ("Diya kepeema" festival of Saman devalaya).

7. Description of the works envisaged under the project

The proposed mitigation works will be highly design exclusive as the slope instability conditions are very much complex. They will include drainage improvement to unstable slope sections, rock barriers to protect the sensitive elements such as road and the river from the debris hazard, and vegetation based slope stability improvement measures as a minimum.

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

8.1 Positive impacts

The mitigation of this slope has strong overall positive impact on the landslide disaster risk reduction in the area as explained bellow.

The landslide and current hazard risk has created a psychological strain and distress on the communities in the village. The temple currently at risk is about 70 years old. Over years the temple has built a strong social connectivity with villages who are Sinhalese Buddhists. About 1500 devotees from 04 GN divisions; Athwelthota, Abegoda, Diganna, Morapitiya associate with the temple for a wide range of religious, cultural and social activities. They include serving dana (regular offering of food other needs) to the temple. About 700 families serve dana to the temple. The temple at this location has a social significance as the next nearest temple is about 2 km from this temple which is at Morapitiya.

The temple is a complete Buddhist religious facility having all spiritual elements characteristic to Buddhist temple architecture. They include shrine room for Lord Buddha designed according to historical temple architecture, pagoda for sacred relics of lord Buddha, a bo-tree (planted sections from sacred Sri Maha Bodhi), Hermitage for the priests, and even a Seema Malaka (a special building dedicated to Buddhist priests for "upasampada" ceremonies).

The temple has a strong cultural and social interaction with the Buddhist people in the area, where all religious and cultural functions of local Buddhists are centered around this temple.

From Buddhist religious perspective the temple is a complete place of worship having a close interaction with the Buddhists in the villages around. The temple has a high importance for Buddhist temple art as the paintings of shrine room had been done by the famous temple artist Solius Mendis. Further, Saman Devalaya, a shrine dedicated to god Saman (a sacred Buddhist god) is situated at the border of the Ratnapura district about 2 km from this temple. The god Saman is deeply venerated in the region of Ratnapura and Kalutara. The temple, Athwelthota Gangaramaya is operating the functions of this Devalaya and conducting an annual festival procession to worship god Saman under the guidance of the priest of the temple. The procession is filled with cultural items and dancing from different regions and closely interlink with religious and cultural life of the people in the area.

The temple is located between a forested mountain and a flowing stream the temple architecture of structures blends ideally with natural scenic beauty typical for rural landscapes of the country.

Therefore the improved slope stability with the proposed structural mitigation will enhance significantly the safety of commuters on the road. The project has a strong positive impacts on the safety of devotees of the temple and the functions and the important worship places of the temple.

8.2 Negative impacts

The mitigation works are generally confined to an area which is already disturbed by a slope failure and unstable slope sections. Therefore, Negative impacts are much localized, and also limited mostly to construction phase.

8.2.1 Loosing access to land and future development activities

The land where the project activities are envisaged is road reservation of RDA, private lands, lands belongs to the temple and the forests under Department of Forest. As the proposed mitigation structures will be exclusive to comparatively high magnitude landslide hazard there will be structures extending to relatively large spans of land. Also, some structures may come at the boundaries of the temple premises. As these are relatively large structures to function as barriers to cut off debris flow the owners may lose the future development opportunities of the lands. However, most of these lands are open lands and do not cross any access to houses or service facilities.

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8.2.2 Ecological, biological impacts, and fauna and flora

The forest reservation on crown area is the border of the Diganna Forest Reservation which contains large span of sub montane and montane forests according to the Range Office- Kalutara. Compared to the extent of forest the direct impacts on the forest reserve is highly localized and will not cause significant impacts. However, following impacts to forest ecology and wildlife can happen during construction phase.

- The mitigation work may involve relatively large structures to work as barriers, they can be death traps for wild life, loose habitat connectivity of some species.
- There is a tendency that contractor labor force may engage in hunting and poaching of wildlife or may collect of protected forest specimens (plants and animals). Such acts are prohibited under the Fauna and Flora Protection Ordinance and may damage the resource hence impacts are significant.
- The contractor may carelessly or intentionally remove valuable timber species in the forest area or clear large patches of forest and may damage the resource hence impacts are significant.
- The contractor may cut and use forest trees for temporary structures for construction works and may damage the resource hence impacts are significant.
- Contractor may set fire (intentionally or unintentionally) to the forest. During dry season this may initiate forest fires and damage the forest resource, hence impacts are significant.

8.2.3 Impact on the drainage pattern of the area

If the mitigation measures include improvement to drainage in a relatively a large area, it lowers the ground water table. A significant lowering of ground -water table may dry out the springs on the mountain, the impacts however will be localized and confined to the area. Currently, the spring water in the mountain is used by the families in area and by the temple. Lowering of water table by drainage improvement will dry these springs causing water stress to the temple and the neighbors. Hence impacts on drainage is locally significant.

8.2.4 Erosional impacts and stream bed alterations

If the mitigation works focus largely on the drainage improvement, during rainy season heavy flow of water may enter the nearby natural stream etc**.** This will result increased stream discharge causing stream bank erosion, stream bed scouring, and increased river load in the downstream area. The impacts on environmental flow and sediments on aquatic ecosystems will be locally significant.

8.2.5 Water pollution impacts from construction activities

Sedimentation to existing watercourses and siltation in the downstream channels can be expected during the removal of debris soil produced from earlier slide and during the process of landscaping/reshaping of slopes. Improper disposal of oils and other harmful substances/contaminants from machineries, leakages from temporary storage tanks, solid waste and wastewater disposal/dumping from workers sites could occur causing adverse impacts on water quality of the stream running in the toe area. Intentional and careless disposal of construction waste may result addition or mixing of construction materials (cements/other grout materials used for soil strengthening) with surface water to cause temporary water quality degradation and accumulation of unwanted substances in the downstream.
These discharges may increase the pollution load in the streams with high Biochemical Oxygen Demand, Chemical Oxygen Demand, Suspended Solids, Oils and Greases etc. The emissions will exceed the ambient water quality standards prescribed for designated uses such as drinking, bathing, and aquaculture and may violate even the minimum standards for water quality. The stream water is used by villages for special religious functions. The water quality impacts from discharge of wastewater and pollutants to environment during construction phase is therefore **locally highly significant**.

8.2.6 Open defecation and waterborne infections spread during construction phase

As the site is located in forested, low inhabited area with a stream there is a possibility of open defecation by the workforce. As the stream in the down slope is used by people for bathing, washing and other sanitary purposes, and also for special religious activities faecal contamination of stream water is highly significant.

8.2.7 Impacts on the downstream water uses

There is a possibility of feacal contamination of water and spread of water borne infections. This will make water unsuitable for human use and aquatic life. The water quality impacts from discharge of wastewater and pollutants to environment during construction phase is **therefore is highly significant.**

8.2.8 Solid waste disposal issues

Storage of waste debris near river banks and road reservation can generate contaminated runoff and pollute the stream water. The impacts are highly significant as the stream is a clean water body with multiple downstream water uses (domestic and religious).

8.2.9Air pollution impacts

Construction activities that contribute to air pollution include: land clearing, operation of diesel engines, excavations, burning, and transportation disposal of construction materials, construction waste and working with toxic material (blasting chemicals). During construction, it generates high levels of dust typically from concrete, cement, wood, stone, and silica. The direct exposure risk of residents to air

pollution is minimum as there are no houses with occupants closes to the site. However, Air pollution may have an impact on the pedestrians/ commuters of the road.

8.2.10 Noise pollution, Vibration, blasting, impacts during construction, potential damage to buildings, infrastructure

Noise and vibration is expected from construction equipment. Noise impact is significant as the construction is carried in the proximity of the temple. The noise generated from the machinery will disturb the religious activities in the temple. **Hence the impacts of noise is considered significant at this site**

If heavy machinery is operated the vibration can affect the buildings of the temple. As a result structural deformations such as cracks and collapse of walls etc. may happen. **Hence vibration impacts at this site is considered significant.**

8.2.11 Relations between workers and the people living in the vicinity of the site and possibility of disputes

There may be disputes of the workers of the construction site and the villagers as the people are living nearby.

8.2.12 Work camps and lay-down sites requirement

The work camps will be established closer to the site. Often the contractor rent out houses in the proximity. The camps sites 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 sewerage will be an issue. Therefore, **the risks are significant.**

8.2.13 Risks of public accessing the site during construction

The site may have machinery with high hazard risk such as drilling, boring and excavation machines etc. Only skilled workforce will be safe working in this environment. If unauthorized persons accesses the site there may be a risk of being subjected to accidents by the heavy machinery.

8.2.14 Explosive hazards and hazardous materials

The slope has several impeding boulders and boulders deposited on the debris flow path. Explosives may be used to blast these boulders. This may pose risk due to unsafe use. As these operations are to be done on unstable slopes the risk of improper use of explosive and accidents from rock fragment are highly significant**.**

8.2.15 Safety to the public from construction activities: High risk for commuters

During construction phase the road will be obstructed by the frequently moving machinery, loaders, trucks etc., the trucks and loaders etc. can obstruct the pedestrian passage and may pose high risk on their life.

8.2.16 Workers safety during construction

The proposed mitigation site is a steep forested mountain slope, which is under risk of landslide hazard. The workers may have to work on these unstable steep slopes climbing regularly the slope for various construction activities. Such construction activities may even take place inside the forest area. Further, as this forest is a dense forest the workforce can have a risk of snake bites. Hence, the worker safety during construction is highly significant.

Risk of hazard from vehicle and construction machinery accidents is significant as common to any construction site. Contractor may engage under age workers (children) for construction work, which is risky results serious accidents and injuries.

9. Public and Stakeholder Consultations - that have been held and/or will be held

Chief priest; Rev. Warakagoda Kassapa thero of Athweltota Gangarama temple was consulted during site visits. The priest expressed his emotional distress living under risk of landslide. According to the priest the area is subjected several risks during extreme weather, both landslides and floods, the stream Pelan Ganga floods. Therefore during floods evacuation routes are inundated and people face difficulties

Mr BL Jayaratne, GN officer of Athweltota and members of temple devotee's society were consulted during the field visit. According to them landslide hazard has made serious distress to the life of people in the area. The temple is an important religious and cultural center of the people and during floods temple is place where people gather. However, landslides have made the temple unsafe to stay.

The priest, the GN and the devotee were made aware of the project, the current level of risk, the intended mitigation, the funding mechanism and requirement to use the lands for access the site to move construction machinery and to carry out mitigation works, project benefits, both negative and positive environmental and social impacts etc.

All parties were more than willing to accommodate the project, and agreed to provide facilities and lands in the temple premises for construction activities. However, as owners of other lands were deceased could not be consulted.

9.1 Stakeholders involved in the consultations; recommendations or agreements reached in the consultations. (*Ref: Annexure II- Images of consultation*)

10. Significant Environmental and Social Impacts: Social or Environmental impacts or risks that will require special measures on the part of NBRO

10.1 Impacts on water or wetlands (issues relating to changes or contamination of streams, rivers and other bodies of water, typically downstream from the site). Long-term impacts and potential impacts and risks during construction/remediation of the landslide site

Washout of fines, sedimentation to existing water courses and siltation in the downstream channels can be expected during the removal of debris and soil produced during the process of landscaping/reshaping of slopes. Improper disposal of oils and other harmful substances/contaminants from machineries, leakages from temporary storage tanks, solid waste and wastewater disposal/dumping from workers' sites could occur causing adverse impacts on surface quality of the stream runs at the landslide toe area.

10.2 Erosional impacts and stream bed alterations

During rainy season heavy flow of water may enter the nearby natural stream and will result increased stream discharge causing stream bank erosion, stream bed scouring, and increased river load in the downstream area.

10.3 Impacts on transport infrastructure (especially temporary loss of road or rail access, risks of traffic congestion)

The traffic due to full/partial road closure may obstruct the smooth flow of vehicles during the week days, in office hours, school times, on holy days, season of pilgrimage. This will cause nuisance to pedestrians and commuters.

10.4 Impacts on downstream service provision (water supply, sewerage, electricity, etc.)

Sediment laden runoff, pollutants from construction activities, faecal matter will pollute the stream water quality these pollutants will violate the ambient water quality standards prescribed for designated uses such as drinking bathing aquaculture and may violate even the minimum standards for water quality. The water quality impacts from discharge.

10.5 Ecological, biological impacts, and fauna and flora

Following impacts to forest ecology and wildlife can happen during construction phase

i. Large structures to work as barriers, and can be death traps for wild life, loose habitat connectivity of some species
ii. Hunting and poaching of wildlife or may collect of protected forest specimens (plants and animals).
iii. Carelessly or intentional removal of valuable timber species in the forest area or clear large patches of forest
iv. Cutting and use forest trees for temporary structures for construction works
v. Set fire (intentionally or unintentionally) to the forest during dry season to initiate forest fires

10.6 Impact on the drainage pattern of the area

If the mitigation measures include improvement to drainage in a relatively a large area, it lowers the ground The spring water in the mountain is used by the families in area and by the temple can be dry out due to lowering of water table by drainage improvement causing water stress to the temple and the neighbors.

10.7 Open defecation and waterborne infections spread during construction phase

Open defecation by the workforce, possibility of feacal contamination of water and spread of water borne infections.

10.8. Solid waste disposal and contamination of water

Depositing solid waste near river and road reservation and contaminated runoff entering the river polluting its water impacting downstream water uses.

10.9 Households living 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 of the houses and on the buildings of temple previously demarcated as high risk

10.10 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 immediately adjacent to the site hence has no significant impact.

10.11 Areas used for businesses, agriculture or other immediately to the site

As there are no areas used for business, agriculture or other immediately adjacent to the site, impact will be insignificant

10.13 Need for people to enter or cross the site

There is no special need for people to enter the site for other purposes. However, unauthorised entry of ordinary people may occur due to intentional or unintentional purposes may at risk due to operating machinery, and vehicles, electricity, and may be blasting materials.

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

Workforce is exposed to following high hazard risk

i. Risk of accidents from falling as the workers have to work on unstable steep slopes climbing regularly the slope for various construction activities
ii. Snake bites inside the forest area
iii. Risk of hazard from vehicle and construction machinery
iv. Risk from landslide hazard

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10.15 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.

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

11.1 Project implementation

i. Approval from the District Secretariat

The approvals will require to be obtained from the District secretary for the implementation of project where 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. This issues will be discussed, the recommendation at this meeting will be considered in the implementation of the ESMP.

ii. Approval from the planning committee

The project will obtain the approval from the planning committee of the Palinda Nuwara Pradeshiya Sabha.

11.2 Approval to implement the project in the specified site

i. Approvals from regional office of Ceylon electricity board will be required for power supply for site operation.
ii. Approval from Chief incumbent of the temple

11.3 Approval from Central Environmental Authority, Department of Forest, Department of Wildlife Conservation

According to the Central Environmental Authority, the area is not covered under a sensitive area hence CEA approval is not needed. The approval will require to be obtained from the Forest Department for the implementation of project where the proposals need to be submitted to the Forest Department for Approval

11.4 Other approvals

i. Approval from regional Geological Surveys and Mines Bureau will be obtained for transportation and disposal of earth, rocks and mineral debris
ii. Approval for extraction of materials - Approval from Geological & Mines Bureau (GSMB) is needed (if necessary only).
iii. Approvals from Palinda Nuwara Pradeshiya Sabha will be obtained for the disposal of waste and plant litter.
iv. Approval through the Divisional Secretary from the district office of Ministry of Defense will be obtained for the sites if requiring rock blasting.

11.5 Consent/ no objection/ legally bound agreement from the private land ownerships

Signing a legally bound agreement between the private land owners, chief incumbent of the temple and the project implementing authority will be made 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 1.

Table 1: The 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 Provincial Eng.: Office & CEA Submission of application Respond to comments Approvals								
Approval from DFC, DWLC Submission of application Respond to comments Approval								
Other approvals GSMB Ministry of Defense (Depends on the requirement)								
Consent/ no objection from the private land ownership								

12. Environmental Social Management Plan (ESMP)

Measures to manage and or mitigate the impacts and risks, especially the impacts and risks identified in Sections 8 & 10. This will be included in the specific recommendations and requirements of the ESMP.

12.1 Resettlement action plan

Will not be applicable to this site as there is no project based resettlement.

12.2 Evacuation of people: arrangements to move people from the site or areas immediately adjacent to the site, or from high-risk areas up-slope/down-slope or downstream from the site

There are occupied houses in the hazard zone instructed to evacuate, but continue to live in the same location. These houses may have a life threatening impact during the construction. Also the Athweltota temple is in the high risk category. As possible activation of slide during the construction phase may occur, and also as the mitigation work has a strong influence to the aggravation of slope failure risk, it is logical to consider that the risk is linked with project works. Therefore a temporary evacuation system is strongly recommended to this site.

Also, the Environmental, Social and Health and Safety unit of PMU should pay special attention to implement the warning systems and ensure evacuations of people at this site. Further, measurers should be taken to minimize all possible risks on the community from the boulder fall, debris flows and etc.

12.3 Procedure for removal of damaged structures, facilities infrastructure

Meaningful consultation should be done to get the landowners agreed for removal of structures. The owner may require removal of the structure at the project cost as it has no future value. But, signing a legally bound agreement between the land owner and the project implementing authority allowing no-objection to remove the structures is mandatory. During this process following is recommended as a minimum

i. Thorough consultation with the land owner to get his consent
ii. Allow land owner to extract/ or extraction by the contractor on behalf of the land owner any valuable items from the structures
iii. Project bear the cost of removal of the structure

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

May be applicable as moving vehicles, construction machinery and excavation works may damage roads, structures and water supply lines etc.

12.5 Public awareness and education - needed for following areas

i. Programs to inform and educate people in the vicinity and the school population about the risks posed by landslides.
ii. Requirement for special awareness for communities with potentially high risk during construction phase; short-term early warning measures (evacuation), and measures related to construction and land-use.

12.6 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 removal of tree species. Sufficient emphasis should be made to consider conservation of trees if important tree species are found intervene with designs	High
ii. Habitat connectivity and animal trails If large fraction of vegetation is required to be cleared in ecologically fragile habitats for permanent structures or for access, or if deep drains etc. The designs should include habitat connectivity features, animal trails and vegetation strips and etc. even if the impact are localized. Construction of deep long drains if required, proper safety measures should be included to minimize deaths to wild animals who would fall and die. Such safety measures may include climbing steps at selected locations so that animals can climb up and save their lives. If large debris barriers are to be included between the slope and the stream, consider keeping connectivity of animals trails that might be disturbed by large structures	Very high

iii. Conservation of water resources This involves extraction of water both surface and sub-surface. The water extracted is in relatively good quality. In a well thought design this extracted water can be conveyed in such a manner that the water can be accessed by wild fauna as well as the neighboring communities for bathing and other domestic purposes, even as drinking water.	Very high
iv. Interruption to water supplies Analysis of design for drainage control should consider whether proposed mitigation measure would dry out the natural springs on the mitigation slope. If drying out of springs is significant, permanent design solution for domestic water should be provided for the affected parties. Such solutions could be storage and distribution for extracted water (extraction of water both surface and sub-surface) to be used as a source of drinking water.	Very high
v. 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. Service of landscape architect may be important for the design of suitable mitigation structures.	Very high
vi. Consideration of green environmental features As many of the mitigations works are carried out in ecologically sensitive habitats, It is recommended to consider green environmental designs as much as possible in the designs e.g.: use of local vegetation species for erosion control, combination of plants to sustain species diversity in the environment, avoiding inclusion of potentially invasive species & etc.	Very high
vii. Workers/ commuters and community safety Activation of slide may occur during construction phase and may pose threat to workers and commuters. Therefore, design based safety consideration such as berms, safety nets etc. should be considered.	High
viii. Erosion control structures In drainage management, water is extracted and conveyed to nearby streams often through culverts. During rainy season the flow in these drainage structures can be significantly high and this may cause stream bed and bank 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. A natural stream with potentially high aquatic diversity flows at the toe area of the failed slope.	High
ix. 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 etc. should be considered if drain water is expected to be directed to natural streams. The materials used for structures should be chosen carefully so as to withstand local weather conditions with high durability. Designs should specially consider corrosion prevention techniques if steel structures are used and geotextiles if fine sediments are prone to enter sub drains.	Very high

12.7 Mitigation of impacts during the construction phase

12.7.1 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 and 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.

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 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 (near stream bank)	Highly Relevant
2002.2 2)	Noise and Vibration	Highly relevant
2002.2 3)	Cracks and damages to the buildings	Highly relevant (temple buildings/houses)
2002.2 4)	Disposal of waste (littering near stream banks)	Highly relevant
2002.2 5)	Disposal of refuse (near stream banks)	Highly relevant
2002.2 6)	Dust control	Relevant
2002.2 7)	Transport of Construction materials and waste	Relevant
2002.2 8)	Water	Relevant
2002.2 9)	Flora and Fauna	Highly Relevant
2002.2 10)	Physical and cultural resources (temple)	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 (pollution)	Relevant
2002.2 16)	Disruption to public	Highly relevant
2002.2 17)	Utilities and roadside amenities (road to temple)	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	Optional
	Reporting and maintenance of records	Relevant

2003. Working Conditions and Community Health and Safety (school children)		
2003.2	Safety organization and communication	Highly relevant
2003.3	Child Labor and Forced Labor	Highly relevant
2003.4	Safety reports and notification of accidents	Highly relevant
2003.5	Safety Equipment and Clothing	Highly relevant
2003.6	Safety inspections	Highly relevant
2003.7	First Aid Facilities	Highly relevant
2003.8	Health and safety information and training	Highly relevant
2003.9	Plant equipment and qualified personnel	Highly relevant

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

12.7.2 Site specific mitigation

Table 4: Site specific ES & HS migratory measures

Mitigation item	**Project implementation phase**	**Responsibility**
i. Disturbance to flora and fauna The contractor should not deviate from the design without permission from the PMU; fell of forest trees, clear large section of forests etc. Construction activities should be carried out with minimum disturbance to wild habitats. The wild fauna, niches (dens of wild animals) if found should be protected or relocate safely without harming the animals Hunting and poaching wild animals and collection of valuable forest specimens are prohibited under the fauna and flora protection ordinance and hence such activities are strictly prohibited. Intentional and unintentional Setting of fire to forest area should be strictly controlled.	Construction	Construction Contractor
ii. Minimize erosional impacts during construction It is recommended that mitigation works involved with site clearance, slope reshaping, removal of debris etc. are avoided during rainy season. Therefore, it is imperative that site works in upslope mitigation are carried out in the dry season before rainy season begins and avoid such activities on upslope area in the wet season as much as possible. This should be considered in project planning stage. Effective silt traps should be made to cut down sediment laden runoff entering the stream in the down slope.	Site preparation and construction	Construction Contractor

iii. Disposal of construction waste The contractor should pay special attention with respect to disposal of construction waste. Such waste if generated should store properly without getting washed off and dispose according to approved procedures by the PMU. Under any circumstance construction waste should not be released to the temple premises or deposit near river banks etc. Contractor should obtain the approval from the Baduraliya UC for disposal of solid waste at approved locations	Site preparation and construction	Construction Contractor
iv. Noise pollution The heavy noise generating activities should be discontinued during Poyadays and during large public gatherings such as in delivering sermons, Poojas etc**.** in the temple The priest should be made adequately aware of planned heavy construction activities before execution	Site preparation and construction	Construction Contractor
v. Vibration impacts Vibration generating activities should be done within the prescribed limits specially to avoid damage to old temple structures. Cracks in the temple buildings should be monitored before, during and after completion of the project. Suitable compensation should be made if damages/ cracks due to construction work occur in the buildings	Site preparation and construction	Construction Contractor
vi. Disruption to water supply lines Potential disruption to water supply lines and facilities in the hilly mountain should be avoided. Before commencing the construction, alternative supplies should be provided if the lines are interrupted.	Site preparation and construction	Construction Contractor
vii. Water for construction Water for construction works should be obtained only from the approved places. Water in the temple sources should not be used for construction and should be under approval from relevant authority	Site preparation and construction	Construction Contractor
viii. Dust and aerosol control screen The heavy dust generation activities should be carried out with sufficient care. Adequate water spaying is recommended to this site.	Site preparation and construction	Construction Contractor

ix. Managing disputes between construction workers and public and workers code of conduct The PMU should make the contractor aware on all potential disputes between contractor workforce and devotees that should be properly managed. Following are recommended for contractor's workforce. • Proper awareness, education on code of conduct, monitoring and punishing. • Define project activity zone with restricted access to other areas in the temple. • Workers cannot use water sources of the temple without proper permission. • Workers cannot use sanitary facilities of the temple, on site sanitary facilities should be arranged to avoid possible open defecation. • The contractor should not use children for any form of project related works (direct/indirect) • The heavy machinery operators should be extremely cautious in operation of machinery as possible accidents will be high. • Full time watchmen should be kept in the risk area to ensure safe movement of heavy machinery and vehicles • Discontinue construction work on Poya days and religious festival days of Buddhist • The electrical wiring systems and layout should be done with proper safety measures approved by the PMU to ensure that accidents mainly to children from electric shocks are prevented • Parking and storage areas should be done in approved locations by the PMU • Establish a system of vigilance to monitor the behaviour of the workforce and the movement and address immediately any dispute that would rise during construction phase • Ensure strict code of conduct in the worksite is maintained. They include No alcohol, no smoke, indiscipline noisy behaviour, any form of sexual abuses with female devotees. • The workers should not enter the worship places with untidy un acceptable dresses or use worship places for resting during construction without a purpose	Site preparation and construction	Construction Contractor
x. Working hours The construction activities should be in accordance with priest of the temple. Noise, vibration and dust generation activities should be carried out not disturbing religious activities of the temple. If night time operations are required to achieve project targets such works should be carried out with adequate safety measures.	Construction	Construction Contractor
xi. 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

xii. Historical/ cultural/religious important findings Whenever chance finds are made during the works, the contractor shall immediately inform to the Project Manager.	Construction	Construction Contractor
xiii. Warning dissemination The hermitage building should be evacuated throughout the construction phase. Proper warnings/ safety signs should be made at the construction site preventing entry by public, hazard risks etc.,	Construction	PMU Construction Contractor
xiv. Households living in high risk areas It is advised that holding of religious activities and public gatherings are avoided during heavy rainy period while responding to NBRO landslide hazard warning alerts.	Construction	PMU & the priest in the temple
xv. Workers health and safety i. 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. Additionally, ii. Work should be discontinued for sufficient time period during rainy period as working on unstable slopes will be highly risky in the rainy season. iii. A good warning system and fulltime watchmen is highly recommended for this site for both worker and commuter safety. iv. Safety barriers and safety nets should be installed at places of risk to protect workers and commuters from boulder falling risk v. Onsite sanitary facilities should be made available for the workers, and sanitary waste should be properly disposed.	Construction	Construction Contractor
xvi. Fire hazard and forest fires The electrical lines should be places safely to ensure no leaking of current and sparks, burning in the construction should be prohibited	Construction	Construction Contractor

13. Monitoring requirements specific to the site

Following monitoring plan is recommended during the construction phase.

Table 5: Environmental and Social monitoring plan; construction phase

Monitoring requirement	**Parameters**	**Frequency**
Baseline monitoring	Water quality	Once*
	Pre crack survey of the buildings of the temple (Shrine room)	Once*
	Air quality: particulate matter	Once*
	Ground vibration	Once*
	Background noise measurement	Once*

During Construction	Crack survey of the high risk school 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 *
	Micro habitat assessment	Once ***
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	
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 *** Micro habitat assessment should be conducted by a competent authority approved PMU as required by the FD	
Reporting requirements	**Stream water quality** – Comparison with ambient water quality standards published by the CEA, 2017 **Pre 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. **Micro habitat assessment:** Micro habitat assessment report, recommendations with habitat impact mitigation as per the ToR of FD	

14. Grievance redress mechanism for this site

The consultants ES officer is responsible for establishing the grievance redress mechanism for this site **with special consideration for following impact communities;** a) Chief incumbent of temple b) Occupants of nearby houses. *(Reference: Environmental and Social Management Framework for recommended procedure for establishment of grievance redress mechanism).*
Also, it is recommended to keep a grievance box in the temple premises

15. Information disclosure

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

Table 6: Proposed scheme of information disclosure

Information	Proposed agencies	Mode of information disclosure
i. Project plan (site details, design , implementation arrangements)	District CEA, DFC, DWLC, District Secretariat, Divisional Secretary, RDA, State land owners, 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, DFC, DWLC, AIIB, Principal of the school	Meetings, District Coordination Committee, submission of relevant report to sign agreements, approvals and consents
		During consultation

iii. Monitoring reports (baseline and during construction)	District CEA, DFC, DWLC, 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, DFC, DWLC, RDA, Divisional Secretary, Police, State Land Owners, Grama Niladhari, District Office NBRO, AIIB and relevant parties as appropriate	Written and verbal communications, submission of relevant reports
v. Decisions taken and progress review meetings pertinent to ES matters	District CEA, DFC, DWLC, RDA, Divisional Secretary, Police, State Land Owners, Grama Niladhari, District Office NBRO, AIIB and relevant parties as appropriate , principal of the school	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**
27/09/2018 @ 11.30 hrs	Forest Department	Mr Upul Vijayantha – Range Forest Officer
05/10/2018 & 14.00 hrs	Central Environmental Authority	Mrs.Chandrika Hewage Deputy Director –CEA Kalutara District

Annexure I: Drone image of the project area

Annexure II: Images of the consultation

Fig a: Consultation with the GN, Mr B L Jayaratne

Fig b: Consultation with priest, Warakagoda Kassapa thero in the Gangaramya temple

Fig c: Statue of lord Buddha, followers, the Buddhist gods and temple art work of famous temple artist ; Soluis Mendis

Fig d: Debris flow path of the landslide which miraculously escaped the temple building without harm

Annexure III: Report on the Stakeholder Consultation: Kalutara District

Date: 27/09/2018 and 05/10/2018		
Institution	**Name and designation of the contact officer**	**Concerns raised**
Forest Department	Mr Upul Wijayantha Range Forest Officer	✓ The Forest Department has no objection on the project Following matters were emphasized. ✓ Regarding the project implementation, he said that mitigation proposal with draft layout should be submitted to Conservator Forest and approval to be obtained. • If plants are used for remediation prior approval should be obtained
Central Environmental Authority	Mrs Chandrika Hewage Deputy Director – CEA Kalutara District	✓ **CEA has no objection on the project** ✓ According to her no concern or recommendation is required for the mitigation of the site

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

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

i. The design to be accepted by the RDA: The project implementing agency should submit detailed design report to RDA with a formal request on nature of approvals required. PMU should prepare above documents and should submit the documents to RDA regional office.

ii. RDA regional office will evaluate the proposal and may call for project briefing. The PMU should provide necessary briefing as appropriate

iii. On the approval by RDA an agreement will be signed between RDA and Project implementing agency to access the site, erect structures, and implement mitigation works.

iv. A conditions that would include is

- A proper handing over of the project is required after the mitigation
- RDA will do the maintenance after mitigation
- It is emphasised that during the construction the contractor should use Personal Protective Equipment
- At all times, the contractor shall provide safe and convenient passage for vehicles, pedestrians, and traffic safety measures, barricades, flagmen and for the night work, lights and illumination should be provided.
- Construction waste/ excavated materials should not be a nuisance to public/commuters

Annexure IV: Study team

Name	Designation	Position in the study
TDSV Dias	Director/ ESSD/NBRO	Team leader
SAMS Dissanayake	Senior Scientist/ESSD/NBRO	Senior Environmental Scientist
Prabath Liyanaarachchi	Scientist/ ESSD/NBRO	Environmental scientist
H Kusalasiri	Technical Officer/ESSD/NBRO	GIS/Demographic data /survey support
Harsha Ekanayaka	Officer in charge-Kalutara District office	Geologist

Annexure V: List of references

1. NBRO site investigation report on landslide disaster at Athweltota landslide
2. Contractor's obligations for Geriatric Environmental and Social Management Plan- Sri Lanka Landslide Mitigation Project-AIIB
3. Environmental and Social Management Framework-Sri Lanka Landslide Mitigation Project -AIIB
4. Resettlement Planning Framework- Sri Lanka Landslide Mitigation Project -AIIB