Site Specific Environmental and Social Management Plan

(SSE & SMP)

Site No. 27
Sri Abhinawarama Viharaya, Lihiniyawa
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
ES	Environmental & 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
NBRO	National Building Research Organization
RDA	Road Development Authority
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 **Sri Abhinawarama Viharaya - Lihiniyawa** of 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.27, Package-8, Kalutara District, Abhinawarama Temple, Lihiniyawa

Site Details

i. The proposed site is a temple located at 848/ B, Lihiniyawa Grama Niladhari Division (GN Division) of Wallallawawita Divisional Secretariat Division (DS Division), Kalutara District of Western Province. The location address is, Abhinawarama temple, Lihiniyawa, Mahakalupahana.
ii. Sri Abhinawarama temple is located on the left hand side of upper slope near the 6/4 and 6/3 culvert of Horawela – Pelawatte – Pitigala road (B158) at Lihiniyawa in a hill slope. To obtain land for development several cut and fill modifications have been made to original slope geometry.
iii. Nearest town to the site is Matugama, about 10.3 km from the site.
iv. GPS reference of the site is 6 .460525 N & 80·165386 E.: Ref. Fig 1.Google Map of the location.

v. The site belongs to Abhinawarama temple, Lihiniyawa – land under Vihara Dewalagam Act of Sri Lanka

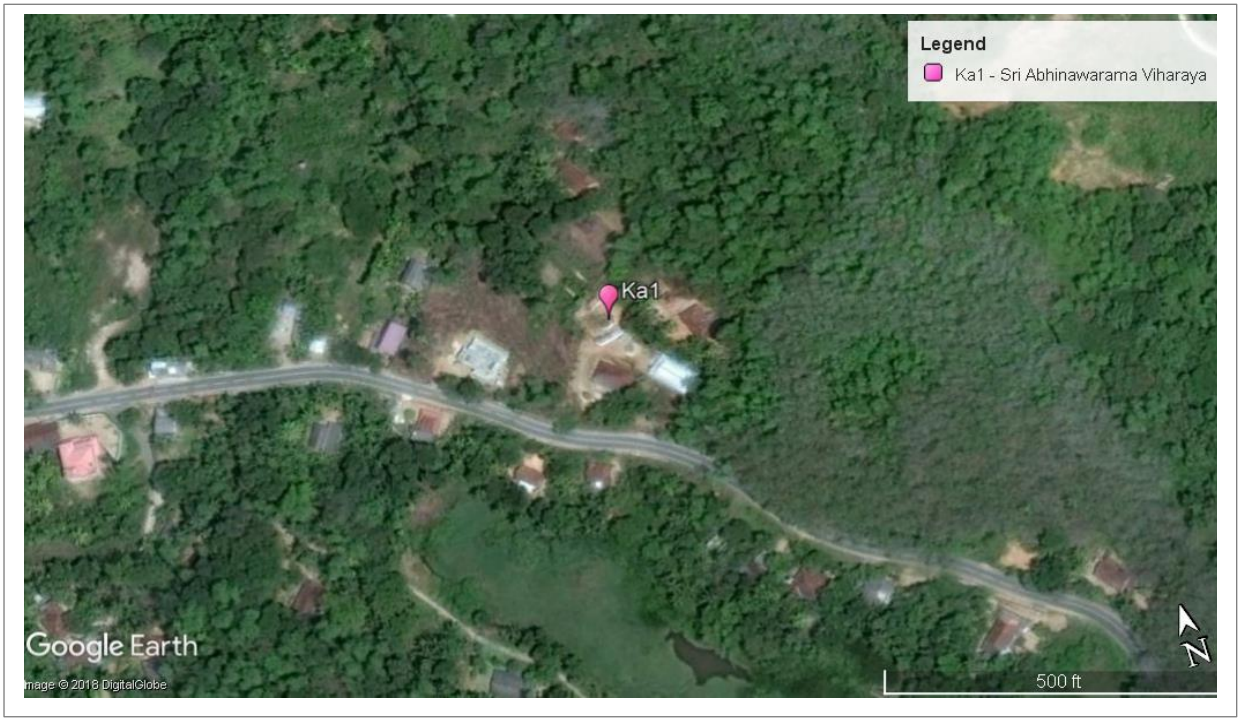

Fig 1: Google image of the proposed landslide mitigation site.

3. Landslide hazard incident details

Initially a failure had occurred on 14.06.2014 at this location, and it was a cutting failure near the hermitage of the temple. The slope had destabilized again on 26th May 2017 following an extreme precipitation event exceeding the rainfall 300 mm.

The damages occurred due to the incident

The location where the failure had occurred is on South –West escarp slope of the ridge, this slope is trending towards the North- West direction. The incident had resulted cutting failures at 2 places. One at the hermitage of the temple and the other adjoining the Bo tree. Due to this cut slope failure, the open space between rear wall of the hermitage and the vertical cut has been filled with debris. From the second failure, a portion of the retaining wall of the Bo-tree has been collapsed. At the inspection dislodged earth piles were observed behind the retaining wall of the Bodhi tree.

i. The collapse at the hermitage had damaged the forest vegetation in the area.
ii. There were no casualties due to the incident.
iii. The incident had not caused damage or cracking to other buildings in the temple.
iv. The retaining wall of the Bo-tree was partially damaged.

Refer figure 2; the images of the project area.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Fig 2a: Cutting failure near the Bhoodhiya</td><td>Fig 2b: Area of cut slope behind the hermitage.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Fig 2c: Hermitage of the Temple, the cutting failure had occurred on the slope behind this building. The natural forest vegetation on the hill crest is observed.</td><td>Fig 2d: Temple seen from the downslope area.</td></tr>
</table>

Fig 2: Images of the project area

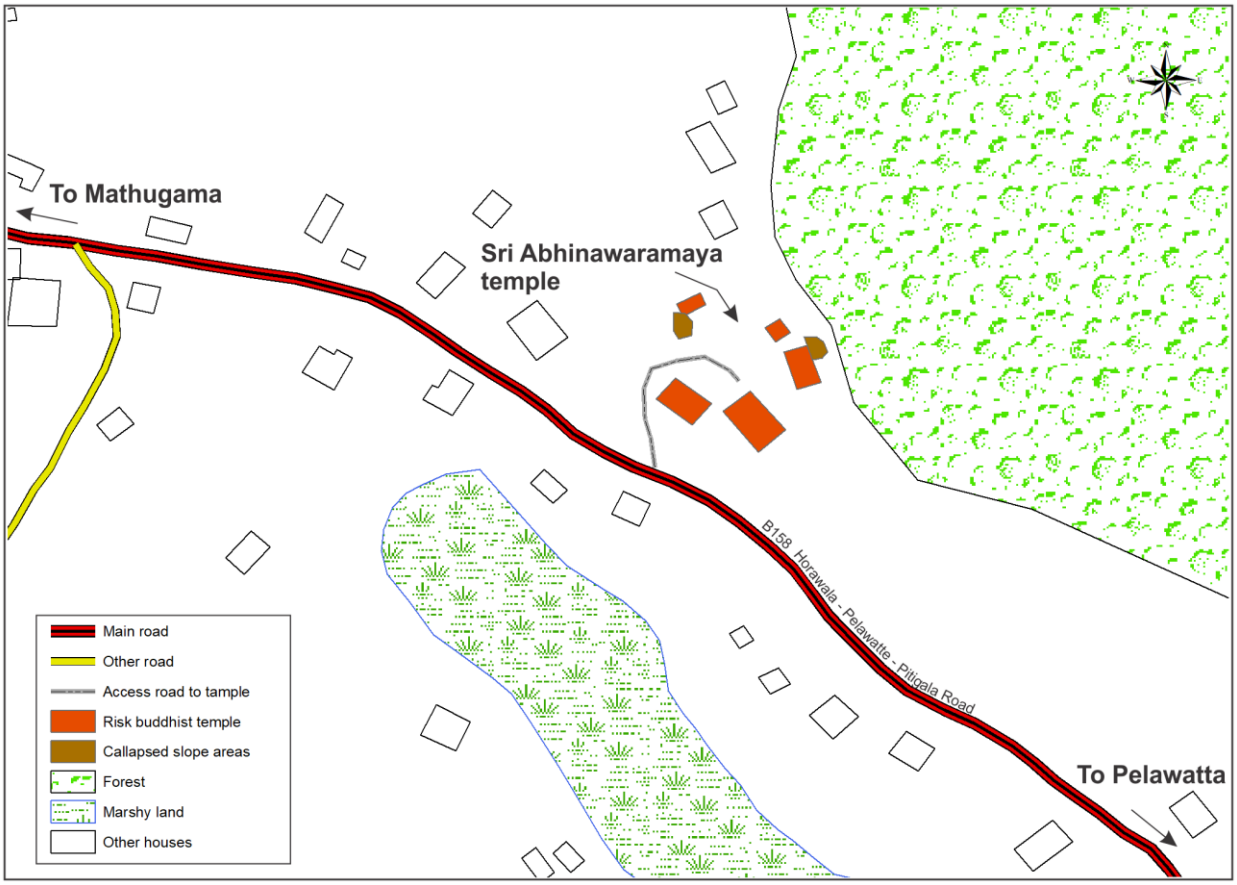

Fig 3: Diagrammatic interpretation of affected slope area and buildings due to ground movement

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

NBRO has inspected the sites and inspection report was given. In this report, NBRO has identified the hermitage as high risk with potential future failure, and had advised the priest to evacuate the hermitage building during rainy days. Other than evacuation warning, no physical remediation measures were taken to reduce the potential risk.

Evacuations: Only one priest (Rev. Molkave Vijithananada) reside 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 and areas adjacent to the landslide and current level of risk

The affected site is at Abhinawarama temple, Lihiniyawa. This is a small temple, but complete with all religious infrastructure for a complete temple of Buddhist devotees. The infra-structure includes a shine of Lord Buddha with the statue, Stupa for sacred relics of Lord Buddha, a Bo-tree, the hermitage, large hall for Buddhist sermons and etc. Several cuts have been made to the original slope time to time, to obtain space to house these buildings and structures. The stupa was under construction at the time of inspection. Above, the failed slope on the mountain crest is a natural forest vegetation.

According to the priest the temple in this location is about 70 years old. About 200 families in the village who are largely Buddhists pay religious devotion to the temple such as attending to Poya day religious ceremonies, the children in the village attend to Sunday School every week, several other religious functions dedicated to Buddhists such as Katina Pooja (religious event for devoted priests

during rainy season) etc. take place in this temple. Also the temple is a center for several welfare activities of the village too.

As no any physical remedial measures were done to stabilize the slope and hence the destabilized slope sections at the two locations are at risk of future failure. The potential failure risks could be considered high as the slope is relatively steep. Due to this, especially the priest and the villages who are attending to various religious functions are exposed to high risk from potential failures

If the site is left un-attended further propagation of slope instability leading to failure of the slope may occur. This will result damage to hermitage and, area of Bo-tree affecting the devotees and religious functions.

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

The affected site is a Buddhist temple which has buildings at different elevations, the sloping terrain have been largely modified for buildings and walkways and steps. Original forest vegetation has been cleared to construct buildings. Natural forest vegetation is present on the upslope area which provide shade and protection against slope erosion. Disturbed vegetation with some tree cover present on the sloppy downslope sections. The trees in the temple premises are mainly homestead species. The common tree species that were observed in the site are Jack, Palmyra, breadfruit, Olive and the ground layer consisting of grasses and herbs common to homesteads in the area. A land plot cultivated with cinnamon trees is also found above the temple buildings. Natural forest vegetation exists in the crown area of the hill called "Kumaran Kanda ". According to the villagers wild animals such as samboo, monkeys, wild bores, and hedgehogs characteristic to lowland rainforests inhabit the forested area. Some bird species were also found in the temple premises and forested hilly area typical to low land rain forests. There are three houses, located close to the access road of the temple. These lands were given to these occupants through Jaya Bhumi deeds. An abandoned paddy field can be seen at the lower part of access road near the main road.

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

i. The Bodhi tree, hermitage, and other buildings of the temple
ii. The priest, worshippers, devotees in the Buddhist temple and the religious events
iii. The children of Sunday school
iv. The natural forest cover and its micro ecology

7. Description of the works envisaged under the project

The proposed mitigation works will be largely concentrated on i) slope modification by changing slope geometry and reinforcement by retaining walls ii) surface drainage improvement and iii) surface erosion control.

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

8.1 Positive impacts

The proposed site is a Buddhist temple in the Lihiniyawa village. According to the priest the temple is in existence for about 70 years. The temple in this location is significant in religious, cultural and social perspective. The next nearest temple is located at about 2 km from this location which is out centered from this village and the people.

According which the priest, the Bo-tree is a seedling from Ananda Bodhi branch, India. A sacred Bodhi for Buddhists originally planted about 2500 years in India. The tree is a scared religious tree for Buddhists in the village, as a place of worship.

As the temple has been in this location over 70 years actively interacting with villages forming very strong social and cultural network, therefore it's existence at this very location is highly significant to Buddhists (who are the vast majority in the village).

The improved slope stability with the proposed structural mitigation will enhance significantly the safety of the priest and the religious places (Bo-Tree, and the hermitage, the safety of devotees of the temple and the functions. Therefore, the mitigation work has a strong positive impact on over all social and cultural sustainability of the village and Disaster Risk reduction of temple infra-structure and the life of people.

8.2 Negative impacts

The work is confined to an area which is already disturbed by a slope failure. Therefore, Negative impacts are much localized and limited mostly to construction period.

8.2.1 Loss of access to land and future development activities

The mitigation activities will be carried out in the temple premises. Currently the hermitage building adjacent to the cut slope occupied by the priest despite NBRO's advice to evacuate the building during rainy days. The project will not result loss to land ownership of temple, neither the project will require removal of this building. However, the priest may require to evacuate the building temporarily during the construction phase as potential risk of failure will be high during the construction phase. The construction activities will not require removal of telephone lines and electricity line etc. However, during the site inspection a water storage tank was observed. The water is store in an overhead tank closer to the hermitage. These structure has a potential to be damaged during the construction phase.

8.2.2 Ecological, biological impacts, and fauna and flora

There is a natural forest cover in the affected slope. It is very much undisturbed on the crown area. However the vegetation on down slope, the cuts and failed slope is disturbed. The crown drains that will be constructed behind the hermitage in the crest area may require removal of vegetation which include felling of forest tree species. However other areas do not have trees or vegetation patches of ecological importance. As the construction of drains are limited to the affected slope the impacts on vegetation due to direct project actions are localized.

Nevertheless, the contracting parties may disturb the natural vegetation due to negligence, careless construction activities and even due to intentional felling of trees with high timber value. This will have locally significant impacts on flora and on ecology.

8.2.3 Impact on the drainage pattern of the area

The proposed mitigation measures will have very marginal impacts on the drainage. As the works are localized and as there is no stream in the proximity the change to drainage will not cause a significant impact on the hydrological regime in the area.

8.2.4 Erosional impacts and stream bed alterations

The project activities will open the slope for surface erosion during the construction phase. Therefore the impacts are significant. There are no water streams nearby hence the impacts on bank erosion, stream bed scouring river bed scouring will not be significant.

8.2.5 Water pollution impacts from construction activities

The project actions are much localized and will not involve excavations and slope modification of large areas. Therefore, although there is a surface erosion in the exposed slopes the load of sediments generated will not be high enough to cause sediment pollution in the streams. Therefore, water pollution impacts from erosion and sediments are not highly significant in this site.

8.2.6 Open defecation and waterborne infections spread during construction phase

As site is located within a temple in an open area possibility of open defecation is low.

8.2.7 Impacts on the downstream water uses

Since there are no water stream closes to the site impact will be insignificant.

8.2.8 Solid waste disposal issues

Haphazard disposal of Solid waste; various types of waste such as litter, food waste, construction waste will be generated and may store or dispose on site. The littering and hap hazard storage and disposal of solid waste in and around the temple will create inconveniences to the priest, devotees, students of Sunday school can block the drains 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. Therefore, **environmental impacts of poor management of solid waste in this site is highly significant**.

8.2.9 Air pollution impacts

Construction activities that contribute to air pollution include: land clearing, operation of diesel engines, demolition, burning, from storage, transportation disposal of construction materials, construction waste and working with toxic materials (blasting chemicals). During construction, it generates high levels of dust typically from concrete, cement, wood, stone, and silica. The effect will have locally significant impacts on the devotees if heavy air polluting activities are carried out during special religious activity days.

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 to the temple. The day time noise generated from the machinery will disturb the classes of Sunday school and other religious functions, Hence **the impacts of noise is considered significant at this site**

If heavy machinery is operated, the vibration can affect the buildings in 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 and devotes will visit the temple for religious activities.

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 access the site (specially children) there may be a risk of being subjected to accidents by the heavy machinery.

8.2.14 Explosive hazards and hazardous materials

Affected slope has no large rocks, hence it is highly unlikely that rock blasting will encounter

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

As the site is located away from a road within the temple premises the safety on commutes will be very much low except the fact that some heavy locomotives such as excavators, rollers, water bowsers, trucks and lorries carrying refuses etc. on road may pose risk of accidents as the road is relatively a narrow one. However, as the construction work is not a large scale one frequency of moving of such heavy vehicles on road will be low.

However, the temple is a public place where devotees from different ages and backgrounds with poor knowledge on construction risk participate in various religious activities. The unsafe electrical connections, machinery operations etc. may pose a risk on the public (specially youth and children). Hence the impacts on public safety during construction phase is significant.

8.2.16 Workers safety during construction

The heavy construction machinery may be used in limited work spaces. 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

The priest; Rev. Molkave Vijithananada of Abhinawaram temple was consulted during the site visits. He expressed the fear of living under risk. He described the history and the significance of the temple at this location and cultural/religious and community services centred around in the temple. According to him the people in the area are mainly self-employment representing the local labour force in rubber plantations, factories and constructions. He stated that this is an old village of Sinhalese Buddhist community. The Temple is the religious, cultural and community centre for these villages, and the temple offer monthly Poya day sermons, Sunday schools for Children, Vas Pinkam (special devotions for Buddhist priest who perform religious dedication during rainy season), welfare activities such as sermons on the deaths of villages, provide community facilities such as elders society, society to assist the communities when a family member is deceased. However, current risk of landslides is badly threatening the existence of temple according to the priest.

The temple's Bo tree is a vegitatively propagated section Ananda Bo tree of India (which in existence for 2500 years). And sacred relics of Lord Buddha are in the temple.

The priest emphasised further the importance of temple at this location indicating that nearest next temple is almost 2km from this location and dedicated to other villages. Usually, that is quite far as a

village temple. According to the priest about 200 families are currently permanent devotees centred around the services of the temple

The priest further expressed full support to the project and agreed to provide facilities within the priest's boundaries. The priest was informed of the project details and on the requirement to sign the agreements for "no objection "for the project and permission of the access and to carry out construction work within the premises, and verbal consent was obtained during the visits.

Mrs. N.S.P Athukorala, G N officer of Lihuniyawa and members of temple devotees' society were also consulted during the field visits. According to them they will give their consent as the temple is important to be there for villages, and expressed willingness to support to make the project success.

9.1 Stakeholders involved in the consultation any recommendations or agreements reached in the consultations (Ref. annexure III)

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

10.1 Ecological, biological impacts, and fauna & flora

The contracting parties may disturb the natural vegetation due to negligence, careless construction activities and even due to intentional felling of trees with high timber value. This will have locally significant impacts on flora and on ecology.

10.2 Solid waste disposal issues

Solid waste can be generated pollute the soil, and leave various environmental impacts if proper disposal mechanism is not in place during the construction period. Therefore, **environmental impacts of poor management of solid waste in this site is highly significant**.

10.3 Air pollution impacts

Construction activates will have locally significant impacts on the devotees if heavy air polluting activities are carried out during special religious activity days.

10.4 Noise pollution, vibration, blasting, impacts during construction, potential damage to buildings, infrastructure

The day time noise generated from the machinery will disturb the classes of Sunday school and other religious functions, Hence **the impacts of noise is considered significant at this site.**

10.5 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 project activities will be carried out in a public place

10.6 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. If unauthorized persons accesses the site (especially children) there may be a risk of being subjected to accidents by the heavy machinery.

10.7 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 and devotees in the temple premises for religious activities.

10.8 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 (especially children) there may be a risk of being subjected to accidents by the heavy machinery.

10.9 Impacts on downstream service provision (water supply, sewage, electricity, etc.)

The water supply to the temple will be obtained from a dug well in the downslope and will be pumped up to the Hermitage and other places where water is required. The natural springs in the uphill of the mountain is used as a domestic water source for few families in the down slope. The construction work will certainly involve drainage improvement of the slope by constructing cut off drains, horizontal drains etc. This will lower the groundwater table and as a result some of these springs will run dry causing significant water scarcity issues for houses in the down slope.
Further if water table is brought far below the root zone of forest trees. There is possibility of dying some of the sensitive forest trees. However such impacts can be only locally significant.

10.10 Households living in high-risk or medium-risk areas adjacent or near to the site (up-slope, down-slope, downstream, etc.)

The construction pose high risk on public safety, noise and vibration impacts, and cracks in buildings of the temple.

10.11 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

10.12 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

The temple is a public place where devotees from different ages and backgrounds with poor knowledge on construction risk participate in various religious activities. The unsafe electrical connections, machinery operations etc. may pose a risk on the public. Hence the impacts on public safety during construction phase is highly significant.

10.14 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 largely common to any landslide mitigation site. Such common E & HS issues have been discussed in the **ESMF**. Worker safety requirement in the construction site is more detailed under 2003 5: Safety equipment and clothing in the section 2003:

Working conditions and community health and safety in the Bidding document. Also there is a risk of Snake bites during the construction work in forest area.

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.

10.16 Cracks in the buildings due to vibration impacts

If heavy machinery is operated, the vibration can affect the buildings in 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** the sensitive structures are i) Hermitage ii) retaining wall of the bo-tree area iii) Shrine room.

10.17 Fire hazard and forest fires

Unsafe electrical wires, careless burning of waste and intentional setting of fire to forest etc may trigger fires and forest fires. The impacts of fire hazard are highly significant for this site.

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 Baduraliya Urban council.

11.2 Approval to implement the project in the specified site

Approval from the land owner (the priest)

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

The lands above the temple boundary is reserved forest under the jurisdiction of department of forest. However, boundaries are not clear as the lands have not been surveyed and demarcated by the Forest Department. Approval may require from the Forest Department for i) if construction works extend to forest areas ii) for felling of trees above the girth 18cm.

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 Walallavita 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.

v. Approvals from regional office of Ceylon Electricity Board will be required for power supply for site operation.

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

Signing a legally bound agreement between the priest 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

The nearest building (hermitage) may have some impacts in the form of structural damage during the project actions due to ground vibration induced by heavy machinery operation. Before the construction the building should be evacuated.

12.3 Procedure for removal of damaged structures, facilities infrastructure

This risk may not be triggered in this site. There some damaged walls in the Bo-tree area, but can be removed without big obstructions.

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 buildings and structures in the temple. Suitable compensation mechanism should be in placed to compensate affected parties based on damage assessment.

12.5 Public awareness and education- needed for following areas

i. Programs to inform and educate people in the vicinity and the devotees 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), safety and measures related to construction and land-use.
iii. Awareness programs to workers on behavioural conduct and discipline inside religious places.

12.6 Design based environmental/ social management considerations

Following environmental and social design considerations are recommended for this site 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 forest trees if important tree species are found in designed sections.	Very 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. are to be made the designs should include habitat connectivity features, animal trails and vegetation strips and etc. even if the impact are localized.	Very high
iii. Conservation of water resources Analysis of design for drainage control should consider whether proposed mitigation measure dry out the natural springs on the mitigation slope. If drying out of springs is significant permanent design solution should be provided for the affected parties. Such solutions could be providing facilities such as water supply lines and storage for extracted water (Extraction of water both surface and sub-surface) to be used as a source of drinking water. 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. Although Not highly significant the overall drainage management design should carefully consider water table drawdown and possible dying of forest trees. Extreme water table dropdown beyond the required below the root zone should be avoided as much as possible.	Very high
iv. 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.	Moderate
v. 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.	High
vi. 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	Very high
vii. 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	Very high

corrosion prevention techniques if steel structures are used and geotextiles if fine sediments are prone to enter sub drains.	

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	Highly Relevant (Religious Place)
2002.2 2)	Noise and Vibration	Highly relevant (Religious Place)
2002.2 3)	Cracks and damages to the buildings	Highly relevant (Old temple building)
2002.2 4)	Disposal of waste	Highly relevant (Religious Place)
2002.2 5)	Disposal of refuse	Highly relevant (Religious Place)
2002.2 6)	Dust control	Highly Relevant (Religious Place and devotees)
2002.2 7)	Transport of Construction materials and waste	Relevant
2002.2 8)	Water	Relevant
2002.2 9)	Flora and Fauna	Relevant
2002.2 10)	Physical and cultural resources (temple)	Highly Relevant (Religious Place)

2002.2 11)	Soil Erosion	Relevant
2002.2 12)	Soil Contamination	Relevant
2002.2 13)	Borrowing Earth	Relevant
2002.2 14)	Quarry Operations	Not relevant
2002.2 15)	Maintenance vehicles and Machinery (pollution)	Relevant
2002.2 16)	Disruption to public)	Highly relevant (Religious Place and devotees)
2002.2 17)	Utilities and roadside amenities (road to temple)	Relevant
2002.2 18)	Visual environment enhancement	Highly Relevant (Religious Place)
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	Relevant
	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 to fell forest trees, Clear large section of forests etc. Construction activities should be carried out with minimum disturbance to wild life habitats. The wild fauna, niches (dens of wild animals) if found should be protected or relocate safely without harming the animals Hunting and pouching wild animals and collection of valuable forest specimens are prohibited under the fauna and flora protection ordinance and hence such activities should be strictly controlled.	Site preparation and construction	Construction Contractor
ii. 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. Contractor should obtain the approval from the relevant Urban Council for disposal of solid waste at approved locations	Site preparation and construction	Construction Contractor
ii. 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. Dust screens to cover open vents of building in the downslope is recommended (wet)	Site preparation and construction	Construction Contractor
iv. Noise pollution The heavy noise generating activities should be discontinued during Poya days and during large public gatherings such as in delivering sermons, Pooja etc**.** The priest should be made adequately aware of planned heavy construction activities before execution	Construction	Construction Contractor
v. Vibration impacts Vibration generating activities should be done within the prescribed limits to avoid damage to structures. Cracks in the buildings should be monitored before, during and after completion of the project. Suitable compensation should be made if damage cracks due to construction work occur in the buildings	Construction	Construction Contractor

vi. Disruption to water supply lines Potential disruption to water supply lines in the hilly mountain should be minimized properly before commencing the construction. Alternative supplies should be provided if the lines are interrupted	Site preparation and construction	Construction Contractor
ii. 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 under approval from relevant authority	Construction	Construction Contractor
i. Managing disputes between construction workers and public **The** PMU should made contractor aware on all potential issues with contractor workforce and devotees that should be properly managed. Following are recommended for contractors workforce ii. Proper awareness, education, monitoring and punishing. iii. Define project activity zone iv. Workers cannot use water sources of the temple v. Workers cannot use sanitary facilities of the temple vi. The contractor should not use children for any form of project related works (direct/indirect) vii. The heavy machinery operators should be extremely cautious in operation of machinery as possible accidents will be high. viii. Full time watchmen should be kept in the risk area to ensure safe movement of heavy machinery and vehicles Other ix. Discontinue construction work on Poya days and religious festival days of Buddhist x. The electrical wiring systems and layout should be done with proper safety measures approved by the PMU ensure that accidents mainly to children from electric shocks are prevented xi. Parking and storage areas should be done in approved locations by the PMU xii. 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 xiii. Ensure strict code of conduct in the worksite is maintained. They include No alcohol, no smoke, indiscipline noisy behaviour, The workers should not enter the warship places with untidy un acceptable dresses during construction without a purpose	Construction	Construction Contractor
ii. Working hours The construction activities should be in accordance with chief priest of the temple. Work after 6 pm should be avoided. Adequate no entry / danger signs and monitoring should be established so that public are not permitted in the project area Noise, vibration and dust generation activities should not be carried out on days of religious activities and on Sundays (day of Sunday school is held).	Construction	Construction Contractor

ix. 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., Adequate night lamps should be provided so that night time accidents (public and workforce) will be minimum. Safe electrical systems should be installed for construction work. The safety officer should make sure that line is disconnected during no work times	Construction	E & S Unit of PMU
x. 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
xi. Households living in high risk areas It is advised that holdings of religious activities and public gatherings are minimised during heavy rainy period while responding to NBRO landslide hazard warning alerts	Construction	PMU ES officer and priest of the temple.
ii. Workers safety Construction activities during night and in heavy rainy period should be avoided as much as possible to ensure the safety of construction workers. There is a risk of Snake bites during the construction work in forest area.	Construction	Construction Contractor
iii. Fire hazard and forest fires The electrical lines should be placed safely to ensure no leaking of current and sparks, burning in the construction should be prohibited	Construction	Construction Contractor

12.7.3 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	Pre crack survey of the high hermitage and shrine room buildings	Once*
	Air quality: particulate matter	Once*
	Ground vibration	Once*
	Background noise measurement	Once*
Construction phase	Crack survey of the 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 *
	Drying of springs in the water supply lines to community	Regular ***
Operational phase	Drying of springs in the water supply lines to community	Regular ****
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 *** Contractor ES officer **** Agency recommended by PMU	
Reporting requirements	• **Pre crack survey of the high risk Houses**-Professional report • **Ground vibration**-as per The interim standards on vibration for the Machinery, Construction activities and Vehicular movements, CEA • **Background noise measurement** –Extraordinary Gazette No.924.1, May 23,1996, CEA • **Air quality particulate matter**- The National Ambient Air Quality standards stipulated under the Extraordinary Gazette, No. 1562/22 August 15, 2008 -Central Environmental Authority of Sri Lanka.	

13. 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) Priest of the temple, b) Occupants of nearby houses. C) Devotees of the temple. Also it is recommended to keep a grievance box in the temple premises *(Reference: Environmental and Social Management Framework for recommended procedure for establishment of grievance redress mechanism).*

14. Information disclosure

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

Table 6: Proposed scheme of information disclosure

Information	**Proposed agencies**	**Mode of information disclosure**
. 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,	Meetings, District Coordination Committee, submission of relevant report to sign agreements, approvals and consents
ii. Monitoring reports (baseline and during construction)	District CEA, DFC, DWLC, AIIB and relevant parties as appropriate	Progress meetings, special meetings, submission of relevant reports

v. 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	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**
08/08/2018 @ 13.00 hrs.	Forest Department	Mr Upul Wijayantha Range Forest Officer
09/08/2018 @ 10.00 hrs.	Divisional Secretariat	Mrs.Erandi Fernando Assistant Divisional Secretariat

Annexure I: Drone image of the project area

Annexure 1I: Images of the site condition and the consultation

Fig a: Consultation with Chief monk of the Sri Abhinavaramaya, Molkawe Wijithananda Theoro

Fig b: Collapsed wall around the Boodhiya.

Fig c: Consultation with Mrs N.S.P Athukorala, Grama Niladari of Lihiniyawa 848/B Grama Niladhari Division and Chandani Gamage, Representative of temple devotees' society.

Fig d: Abhinawarama temple seen from the mountain

Annexure III: Report on the Stakeholder Consultation: Kalutara District

Date: 08/08/2018 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 According to him no concern or recommendation is required for the mitigation of the site at the temple premises.
Central Environmental Authority	Mrs Chandrika Hewage Deputy Director – CEA Ratnapura District.	**CEA has no objection on the project** According to him no concern or recommendation is required for the mitigation of the site at the temple premises

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
Harshana Ekanayaka	Officer in charge / District office- Kegalle	Geologist

Annexure V: List of references

i. NBRO site investigation report on landslide disaster at Kalawana Gamini MMV – (Ref. Report No. (Ref. Report No. NBRO/ (L1)/17/027.
ii. Contractor's obligations for Generic Environmental and Social Management Plan- Sri Lanka Landslide Mitigation Project-AIIB
iii. Environmental and Social Management Framework-Sri Lanka Landslide Mitigation Project _AIIB
iv. Resettlement Planning Framework- Sri Lanka Landslide Mitigation Project _AIIB