

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

**Site No. 06
Kumari Kanda
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

1. Introduction.....	1
2. Location details and site description.....	1
3. Landslide hazard incident details.....	2
4. Description of any remedial measures already undertaken to reduce the potential risk.....	4
5. Description of the area of the landslide, areas adjacent to the landslide and current level of risk.....	4
6. Brief description on the surrounding environment with special reference to sensitive elements that may be affected by the project actions.....	5
7. Description of the works envisaged under the project.....	6
8. Identification of social and environmental impacts and risks related to the works.....	6
8.1 Positive impacts.....	6
8.2 Negative impacts.....	6
8.2.1 Loosing access to land and future development activities.....	6
8.2.2 Ecological, biological impacts, and fauna & flora.....	6
8.2.3 Impact on the drainage pattern of the area.....	6
8.2.4 Erosional impacts and stream bed alterations.....	6
8.2.5 Water pollution impacts from construction activities.....	6
8.2.6 Open defecation and waterborne infections spread during construction phase.....	7
8.2.7 Impacts on the downstream water uses.....	7
8.2.8 Solid waste disposal issues.....	7
8.2.9 Air pollution impacts.....	7
8.2.10 Noise pollution, vibration, blasting, impacts during construction, potential damage to buildings, infrastructure.....	7
8.2.11 Relations between workers and the people living in the vicinity of the site and possibility of disputes.....	7
8.2.12 Work camps and lay-down sites requirement.....	7
8.2.13 Risks of public accessing the site during construction.....	7
8.2.14 Explosive hazards and hazardous materials.....	8
8.2.15 Safety to the public from construction activities: high risk for commuters.....	8
8.2.16 Workers safety during construction.....	8
9. Public and Stakeholder Consultations - that have been held and/or will be held.....	8
9.1 Stakeholders involved in the consultations; recommendations or agreements reached in the consultations.....	8
10. Significant Environmental and Social Impacts: Social or Environmental impacts or risks that will require special measures on the part of NBRO.....	8
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.....	9
10.2 Erosional impacts and stream bed alterations.....	9

10.3 Impacts on transport infrastructure (especially temporary loss of road or rail access, risks of traffic congestion).....	9
10.4 Impacts on downstream service provision (water supply, sewerage, electricity, etc.)	9
10.5 Ecological, biological impacts, and fauna & flora.....	9
10.6 Impact on the drainage pattern of the area.....	9
10.7 Open defecation and waterborne infections spread during construction phase	9
10.8. Solid waste disposal and contamination of water.....	9
10.9 Households living in high-risk or medium-risk areas adjacent or near to the site (up-slope, down-slope, downstream, etc.).....	9
10.10 Areas used for businesses, agriculture or other within the area to be remediated	9
10.11 Areas used for businesses, agriculture or other immediately to the site.....	9
10.13 Need for people to enter or cross the site.....	10
10.14 Priority Health and Safety Issues - Specific H&S concerns that require measures that go beyond the standard contractual requirements for contractors.....	10
10.15 Child labour & forced labour.....	10
11. Clearances, no objection, consent and approvals required for the implementation of the project	10
11.1 Project implementation.....	10
11.2 Approval to implement the project in the specified site	10
11.3 Approval from Central Environmental Authority, Department of Forest, Department of Wildlife Conservation.....	10
11.4 Other approvals.....	10
11.5 Consent/ no objection/ legally bound agreement from the private land ownerships	11
12. Environmental Social Management Plan (ESMP)	11
12.1 Resettlement action plan.....	11
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	11
12.3 Procedure for removal of damaged structures, facilities infrastructure.....	11
12.4 Requirement for compensation for loss of property /uses due to project actions.....	11
12.5 Public awareness and education - needed for following areas	12
12.6 Design based environmental/ social management considerations	12
12.7 Mitigation of impacts during the construction phase.....	13
12.7.1 Construction contractors' requirement to comply with environmental and social management during the construction phase	13
12.7.2 Site specific mitigation.....	14
13. Monitoring requirements specific to the site.....	17
14. Grievance redress mechanism for this site.....	17
15. Information disclosure	18

List of Annexures

Annexure I : Images of the consultation	i
Annexure II : Report on the Stakeholder Consultation : Kalutara District	ii
Annexure III: Study team.....	ii
Annexure IV: List of references.....	ii

List of Figures

Fig 1 : Google image of the proposed landslide mitigation site.	2
Fig 2a: The failed slope section of the North Western boundary of the Sri Sudharsanaramaya.....	3
Fig 2b: The passage between the failed slope section and the Labour Department building where debris had deposited due to the incident.....	3
Fig 2c: Collapsed downslope area in the District Labour office.....	3
Fig 2d: Partially damaged retaining wall in the toe area.....	3
Fig 2e: Hermitage of the Sudharshanaramaya at risk (upslope)	3
Fig 2f: District Labor Office building at risk (downslope).....	3

List of Tables

Table 1: The tentative timeline for getting approvals	11
Table 2: Design stage Environmental & Social considerations	12
Table 3: Contractor requirement to comply with ES & HS	13
Table 4: Site specific ES & HS migratory measures	14
Table 5: Environmental and Social monitoring plan; construction phase	17
Table 6: Proposed scheme of information disclosure	18
Table 7: Level of information gathered through consulting institutions.....	18

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
LRRMD	Landslide Risk Reduction Management Division
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, social, and health & safety management measures to be considered in the project implementation.

This is the site specific environmental and social management plan for Kumari Kanda 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. 06, Package-8, Kalutara District, Landslide at Kumari Kanda

Site Details

- i. The site falls administratively under Kaluthara South Grama Niladhari Division (GN Division) of Kaluthara Divisional Secretariat Division (DS Division), Kalutara District of Western Province.
- ii. The nearest town to the site is Kaluthara, about 0.72 km from the site.
- iii. GPS reference of the site is 6345831 N & 80575198 E. Ref. Fig 1. Google Map of the location.
- iv. The land ownership is Department of Labor and Sri Sudharshanarma temple of Kumarikanda

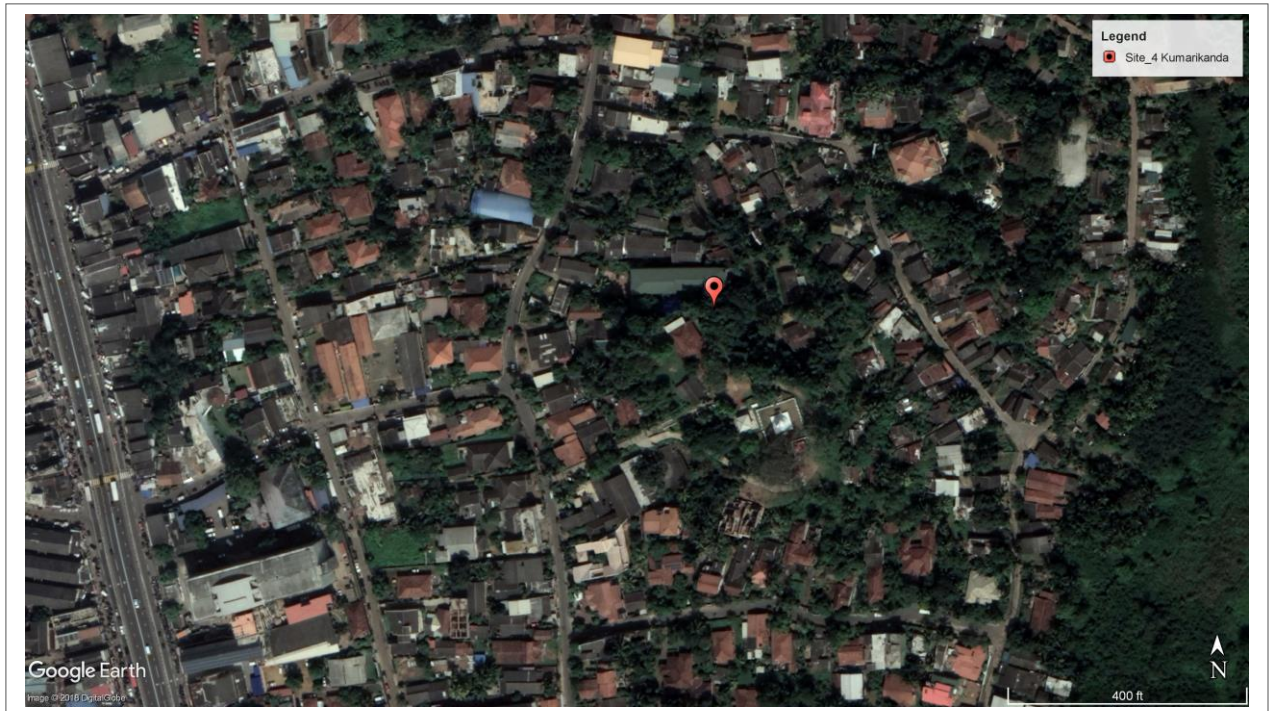


Fig 1: Google image of the proposed landslide mitigation site. Ref. Drone image for details -Annex 1

3. Landslide hazard incident details

A cut slope failure had occurred at this location in May 2017 triggered by a heavy precipitation event. This unstable slope cut has been collapsing time to time with the recurring heavy precipitation. The failure had initiated in the hill crest of Kumari Kanda (at the boundary of Sri Sudharshanarma temple on the upslope) resulting falling down of debris to the adjoining district labor office premises in the down slope. The Dislodged debris mass from the failure had deposited in the space between cut slope and the district labor office building.

The main cause of the slope instability is an improper vertical cut. A long vertical cut of about 150m in length had been made along the Southern boundary of the district labor office premises to gain space for building construction of Labour Department. The construction included a retaining wall on a vertical cut while largely disregarding engineered slope stability norms. Removal of toe support together with poor drainage management have made conditions favorable to initiate several cut slope failures while threatening the buildings, and the occupants in both upslope and down slope areas.

The damages occurred due to incident

The failures had damaged a part of the retaining wall, but had not caused any damage to the building of the Labor Department in the downslope. During repeated collapses the falling debris obstructed the passage between the vertical cut and the department building. According to the resident priest of Sri Sudarshanaramaya, Ven. Hakmana Thilakasiri thero and the OIC LRRMD - NBRO there is a tension crack on the upslope area and cracks in the hermitage building of the upslope. The incident had damaged a temporary hut located in the vicinity of the failed section on the upslope area but no casualties due to the incident.

Refer figure 2 the images of the project area.



Fig 2a: The failed slope section of the North Western boundary of the Sri Sudharsanaramaya



Fig 2b: The passage between the failed slope section and the Labour Department building where debris had deposited due to the incident



Fig 2c: Collapsed downslope area in the District Labour office



Fig 2d: Partially damaged retaining wall in the toe area



Fig 2e: Hermitage of the Sudharshanaramaya at risk (upslope)



Fig 2f: District Labor Office building at risk (downslope)

Fig 2: Images of the project area

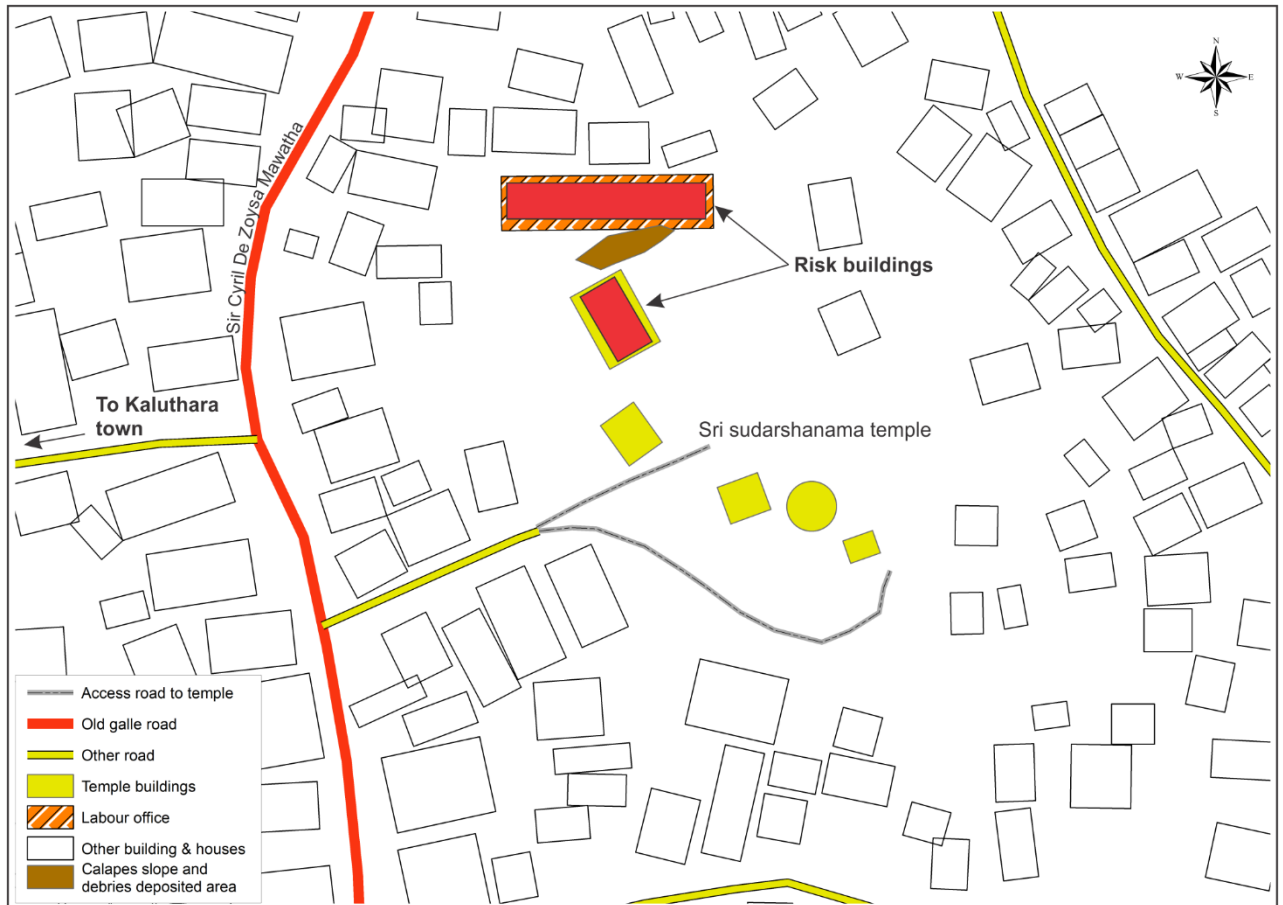


Fig 3: Diagrammatic interpretation of affected slope area and buildings due to ground movement

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

Following the incident, the Department of Labour has requested National Building Research Organisation to conduct an investigation. The NBRO had inspected the site and assessed the risk. According to OIC Kalutara District office of LRRMD, the slope section has reached a state of high instability with tension cracks and cracks in the buildings of Sri Sudharshanaramaya temple on the upslope area. The level of risk has been informed to both the management of Kalutara district Labour Department and the priest of the temple. Both parties have been instructed to evacuate the building during heavy precipitation and to follow the early warning alarms of NBRO during extreme precipitation events. There were no any form of physical remediation measures done to improve the stability of the slope.

Evacuations: Respecting the risk informed by the NBRO the ground floor office section of the building (District Labour office) was evacuated.

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

The location

The slope where the failure had occurred is the Kumari Kanda hillock. The area is a relatively a flat terrain with an isolated hillock named “Kumari Kanda”. The flat terrain is largely an urban residential area. Schools and Government institutions, a kovil and settlements are located in the surrounding area. On the hillock, a Buddhist temple “Sri Susharshanarama Viharaya” is situated. The main access road to the site is Old Galle road, presently it is called Sir Cyril De Silva Mawatha. This road and the Colombo -Galle (A2) main road run parallel to each other. This road can be accessed through several cross roads from Colombo -Galle A2 main road.

Sri Sudharshanarama Temple - Kumari kanda (upslope)

The Sri Sudharshanaramaya located at the hillock has an important legendary history. Before 300 years this hillock was a *Solee* fort who came from India and invaded coastal zone of Sri Lanka. A king named Wickramapandaya had ruled this areas and his princesses had lived in a castle built on this hillock. Due to this reason, this hillock was named “Kumari Kanda” which means the mountain of princess.

After the *Solee* ruled period, this location was converted into a temple by placing ruins of Lankathilaka Viharaya at Kalutara (now sacred Kalutara Temple) which was destroyed by *Solee*. According to the resident priest, Kumari Kanda temple is the oldest temple in the Kaluthara district. There were few historical ruins brought from old Lankathilaka Viharaya still remain in the temple premises. It include Temple Bell and some stone ruins. According to local information, the famous Kaluthara Bodhi tree and Kumarikanda temple’s Bodhi tree were trees of the same age. This historical Bodhi tree has been brought from Berma by king Wikramapandya. During 1950s this temple was a well-functioning Buddhist education centre for Bhikkus (pirirvena). Later, in 1970s the temple was isolated due to urbanisation, development of other Buddhist temples, and lack of attention by the people etc. At present, only one monk is residing in the temple. The temple is a complete Buddhist religious facility having all spiritual elements characteristic to Buddhist temple architecture such as Dharma shala (place for sermons), Pagoda, ancient Bodhi tree, hermitage, and shrine room and etc. The temple at this location is a significant landmark because from this site a unique aesthetic view can be captured, a calm environment and also an excellent view on horizon of the sea can be seen from this hillock.

Currently, the temple serves as a religious place for local Buddhist in the area. Several religious events such as monthly poya day sermons, dhamma sermons, special religious activity termed as Katina Pooja (dedicated for priests) etc. Sunday school for Buddhist children, several welfare activities in the village are operated centering this temple. About 50 houses associate with the temple for a wide range of religious, cultural and social activities

District Labour Office (down slope)

The district labour office of the Department of Labour and Labour Relations is located in the downslope of the failed slope. The building is a three story building; First floor is the Office of the Deputy Commissioner Western Province -and the second floor is occupied by the District Factory Inspecting Engineer’s Office. The total staff is 30 and no watchman. Mainly the institution provides labour related services such as, releasing 30% ETF, providing EPF of deceased persons. Around 100 persons come to get this service daily. Further, people visit the Labour office on Mondays and Wednesday, for labour inquiries and conflict solving. All the records of the employees of the district are kept in this place.

Current level of risk

Currently, the failed slope adjoining the district labour office and the temple are highly unstable and is subjected to erosion. According to NBRO investigations a tension crack and unstable sections on the slope pose future risk of failure risking people and functions of district labor office building in down slope area.

In addition, Sri Sudharshanarmaya temple at Kumarikanda which is an important historical Buddhist temple in the upslope area too is graded under high risk category. Tension crack in the temple premises poses high risk to the religious structures, events and the buildings of the temple. The damage to structures may result temple premises unsuitable to future religious activities and will impact on important religious concerns of local residents who are devotees of the temple. Further, the passage between the Labour Department building and the failed slope is commonly used by the visitors to access sanitary facilities. The failure may obstruct this passage, and in case of a sudden failure it can even result casualties.

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 slope mitigation site is located on a cut slope. Upslope area of the landside is a temple premises and downslope area of the landslide is district office of labour Department. Both these facilities will be at risk during the construction phase. The elements and services at risk during the project implementation are:

- i. Staff and public who come to the district labour office
- ii. The priests, worshippers, devotees in the Buddhist temple and the religious events
- iii. Important historical worship buildings and monuments of the temple
- iv. Occupants of the houses closer to the mitigation site
- v. The children of Sunday school
- vi. The commuters, and pedestrians of the Cyril de Silva road and road traffic

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

The slope failure incident and current hazard risk have created a psychological strain and distress on the staff of the district labour office, the devotee community in the village and the priest in Sri Sudharshanarmaya. The mitigation works will relieve the stress of them. The temple will be a safe place for devotees and religious functions can be performed in safe surroundings.

Currently temporarily relocated office section in the Labour department can return to its original place and can work in a safer surrounding. The improved slope stability with the proposed structural mitigation will enhance significantly the safety of labour office premises, the staff and the service seekers as a whole.

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 belong to the temple and the Department of Labour. The project will not result loss to land ownership of temple, neither the project will require removal of the buildings.

8.2.2 Ecological, biological impacts, and fauna & flora

There are no significant ecological or biological habitats within the study area and there will be no impact on them.

8.2.3 Impact on the drainage pattern of the area

There will be no change to drainage pattern in the area.

8.2.4 Erosional impacts and stream bed alterations

The proposed mitigation works will be largely focused on the upslope area. The slope reshaping may pose the slope more vulnerable to erosion especially in the rainy season. The excavations will generate runoff with high sediment load. Hence slope erosion impacts are significant at this location.

8.2.5 Water pollution impacts from construction activities

There are no water streams nearby, hence the effect on water pollution is not significant.

8.2.6 Open defecation and waterborne infections spread during construction phase

As the site is located in a built area possibility of open defecation is low.

8.2.7 Impacts on the downstream water uses

There is no stream or water springs nearby to the site. Therefore no any impact for downstream water uses.

8.2.8 Solid waste disposal issues

During the construction phase, two types of solid waste will be generated; spoils resulting due to construction activities and domestic refuse (food wrappers, plastic bottles) generated by the labour force. Since the site is located closes to the road, government office and the temple improper solid waste management can cause impacts on public and unpleasant, awful visual pollution. The effect is significant if proper solid waste disposal mechanism is not used by the contractor during the construction period.

8.2.9 Air pollution impacts

Construction activities that contribute to air pollution include: clearing, operation of diesel engines, excavations, burning, 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. Air pollution may have an impact on the staff of the labour office and the public coming to the labour office. The direct exposure risk of people to air pollution is high as the labour office is located nearby and significant number of people come to get the service from the labour office.

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 out in the proximity of the temple and district labour office. The noise generated from the machinery will disturb the religious activities in the temple and the services of district labour office. **Hence the impacts of noise is considered significant at this site.**

If heavy machinery is operated the vibration can affect the building of district labour office and 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 staff of the district labour office, devotees of the temple and also residents who are living nearby. Also there can be disputes regarding the vehicle parking spaces between the drivers and construction labour force.

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 from the neighbourhood of community. If proper camp management is not in place it may result several labour issues, social issues with community, conflicts for shared resources with the community, nuisances, and management of waste etc.

If temporary camps are built in the close proximity of the site, management of solid waste and sewage will be an issue. Therefore, **the 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, 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. 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

The construction activities are to be carried out adjoining a busy government institution, during construction phase in a limited space. This space will be obstructed by frequently moving machinery, loaders, trucks etc. The moving heavy machinery and construction vehicles may pose a risk of accident hazard on these public and staff.

8.2.16 Workers safety during construction

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; Ven. Hakmana Thilakasiri Thero of Sri Sudharshanarama temple Kumarikanda and the president of the temple devotee's society; Mrs. S Maddumabandara were consulted during site visits. According to them, hazard has made serious erosional impacts to the temple land resulting gradual decline of temple territory. The slope instability has made the temple premises unsafe to occupy and hold religious events.

Mr R.W.M. Podinilame, Deputy Labor Commissioner of Western Province zone number 2 was consulted during the field visit. According to him, the accommodation facilities will not be allowed in the labor office premises. The contractor could use the electricity and water subjected to compensation of the cost. Further, the labour force can use sanitary facilities in the Labour office subjected to proper sanitation and cleaning. He emphasized the possibility of dispute with the labour force and the staff of labour for parking facilities and the movements. He indicated that due to this slope failure drain system had got blocked time to time. Further, fear on falling of trees due to the slope instability.

The priest, the Deputy Labour Commissioner and the devotees were made aware of the project, the current level of risk, the intended mitigation, the funding mechanism and requirement to use the lands to access the site, to move construction machinery and to carry out mitigation works. Further, project benefits, both negative and positive environmental and social impacts were explained to them.

All parties were more than willing to accommodate the project, and agreed to provide facilities and lands in the temple premises and district labour office premises for construction activities.

9.1 Stakeholders involved in the consultations; recommendations or agreements reached in the consultations

(Ref: Annexure I- 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

The construction activities will take place in a location which is open to public. Further, the site can be accessed either from downslope (through labour department premises) or from temple premises (upslope). The construction workforce and machinery will have to use these common accesses. Further, the operations will have to be done in a congested and space limited environment. Under this situation project is exposed to high social vulnerability, safety issues and other logistical issues such as accessing, parking, using common facilities such as water, electricity etc. during the construction phase.

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

Since there are no water ways close to the site impact will be insignificant.

10.2 Erosional impacts and stream bed alterations

Erosional impacts on the upslope area is high if the work is envisaged during rainy weather periods. The water with high suspended solids may enter storm water drains during wet periods.

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

As the site is very much interior from the road full or partial road closure will not be required. However, moving machinery, material transportation will cause nuisance to pedestrians and commuters of the road because there are two schools and government institutions, and a kovil in the proximity to the site.

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

There are no impacts on downstream service provision.

10.5 Ecological, biological impacts, and fauna & flora

There are no significant ecological or biological habitats within the study area and there will be no impact on them.

10.6 Impact on the drainage pattern of the area

Will not be significant as the project area is confined.

10.7 Open defecation and waterborne infections spread during construction phase

Open defecation by the workforce and spread of water borne infections will not be expected because there is no stream nearby.

10.8. Solid waste disposal and contamination of water

Solid waste generated will 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.**

10.9 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 district labour office building and on the buildings of the temple.

10.10 Areas used for businesses, agriculture or other within the area to be remediated

This will not take place at this site.

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

The functions of labour office will be partially affected due to pollution such as dust, noise and vibration, congestion with accessing the site using parking lots and common facilities etc.

10.13 Need for people to enter or cross the site

Entry of ordinary people may occur due to intentional or unintentional purposes as project influence area overlaps with public (temple and labour office) places and people may be at risk due to operating machinery, vehicles, electricity, and may even the 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. Risk of hazard from vehicle and construction machinery
- iii. Risk from slope failure hazard

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 Kaluthara Municipal Council.

11.2 Approval to implement the project in the specified site

- i. Consent from the chief priest of the Sri Sudharshanarama temple.
- ii. Consent from the Commissioner of The Kaluthara District Labour Department

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. As there are no forest reservations and wildlife habitats; Department of Forest and Department of Wildlife Conservation approvals are not needed.

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 Kaluthara Municipal Council 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 Commissioner Labour Department, 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								
<i>Approval from the District Secretariat</i>								
Submission of application	—							
Project briefing		—						
Respond to comments			—					
Approvals				—				
<i>Approval from planning committee</i>								
Submission of application	—							
Project briefing		—						
Respond to comments			—					
Approvals				—				
Other approvals								
GSMB		—						
Ministry of Defense (Depends on the requirement)			—					
Consent/ no objection from the Labour Department and the temple				—				

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.

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

As possible activation of failure 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, measures 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

This may not be triggered in this site.

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

Special educational and awareness programs on landslide risk to both residents and workforce. Special educational programs to Contractors workforce on Health and Safety requirement during the construction phase. 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
<p>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.</p>	low
<p>ii. Habitat connectivity and animal trails If large fraction of vegetation is required to be cleared in ecologically fragile habitats as for permanent structures or for access, or if deep drains etc. are to be made the designs should include habitat connectivity features, animal trails and vegetation strips and etc. even if the impact are localized.</p>	not relevant
<p>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.</p>	Not relevant
<p>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.</p>	Low
<p>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.</p>	Low
<p>vi. Protective fencing in the upslope area for community safety The mitigation should consider a protective fence in the upslope temple premises to protect devotees and Sunday school children from falling risk.</p>	High
<p>vii. Erosion control structures In drainage management, water is extracted and conveyed to nearby surface water drains. During rainy season the flow in these drainage structures can be significantly high and this may cause additional loads. Hence the design should adequately consider flow speed breakers to reduce erosive flows entering storm water drains and drain along the roads.</p>	Low
<p>viii. 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</p>	

<p>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.</p> <p>The materials used for structures should be chosen carefully so as to withstand weather conditions with high durability. Designs should specially consider corrosion prevention techniques if steel structures are used.</p>	Very high
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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 (temple, road, public)
2002.2 2)	Noise and Vibration	Highly Relevant (temple, office)
2002.2 3)	Cracks and damages to the buildings	Highly Relevant (temple/, building)
2002.2 4)	Disposal of waste	Highly Relevant (temple,)
2002.2 5)	Disposal of refuse	Highly Relevant (temple,
2002.2 6)	Dust control	Relevant (Occupants)
2002.2 7)	Transport of Construction materials and waste	Relevant
2002.2 8)	Water	Relevant
2002.2 9)	Flora and Fauna	Low Relevant
2002.2 10)	Physical and cultural resources	Highly Relevant (temple)
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 (temple)
2002.2 17)	Utilities and roadside amenities	Highly Relevant (public, road)
2002.2 18)	Visual environment enhancement	Highly Relevant (temple,
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		
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
<p>Relevant: The section is relevant to the site as a common ESMP applicable to any site</p> <p>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</p> <p>Possibly relevant: This ESMP will be triggered if the site come across with relevant aspect during project implementation</p> <p>Not relevant: The section may not be relevant to this site under disclosed conditions</p> <p>Optional: require to be implement if needed only</p> <p>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</p> <p>Reference: Contractors Obligation for implementation of ESMP</p>		

12.7.2 Site specific mitigation

Table 4: Site specific ES & HS migratory measures

Mitigation item	Project implementation phase	Responsibility
<p>i. Minimize erosional impacts during construction</p> <p>The site clearance, removal of debris, reshaping etc should be planned during the dry season to minimize erosional impacts. Covering of slope with impermeable materials and installation of suitable silt traps are important to reduce sediment laden runoff . On-site storage of soil and debris should be minimized, if unavoidable should be covered until disposed.to prevent wash away.</p>	Site preparation and construction	Construction Contractor
<p>ii. Disposal of construction waste</p> <p>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 on-site permanently. Contractor should obtain the approval from the Kalutara MC for disposal of solid waste at approved locations</p>	Site preparation and construction	Construction Contractor
<p>iii. Noise pollution</p> <p>The heavy noise generating activities should be discontinued during Paydays and during large public gatherings such as in delivering sermons, Poojas etc. in the temple and on public days in labour office. The priest and management of Labour Office should be made adequately aware of planned heavy construction activities before execution.</p>	Site preparation and construction	Construction Contractor

<p>iv. Vibration impacts Vibration generating activities should be done within the prescribed limits specially to avoid damage to buildings. Cracks in the temple buildings should be monitored before, during and after completion of the project. Immediate rectification or Suitable compensation should be made if damages/ cracks due to construction work occur in the buildings</p>	Site preparation and construction	Construction Contractor
<p>v. Water for construction Water for construction works should be obtained only from the approved places. Water in the temple/ Labour office sources should not be used for construction and should be under approval from relevant authority</p>	Site preparation and construction	Construction Contractor
<p>vi. 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.</p>	Site preparation and construction	Construction Contractor
<p>vii. Use of common facilities Access roads Contractor should prepare a well thought plan to access the site by using common public access of the temple and the labour office. These should not be obstructed by the machinery during office hours, during the times of special religious activities Electricity The contractor may use the electricity facility of the labour department on a fair agreement to compensate the consumption and prior approval Water and sanitary facilities Water other than for construction and sanitary facilities may be sought from the labour department sources subjected to prior consent and to compensate the consumption and ensuring high cleanliness on the use of sanitary facilities</p>	Site preparation and construction	Construction Contractor
<p>viii. Use of common access and parking places (temple /labour office) The contractor should prepare the schedule of machinery transportation and parking schedule in such a manner that do not disturb the current land users. (Labour office and temple). Special attention should be made transportation times to avoid high traffic times, Consent of the land owners should be obtained for parking of vehicles and machinery within their respective places. Current limited parking place in the labour should not be obstructed by the construction machinery.</p>	Site preparation and construction	Construction Contractor
<p>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.</p> <ul style="list-style-type: none"> • 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. 	Site preparation and construction	Construction Contractor

<ul style="list-style-type: none"> • 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 during religious events. • 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 Buddhists • 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 that 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 		
<p>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.</p>	Construction	Construction Contractor
<p>xi. Historical/ cultural/religious important findings Whenever chance finds are made during the works, the contractor shall immediately inform to the Project Manager.</p>	Construction	Construction Contractor
<p>xii. Warning dissemination Proper warnings/ safety signs should be made at the construction site preventing entry by public, hazard risks etc.</p>	Construction	PMU Construction Contractor
<p>xiii. Workers health and safety</p> <ol style="list-style-type: none"> 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
<p>xiv. Public safety The site should be made with restricted entry to public from both upslope and downslope with entry barricades, no entry sign boards and etc.</p>	Construction	Construction Contractor

<p>Fire hazard and safety electricity Burning in the construction site should be prohibited. The electrical lines should be placed safely to ensure no leaking of current and sparks.</p>		
<p>xvii. Explosive chemicals On site use of explosive chemicals should be done by authorized personnel, once used remaining materials should be removed as soon as possible. Proper onsite chain of custody should be ensured for explosive materials.</p>	Construction	Construction contractor PMU

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	-
	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 in buildings	Continuous monitoring during heavy machinery operations **
	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	<p>* 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</p>	
Reporting requirements	<p>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</p>	

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 priest of the temple b) Deputy Labourer

Commissioner. (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, 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, AIIB, District labour commissioner, Priest of the temple	Meetings, District Coordination Committee, submission of relevant report to sign agreements, approvals and consents.
iii. Monitoring reports (baseline and during construction)	District CEA, AIIB and relevant parties as appropriate	Progress meetings, special meetings, submission of relevant reports
iv. Site inspections for environmental conformance workers health and safety	District CEA, 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, RDA, Divisional Secretary, Police, State Land Owners, Grama Niladhari, District Office NBRO, AIIB and relevant parties as appropriate , District labour commissioner, Priest of the temple	Meetings, submission of relevant reports
vi. Grievance redress mechanism	Relevant parties , District labour commissioner, Priest of the temple, 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: Images of the consultation



Fig a: Consultation with the Deputy Labour Commissioner R.W.M. Podinilame



Fig b: Consultation with president of the temple devotee's society; Mrs. S Maddumabandara



Fig c: Temple with 300 year ol Ancient Boodhi tree



Fig d: Dharma Serman hall of the temple located upslope of the slope failure



Fig e: Pagoda and the shrine room of the temple



Fig f: Exclusive aesthetic beauty and view of the surrounding area from the temple site.

Annexure II: 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	✓ No relevancy for the site
Central Environmental Authority	Mrs Chandrika Hewage Deputy Director –CEA Kalutara District	✓ CEA has no objection on the project ✓ No concern or recommendation is required for the mitigation of the site

Annexure III: Study team

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

1. NBRO site investigation report on landslide disaster at Kumari kanda 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