

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

**Site No. 13
Kalawana Town, Ratnapura District - Package 2
September 2018**

Prepared for:

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

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Abbreviations

AIIB	Asian Infrastructure Investment Bank
CEA	Central Environmental Authority
DFC	Department of Forest Conservation
DS	Divisional Secretary
DWLC	Department of Wild Life Conservation
EH & S	Environmental Health & Social
E&SU of PMU	Environmental & Social Unit of Project Management Unit
ESMF	Environmental and Social Management Framework
ESMP	Environmental Social Management Plan
SSE & SMP	Site Specific Environmental and Social Management Plan
GN	Grama Niladhari
GSMB	Geological & Mines Bureau
IUCN	International Union for Conservation Nature
LRC	Land Reforms Commission
NBRO	National Building Research Organization
RDA	Road Development Authority

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 (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 Kalawana town 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. 13, package-2, Ratnapura District, Kalawana town

Site Details

- i. The site falls administratively under Thapassarakanda Grama Niladhari Division (GN division) of Kalawana Divisional Secretariat Division (DS Division), Ratnapura District of Sabaragamuwa Province.
- ii. The site is located at Kalawana petrol Filing station; DKW Traders (Pvt) Ltd, Manna, Kalawana at Right Hand Side of Kalawana- Weddagala Road
- iii. The nearest town to the site is Kalawana and is in the scenic distance
- iv. GPS reference of the site is 6.530603N, 80.389833E. Ref. Map of the location Fig 1.
- v. The land ownership is a private land belonging to Mr Kasun Walikala



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

3. Landslide hazard incident details

The cut slope at the site had failed on 26th May 2017 due to heavy precipitation on May 24, 25 and 26 2017. In this location a cut slope has been made at the toe area of the slope to obtain space for buildings and structures and supported by a gabion wall which is an in appropriate structure to bear the load from the upslope. The excessive seepage in the upslope area had resulted increase in pore pressure leading to failure of the slope and the gabion structure. The cut in the slope, poor drainage, and in appropriate retaining structure had supported the failure at this site.

According to the Landslide Zonation Map of 1:10000 the location is categorized as “modest level of landslide hazard” and upslope of the location is categorized as “landslide is to be expected” (Ref. NBRO report NBRO/LRRMD/RT/L1/18/31/40059)

The damages occurred due to incident

The hazard has made a land width of 430 feet unstable while extending debris flow up to an area of 170 feet from the crown. The failure has completely damaged the Gabion wall and the access road to the quarters of Sampath Bank. Partial damage has occurred to building of the petrol filling station. Also, a tension cracks had appeared on the premises of Mrs Peledage Punchi Menike (on the crown of the slope) with several cracks on the walls of her house. Currently, several houses, commercial buildings and other service building between the Kalawana- Mathugama and the failed slope are at medium risk.

The incident had no casualties, as occupants had evacuated the houses and buildings. The Owner of the filling station is now constructing a concrete retaining structure on the failed slope, but, without proper drainage management measures. Two damaged houses in the proximity to failed slope is currently under renovation. The filling station is operating as normal and the occupants in the medium risk buildings continue their routine functions.

No significant crop/ agricultural lands damaged due to incident.

Ref. Fig 2: Images of project area



Fig 2a: Filling station in front of the landslide



Fig 2b: A damaged house due to landslide



Fig 2c: Retaining wall built by the land owner as a temporary measure



Fig 2d: Deposition of the mud and rock behind the damaged house.

Fig 2: Images of the project area

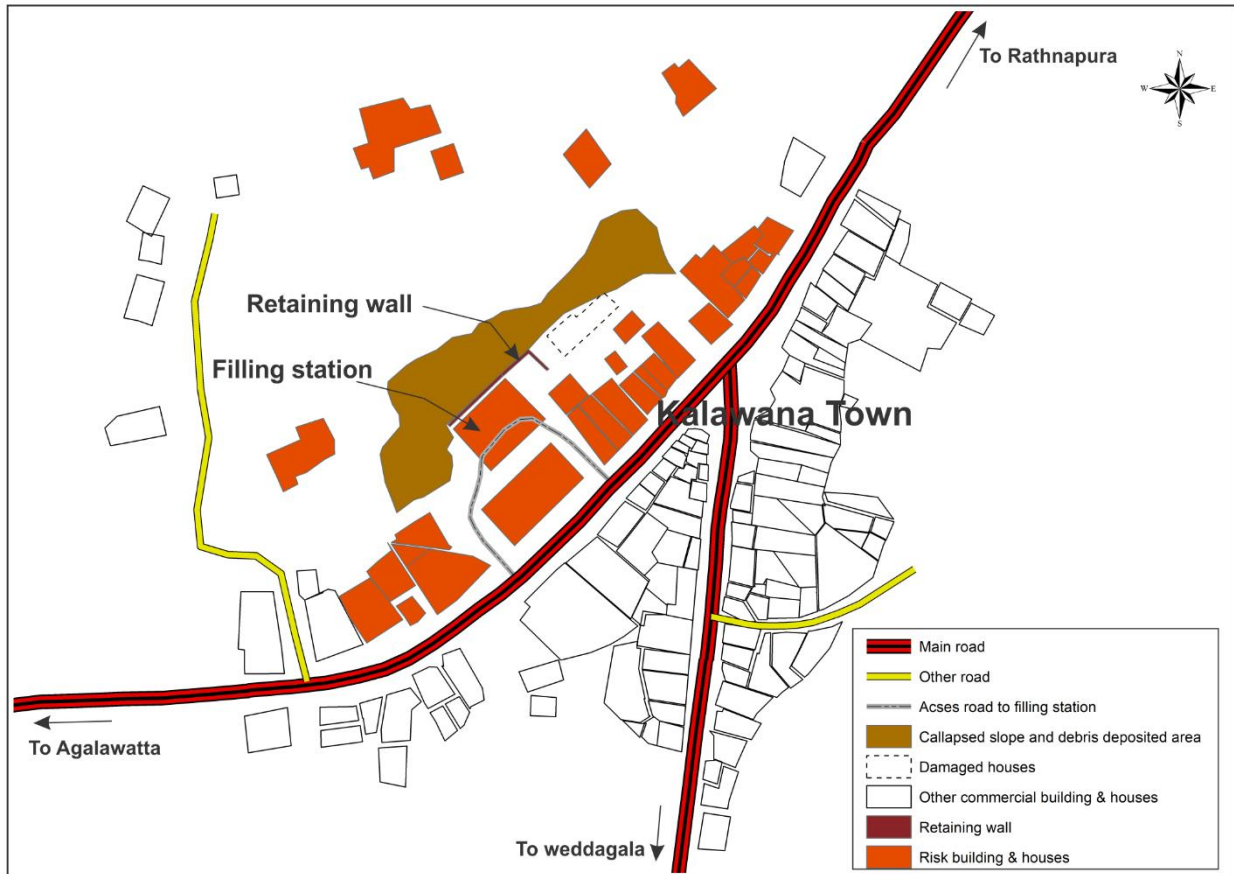


Fig 3: Diagrammatic interpretation of affected slope area and buildings due to ground movement

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

The owner of the petrol filling station is constructing a retaining wall at the back yard/ toe area of the landslide after the incident.

Evacuations: The occupants of two damaged houses have already evacuated the houses. Divisional secretariat of Kalawana had informed (12.09.2018) the owner of the filling station Mr Kasun Walikala to evacuate from the land due to geo instability of the nearby area based on investigation report of the NBRO district office Ratnapura. Other occupants of the buildings at medium risk have been informed to be alert and to respond to NBRO rain fall based early warnings.

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

The surrounding area of the failed slope is residential and commercial area in the Kalawana town owned by the private parties. The commercial facilities such as Bank, shops and the fuel filling station are situated alongside the main road. Behind these buildings congested housing units are located. On the crown area several houses with occupants are found. Due to this hazard DKW Traders (Pvt) Ltd, Manna, Kalawana is at high risk. The houses belong to following named owners are also at high risk; Mrs. Pelegage Punchimenike, and Quarters of Sampath Bank.

Following named houses, business places are marked as medium risk.

Table 1: Medium Risk Houses and Business Places

01. Gamini Samarathunga	11. Sunil Dissanayaka(House/Kasun Traders)
02 .H.M.Nimal Chandrasiri	12 .Ranjith Ranasinghe (Helasiritha/Chasees Hotel)
03. Siril Jayarathna	13. Thissa Krunarathna(Wasana Bakers/ Helasiritha Flora)
04. S.H.Samaranayaka(Building of Sampath Bank)	14. Lokuwaduge (Super Fashion)
05. Dhammika(J.S.P. Wine Stores)	15. Thissa Karunarathna(Karunarathna Motors)
06.W.G.G.M.Rodrigo(Padmasiri Book Shop)	16. W.P.N.Pathirathna(Kalawana Motors/Ruwan Stores)
07. S.H.Samaranayaka(Exercise hall/ Samaranayaka Stores)	17. Premarathna(P.G.D. Shoe Palace)
08. S.H.Samaranayaka(Abans Showroom)	18. S.B.Dissanayaka (D.Mobile/Rent a car/ Dissanayaka shop)
09. H.A.Nilani (House/ Marana Aurweda Shop)	19. K.P.N.Dewpriya, K.V.N. Deshrapiya, K.V.M.Shanthapriya (Building of Peoples Bank)
10. M.M.Ariyarathna Manike(Kukulegama Stores)	

The NBRO report indicates that these people are allowed to live their houses and carry out their activities in the buildings however, the people have to operate responding to warning alters where occupants have to move if the rainfall exceeds 150mm/ day or 75mm/ hour.

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

Surrounding area consists commercial and service buildings, houses, home gardens and the road infrastructure. No forested areas, wild life reservations, environmentally sensitive habitats found within the study area. No ecologically significant habitats found. The natural ecology of the area is greatly disturbed and displaced urban commercial and residential buildings and infrastructure.

Due to the project actions flowing will be affected

- i. Road traffic and commuters of the road and pedestrians
- ii. Occupants of the houses
- iii. DKW Traders Pvt Ltd, Manna, Kalawana and the customers
- iv. The lands owners in the construction area
- v. Current economic activities of the area

7. Description of the works envisaged under the project

The proposed mitigation works will be largely concentrated on change in slope geometry, drainage improvement and construction of a retaining structures.

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

8.1 Positive impacts

The mitigation will make currently unstable land stable securing the safety of filling station and its functions, houses both upslope and down slope, the commercial facilities on the roadside and the houses currently at high and medium risk

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 only to construction period as described below

8.2.1 Loosing access to land and future development activities

The mitigation work at this site is confined largely to the steep slope which has already failed at the boundaries of the lands of crown and down slope. Slope mitigation at this location is a must to make these lands stable. Considering the very nature of construction work in a confined area there will be no permanent loss to access or future development opportunities. However, temporary obstruction to access may occur during the construction period.

8.2.2 Ecological, biological impacts, and fauna and flora

The vegetation in the affected slope is already disturbed. The impacts on terrestrial ecosystems negligible as many project actions will be taking place on already failed or disturbed slopes.

8.2.3 Impact on the drainage pattern of the area

The project will improve the currently disturbed drainage in the location, and hence is not expected to cause significant changes in drainage pattern in the area

8.2.4 Erosional impacts and stream bed alterations

The mitigation works in this will focus largely on the drainage improvement. Therefore, during rainy season sediment laden flow of runoff is expected to enter the storm water drains in the Kalawana town.

8.2.5 Water pollution impacts from construction activities

Since there are no streams nearby the (within 100 m distance, the impact is not highly significant.

8.2.6 Open defecation and waterborne infections spread during construction phase

The effect is insignificant as the site is located in an urban area and adequate sanitary facilities are available in the near distances.

8.2.7 Impacts on the downstream water uses:

The water quality impacts from discharge of wastewater and pollutants to environment during construction phase is not very significant as there are no water ways nearby.

8.2.8 Solid waste disposal issues

Haphazard disposal of Solid waste can become a nuisance, can pollute the runoff and leave various environmental impacts if proper disposal mechanism is not in place during the construction period. The effect is significant unless a proper solid waste disposal mechanism is used during the construction period.

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, silica) and this can carry for large distances over a long period of time. Hence the project will have impacts on neighboring community; specially the workers at the petrol filling station and for the day today customers if the works are envisaged during dry weather periods.

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 there are buildings with occupants living close to the site. Hence the project will have impacts on neighboring community; specially the occupants in the houses and workers at the petrol filling station and for the day today customers.

Vibration can affect the stability of already cracked buildings during construction.

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

There may be disputes with the workers of construction site and the occupants in houses, and the workers of petrol filling station as all of them have to use common access paths.

8.2.12 Work camps and lay-down sites requirement

The solid waste and sewerage removal in the camp if not properly done will be a nuisance to the surrounding community.

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

Explosives may be used if the rock blasting is envisaged. This may pose risk due to unsafe use. As these operations are to be done on unstable slopes the risk of improper use of explosive and accidents from rock fragment are highly significant.

The filling station has underground fuel storage, mobile vessels transporting the fuel, storages of automobile lubricants etc. There is a possibility that the underground fuel storage facilities may get damaged if heavy loads apply from construction machinery and from ground vibration. Such damages may result leakages to vessels, long term undetected leakages and even contamination of ground water.

The unsafe project actions can (temporary electrical line shorts) trigger fire hazard. Hence fire risk is high at this location

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

As this is a busy filling station in the town, many use the station to fuel their vehicles. On the other hand several heavy construction machinery are expected to be operated at the site. The free space between the failed slope and the filling station and other buildings is very much low for simultaneous operation of both filling station functions and mitigation works. Therefore, disturbance to smooth operation of filling station, obstruction to passage, and risk of accidents from moving machinery is highly **significant during construction phase.**

8.2.16 Workers safety during construction

The worker safety during construction phase has risks common to any landslide mitigation 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 proprietor of DKW Traders Pvt Ltd was consulted during the visit. A meaning full consultation carried out with this person as most of the project activities will be taking places in his land including access to sites, use his passage for moving of vehicles etc. As this mitigation work is very much beneficial to him he has indicated his full support to the project including access for construction machinery. As there is a partially constructed retaining structure already there to secure filling station facility, it will be considered in the intended structural design for this site. Hence, requirement for removal of structures will not be needed. As the two houses, damaged by the collapse too belongs to the same owner, use of land for construction work will be permitted by him.

9.1 Stakeholders involved in the consultations: recommendations or agreements reached in the consultations.

Since the mitigation site is a privately own property stakeholder agreement (CEA, RDA, etc.) is not needed.

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

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

Improper disposal of oils and other harmful substances/contaminants from machineries, leakages from temporary storage tanks, solid waste and wastewater disposal/dumping from workers sites could occur causing adverse impacts on the environment. Since there is no water stream nearby the impacts will be localized and insignificant.

10.2 Erosional impacts and stream bed alterations

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

10.3 Explosive hazards and hazardous materials

- i. Explosives may be used if the rock blasting is envisaged. May pose risk due to unsafe application and potential fire hazard in the filling station.
- ii. Possibility of underground fuel storage facilities getting damage due to heavy loads apply from construction machinery and from ground vibration leading to leakages in vessels, long term undetected leakages and even contamination of ground water.
- iii. The unsafe project actions can (temporary electrical lines shorts) can trigger fire hazard. Hence fire risk is high at this location

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

- i. Construction will pose high risk on public safety, noise and vibration impacts,
- ii. Cracks in high and medium risk buildings and houses.

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

The mitigated site is located in a highly business area, Kalawana town. Several offices, small shops are in the vicinity. The moving machinery, noise, vibration may have impacts on occupants, business venders and on the buildings during construction.

The construction activities, moving vehicles and machinery will obstruct the parking spaces of filling station, commercial facilities and the bank

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

As this is a busy filling station in the town, many use the station to fuel their vehicles. On the other hand several heavy construction machinery are expected to be operated at the site. The free space between the failed slope and the filling station and other buildings is very much low for simultaneous operation of both filling station functions and mitigation works. Therefore, disturbance to smooth operation of filling station, obstruction to passage, and risk of accidents from moving machinery is highly **significant during construction phase**.

10.7 Need for people to enter or cross the site

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

10.8 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.

10.9 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 Kalawana Urban council

11.2 Approval to implement the project in the specified site from the state lands

Approvals from regional office of Ceylon electricity board will be required for power supply for site operation.

11.3 Approval from environmental authority, Department of Forest, Department of Wildlife Conservation

As project site is located in a privately owned land and not under jurisdiction of DFC or DWLC, hence these approvals are not required.

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 Kalawana Urban 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

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

Signing a legally bound agreement between the land owner 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 2.

Table 2: 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					—			
<i>Approval from state land owners CEB</i>								
Submission of application	—							
Respond to comments		—	—					
Approvals				—				
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. However, there are occupied houses in the risk zone instructed to evacuate, those people have already evacuated, the filling station continue to operate despite the risks imposed with the construction of retaining wall.

12.2 Evacuation of people

People have already evacuated from high risk houses. Other houses identified as medium risk may have some impacts in the form of structural damage during the project actions due to ground vibration induced by heavy machinery operation. (The scheme of compensation in case of damage to structures due to project may be considered).

12.3 Procedure for removal of damaged structures, facilities infrastructure

The project may not require removal of damaged structures as currently built retaining wall will be included in the design. The two damaged houses may not require removal as intended mitigation works are confined to failed slope section.

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

Possible compensations may be required at several elements as the project activities will take place on highly congested limited space. The possible damages requiring compensation may include

- i. Damage to filling station facilities/operations from moving vehicles and machinery
- ii. Damage to underground fuel storage facilities from loads applying from heavy machinery
- iii. Cracks from excavations and vibration on already damaged buildings
- iv. Cracks from excavations and vibration on medium risk buildings

12.5 Public awareness and education- needed for following areas

- i. Programs to inform and educate people in the vicinity about the risks posed by landslides and occupants in medium risk houses to respond to rainfall based early warning alerts of NBRO
- ii. Requirement for special awareness for filling station workers exposed to potentially high risk during construction phase from moving machinery
- iii. Awareness creation to Filling station management on fire hazard management

12.6 Design based environmental/ social management considerations

Following environmentally and socially significant design considerations are recommended.

Table 3: Design stage Environmental & Social considerations

Design feature	Recommended level of consideration for this site
i. Natural resource management and resource optimized designs Project specific designs should be considered to eliminate mass clearing of vegetation and minimum number of removal of tree species. Sufficient emphasis should be made to consider conservation of trees if important tree species are found	low
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.	low
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.	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. 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</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 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 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 weather conditions with high durability. Designs should specially consider corrosion prevention techniques if steel structures are used.</p>	Very high

12.7 Mitigation of impacts during the construction phase

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

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

Table 4: Contractor requirement to comply with ES & HS

Reference No. as per construction contractors obligation to ESMP	Item	Relevant to the project
2002. Environmental and Social Monitoring		
2002.2 1)	Storage on site	Highly Relevant
2002.2 2)	Noise and Vibration	Highly relevant
2002.2 3)	Cracks and damages to the buildings	Highly relevant
2002.2 4)	Disposal of waste	Highly relevant
2002.2 5)	Disposal of refuse	Highly relevant
2002.2 6)	Dust control	Highly Relevant
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	Possibly relevant
2002.2 11)	Soil Erosion	Highly relevant
2002.2 12)	Soil Contamination	Relevant
2002.2 13)	Borrowing Earth	Relevant
2002.2 14)	Quarry Operations	Not relevant
2002.2 15)	Maintenance vehicles and Machinery	Relevant
2002.2 16)	Disruption to public	Highly relevant
2002.2 17)	Utilities and roadside amenities	Highly relevant
2002.2 18)	Visual environment enhancement	Relevant
2002-5. Environmental Monitoring	Baseline surveys (air, water, noise , vibration, crack surveys)	Refer site specific monitoring plan
	Surveys during construction (air, water, noise , vibration, crack surveys)	Refer site specific monitoring plan
	Surveys during operation phase	Optional
	Reporting and maintenance of records	Relevant
2003. Working Conditions and Community Health and Safety		
2003.2	Safety organization and communication	Highly relevant(unstable combustible fuel storages)
2003.3	Child Labor and Forced Labor	Relevant
2003.4	Safety reports and notification of accidents	Highly relevant(unstable combustible fuel storages)
2003.5	Safety Equipment and Clothing	Highly relevant(unstable combustible fuel storages)
2003.6	Safety inspections	Highly relevant(unstable combustible fuel storages)
2003.7	First Aid Facilities	Highly relevant(unstable combustible fuel storages)
2003.8	Health and safety information and training	Highly relevant(unstable combustible fuel storages)
2003.9	Plant equipment and qualified personnel	Highly relevant(unstable combustible fuel storages)
<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</p> <p>Reference: Contractors Obligation for implementation of ESMP</p>		

12.7.2 Site specific mitigation

Table 5: Site specific ES & HS mitigatory measures

Mitigation item	Project implementation phase	Responsibility
<p>i. Dust and aerosol control screens Special screens etc. should be used if heavy dust or aerosol generating activities are envisaged</p>	Construction	Construction Contractor
<p>ii. Noise and vibration control The noise and vibration generating activities should be controlled and performed according to the recommended environmental regulations</p>	Construction	Construction Contractor
<p>iii. Water for construction Water for construction works should be obtained only from the approved sites</p>	Construction	Construction contractor
<p>iv. Need for people to enter or cross the site Possible unauthorized access to the site should be avoided by awareness, warning signs and vigilance by the contractor's full time watchmen.</p>	Construction	Construction contractor
<p>v. Workers health and safety 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, work should be discontinued for sufficient time period during rainy period as working on unstable slopes will be highly risky in the rainy season. Safety barriers and safety nets should be installed at places of risk to protect workers, commuters and the community in the downslope from boulder/debris falling risk</p>	Construction	Construction contractor
<p>vi. Alert on NBRO warnings The occupants in the houses identified as high/medium risk by the NBRO should be alerted on NBRO warnings during rainy days. Currently operating warning dissemination procedure should be strengthened to ensure that occupants are responsive on alerts. The Environmental and Social unit of PMU should take to step to implement response mechanism.</p>	Construction	E&SU of PMU
<p>vii. Removal of structures: Require consent from the land owners for the site works.</p>	Site preparation	E&SU of PMU
<p>viii. Precautions should be taken to avoid possible damage to filling station facilities/operations from moving vehicles and machinery Underground fuel storage facilities form loads applying from heavy machinery Cracks from excavations and vibration on already damaged buildings Cracks from excavations and vibration on medium risk buildings Skilled personnel should be used for operation of heavy machinery and vehicles, Necessary safety measures such as separations, sign boards, fulltime watchmen are compulsory at this site Compensation should be made for damages if encounter due to project actions</p>	Construction	Contractor
<p>ix. Awareness and education programs on the following are important to be implemented.</p>	During the project implementation	E&SU of PMU

<p>Programs to inform and educate people in the vicinity about the risks posed by landslides and occupants in medium risk houses to respond to rainfall based early warning alerts of NBRO</p> <p>Requirement for special awareness for filling station workers exposed to potentially high risk during construction phase from moving machinery</p> <p>Awareness creation/training to filling station and site workforce on management fire hazard</p>		
<p>x. Use of explosives Extreme care should be taken when using explosive at this site due to possible fire and explosion hazard. Only chemical blasting is recommended under strict control by skilled persons</p> <p>xi. Care should be taken to avoid possible heavy loading on the underground fuel storage facilities. As it may get damaged from heavy machinery.</p> <p>xii. Care should be taken for safe handling of heavy vehicles and machinery, and operations should be avoided during the times when mobile vessels transporting the fuel.</p> <p>xiii. Extreme care should be taken on the safety of temporary electrical wiring systems and unsafe project actions as they can (temporary electrical lines shorts) trigger fire hazard.</p>	Site preparation and construction	Contractor
<p>xiv. Erosion control and overland runoff management During the excavation work if the surfaces are to be exposed during rainy season it is recommended that it is covered appropriately to prevent erosion and generation of sediment laden runoff. Sediment laden runoff if generated should not let to flow through the bus stand premises, but should be directed properly to storm water drains. Silt traps should be placed to reduce the load of sediments entering the drains. Sediment are filled in the public drains they should be cleaned regularly by the contractor.</p>	Construction	Contractor
<p>xiv. Safety to the public from construction activities The contractor should make necessary arrangement to possible obstructions to access to commercial and service facilities in the area, traffic on the road, operations of the filling station, parking places etc. Necessary arrangements with watchmen during traffic and crowded hours is compulsory at this site.</p>	Construction	Contractor
<p>xv. Safety to the public from construction activities: High risk for commuters Disturbances to smooth operations of filling station should be avoided as much as possible. Proper safety measures should be in place to avoid risk of accidents from moving machinery is highly significant during construction phase.</p>	Construction	Contractor
<p>xvi. Working hours The construction activities should be restricted day time only. Working after 6.00pm is not recommended. For any reasons due to safety issues.</p>	Construction	Contractor

13. Monitoring requirements specific to the site

Following monitoring plan is strongly emphasized during the construction phase specific to this site. In addition to this, monitoring procedure indicated in the contractors' obligation to ESMP should also be implemented by construction contractor. The contractor is expected to indicate in the bid the ESMP

procedure to be implemented along with relevant proofs of his competency. The cost for ESMP will require to be indicated as a separate pay item. The environmental and social management method statement is expected to be submitted by the selected construction contractor and to be approved by the PMU unit.

Table 6: Environmental and Social monitoring plan; construction phase

Monitoring requirement	Parameters	Frequency
i. Baseline monitoring	Stream water quality	-
	Pre crack survey of the high risk houses	Once *
	Ground vibration	Once *
	Background noise measurement	Once *
	Air quality: particulate matter	Once *
ii. During construction	Stream water quality	-
	Crack survey of the high risk houses	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 *
	Fire safety system	Regular***
	Electrical wiring systems	Regular***
iii. Vehicular Emission	All machinery/vehicles operational should have the emission control test certificate as applicable - should be checked by the site ES officer of the consultant	
iv. Monitoring agency	* A competent independent monitoring agency with registration of Central Environmental Authority for all parameters except crack surveys **Crack surveys should be conducted by competent agency acceptable to PMU *** Safety officer contractor	
v. Reporting requirements	Stream water quality – Comparison with ambient water quality standards published by the CEA, 2017 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. Fire safety: <i>As per fire safety standards for filling stations</i>	

14. Grievance redress mechanism for this site

The PMU ES officer is responsible for establishing the grievance redress mechanism for this site **with special consideration for following impact communities; a)** proprietor of DKW Traders Pvt Ltd, Mrs Pelendage Punchimenike and Occupants of Sampath Bank Quarters and people of business places of Kalawana and people of Kalawana town area. (*Reference: Environmental and Social Management Framework for recommended procedure for establishment of grievance redress mechanism*)

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

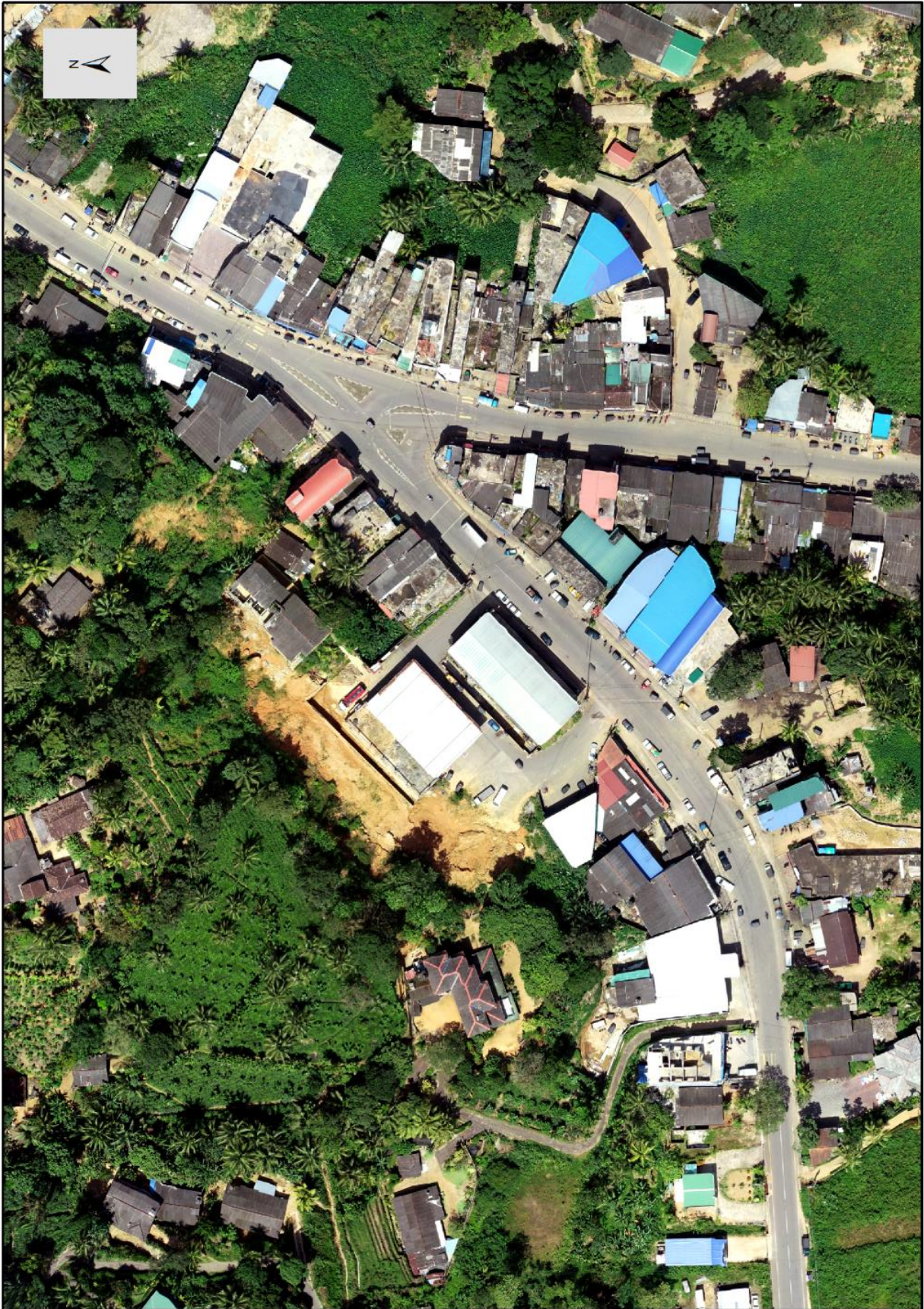
Table 7: Proposed scheme of information disclosure

Information	Proposed agencies	Mode of information disclosure
i. Project plan (site details, design , implementation arrangements)	District CEA, DFC, DWLC, District Secretariat, Divisional secretary, Other district levels Agencies, NBRO district office, AIIB	Meetings, District coordination committee, submission of relevant report to sign agreements, approvals and consents.
ii. Monitoring reports (baseline and during construction)	District CEA, AIIB and relevant parties as appropriate	Progress meetings, special meetings, submission of relevant reports
iii. Site inspections for environmental conformance workers health and safety	District CEA, Divisional secretary, Police, State Land Owners, Grama Niladhari, District Office NBRO, AIIB and relevant parties as appropriate	Written and verbal communications, submission of relevant reports
iv. 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	Meetings, submission of relevant reports
v. 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
09/08/2018 @ 10.00 hrs.	Central Environmental Authority	Mr.K G.D.N Kiriella Director –CEA Ratnapura District
09/08/2008 @ 15.30 hrs.	Owner of D.W.K Filing Station	Mr Kasun Walikala.

Annexure 1: Drone image of the project area



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



Fig a: Retaining wall made by Filling station owner right behind the filling station.



Fig b: Mr.Kasun Walikala was made aware about the mitigation work by NBRO staff (27-09-2018)



Fig c: Risky up slope area.



Fig d: Huge rock blasted by chemicals.



Fig e: Temporary road made by the owner of the filling station



Fig f: Damaged up slope area

Annexure 1I1: Report on the Stakeholder Consultation: Ratnapura District

Date: 08/08/2018 and 09/08/2018		
Institution	Name and designation of the contact officer	Concerns raised
Central Environmental Authority	Mr.K G.D.N Kiriella Director –CEA Ratnapura District	<ul style="list-style-type: none">✓ Under the Soil conservation Act 772/22 of 1996. of National Resource Management Centre, Ratnapura District has been gazetted a sensitive area except the Embitipitiya area✓ Under this gazette any development is not allowed irrespective of the magnitude of the project.✓ In a disaster this is not needed.✓ The Basic Information Questionnaire (BIQ) is needed to fill for the project and submit the application✓ Since the waterway is located downslope in the area it is needed to keep the Environmental flow✓ There may be endemic species, special habitats (niches) , fauna flora study are needed✓ This Environmental assessment may be required to see their difference after mitigation✓ The CEA will grant approval with recommendations.

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
Abheetha Wanasundara	Officer in charge / Ratnapura District	Geotechnical Engineer
Indu Upamali	Scientist/ LRRMD/NBRO	Geologist
H Kusalasiri	Technical Officer/ESSD/NBRO	GIS/Demographic data /survey support

Annexure V: List of references

1. NBRO site investigation report on landslide disaster at Kalawana Town– (Ref. Report No. NBRO/LRRMD/RT/L1/18/31/40059 dated 12/09/2018
2. Contractor’s obligations for Generic Environmental and Social Management Plan- Sri Lanka Landslide Mitigation Project-AIIB
3. Environmental and Social Management Framework-Sri Lanka Landslide Mitigation Project _AIIB
4. Resettlement Planning Framework- Sri Lanka Landslide Mitigation Project _AIIB