

SIGNAL MOUNTAIN ROCKFALL EMERGENCY SCHEME



**NATIONAL DISASTER RISK REDUCTION AND MANAGEMENT CENTRE
(NDRRMC)**

6TH FLOOR, CITADELLE MALL, PORT LOUIS

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Contents

1.0 Introduction	2
1.1 Monitoring of Rockfall at Signal Mountain.....	3
1.2 Rockfall Conditions and Warning System.....	4
1.3 The Rockfall Warning System	4
2.0 General Responsibilities and Actions	6
2.1 Mauritius Meteorological Services	6
2.2 Ministry of Environment and Sustainable Development (MoESD)	6
2.3 NDRRMC/ NEOC	8
2.4 Ministry of Public Infrastructure, L&T (Public Infrastructure)	8
2.5 City Council of Port Louis/LEOC	9
2.6 Forestry Service	10
2.7 Police.....	10
2.8 Special Mobile Force (SMF).....	11
2.9 Police Helicopter Squadron	12
2.10 Mauritius Fire and Rescue Service (MFRS)	12
2.11 Ministry of Health and Quality of Life	13
2.12 MBC.....	13
2.13 Central Electricity Board (CEB)	13
2.14 Central Water Authority (CWA).....	13
2.15 Service Providers (having facilities on top of mountain)	14
3.0 In Case of Sudden Rockfall	14
4.0 Distribution of Rockfall Communiqué	14
5.0 Special Arrangements during Cyclone Warning	14
Annex	15

SIGNAL MOUNTAIN ROCKFALL EMERGENCY SCHEME

1.0 Introduction

The Health Track of the Signal Mountain as shown in **Figure 1** below falls under the purview of the Ministry of Social Security, National Solidarity, and Environment and Sustainable Development (Environment and Sustainable Development Division). It is a 6.6m wide tarred road about 3 km long with an elevation up to 300m. It is open to the public and visited daily by many people. It also serves as an access road to authorised agencies namely the Mauritius Broadcasting Corporation, Mauritius Telecom, EMTel, MCML, Police Communications Branch amongst others which have antennas/facilities located on the mountain peak including a Mauritius Meteorological Services automatic weather station.

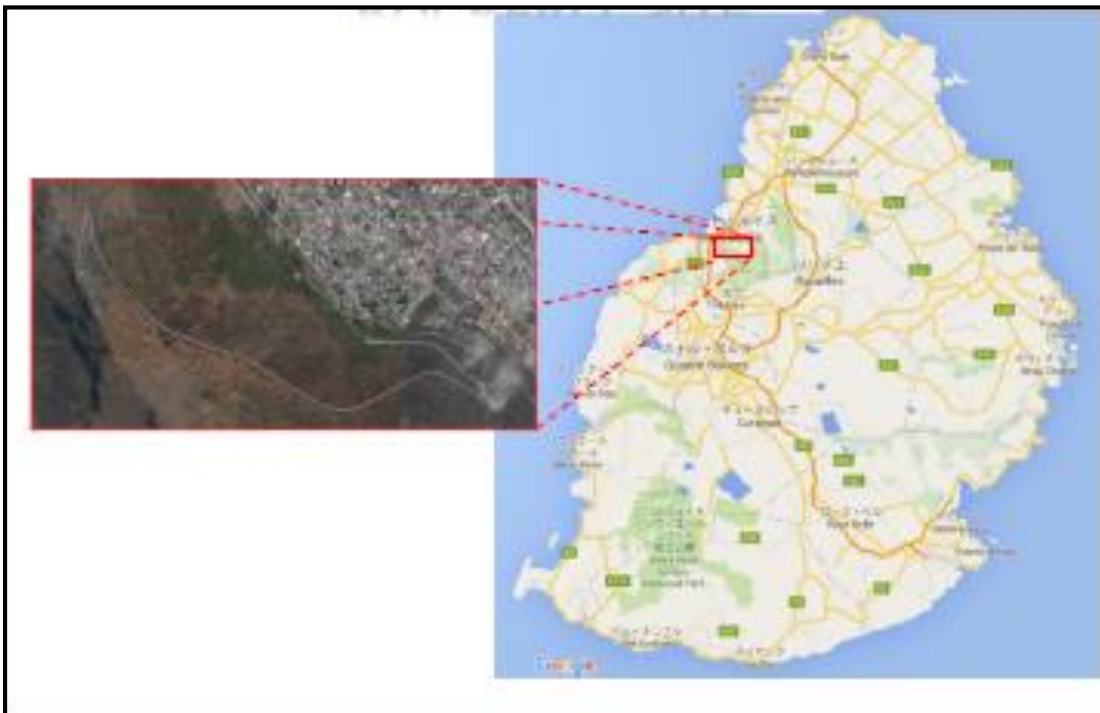


Figure 1: Location of Signal Mountain

It was in October 2015 that the problem of rockfall was formally reported to the Landslide Management Unit (LMU) of the Ministry of Public Infrastructure and Land transport (MPI & LT). During their investigation, officers of the Living Environment Unit (LEU) of Ministry of Environment and Sustainable Development (MoESD) reported that the problem of rockfall had occurred several times before, mostly during and after rainfall.

1.1 Monitoring of Rockfall at Signal Mountain

A preliminary survey was undertaken by the JICA Experts and the MPI (LMU) for evaluating the condition of the affected area at Signal Mountain where it was concluded that the level of risk of rockfall is considered as **HIGH** as illustrated in **Figure 2** and **Figure 3**. The main factors causing the risk of rockfall in this region were identified to be rain, wind and tree roots. Among these factors, rainfall is considered to be contributing the most to trigger rockfall. The situation is being monitored closely by concerned authorities so that the track can be closed based on certain factors/conditions which could cause rockfall.



Figure 2: Signal Mountain Area Vulnerable to Rockfall



Figure 3: Most Vulnerable Site at Signal Mountain

1.2 Rockfall Conditions and Warning System

The following criteria for the issue of warnings of rockfall to the public will henceforth apply:

1. Rainfall recorded;
2. Strong wind;
3. Cyclone warnings;
4. Tree roots causing loosening of rocks and;
5. Observations from public.

1.3 The Rockfall Warning System

The rockfall warning system consists of three warning stages namely the Watch, Warning and the Termination as described below.

a) Watch Stage

The Watch Stage will be triggered based on any one of the following conditions, whichever arises first:

1. The MMS issues a heavy/torrential rain warning or;
2. The MMS issues a strong wind warning or;
3. The MMS issues a cyclone warning Class I or;
4. The Forestry Service has identified area of weaknesses where roots can cause loosening of rocks or;
5. Observations of any incident or potential danger by any public/private Authority or the public.

b) Warning / Closure of the track

The Warning Stage is reached when any one or several of the following conditions are met:

1. The MMS recorded rainfall is 25 mm/hour, or 40 mm per day; and/or
2. Strong wind warning of MMS is in force; and/or
3. A cyclone warning Class II is in force in Mauritius; and/or
4. The Forestry Service has located regions of loose rocks due to roots; and/or
5. Confirmation of rockfall and/or imminent danger by the public/private Authority or the public.

During the Warning stage, the track will be closed.

c) Termination

The termination stage is reached when the following conditions have been satisfied:

1. The MMS has observed no significant rainfall over three days or;
2. There is no cyclone warning in force or;
3. There is no strong wind and/or heavy/torrential rain warning or;
4. The LMU has confirmed stabilisation or removal of loose rocks;
5. The track has been cleared of all debris.
6. Forestry Service has not identified any new areas of loose rocks due to roots and erosion.

A joint survey will be arranged under the lead of the LMU and will include NDRRMC, LEU, CCPL, Forestry Service, SMF and Police. As in the case of the previous stages, the recording will be continuously monitored by the MMS and the data communicated to the NDRRMC/NEOC. When all of the above criteria have been satisfied, the track will be reopened.

2.0 General Responsibilities and Actions

2.1 Mauritius Meteorological Services

General Preparedness

- (a) To ensure that the AWS at Signal Mountain is regularly maintained.

Watch

- (a) To monitor the observations of wind speed and rainfall in the region of the Signal Mountain and inform the NDRRMC/NEOC.
- (b) To issue warnings of heavy/torrential rain, strong wind, and cyclone.
- (c) To monitor evolution of cyclone and weather conditions.

Warning / Closure of the track

- (a) To monitor the observation of the wind speed and rainfall in the region of the Signal Mountain and inform the NDRRMC / NEOC.
- (b) To provide rainfall data and wind speed data (gust registered) to the NDRRMC/NEOC at the shortest possible time interval.

Termination

- (a) To issue termination bulletins for the strong wind, heavy/torrential rain and cyclone and inform the NDRRMC/NEOC.
- (b) To keep the NDRRMC / NEOC informed on the wind speed and rainfall situation in the region of the Signal Mountain.

2.2 Ministry of Environment and Sustainable Development (MoESD)

General Preparedness

- (a) To arrange for countermeasure works as per technical advice from LMU to eliminate or reduce the risk of rockfall.
- (b) To ensure controlled access to relevant authorities for undertaking surveys or patrols.
- (c) To make surveys on a weekly basis to monitor the status, identify regions of loose rocks and notify the PIOR and NDRRMC.
- (d) To maintain the health track.
- (e) LEU to maintain all signage along the health track.
- (f) LEU to maintain all drains falling under their purview along the health track.
- (g) Police de L'Environnement to carry out regular patrols to prevent illegal dumping.

- (h) The Information and Education Division of the Ministry in collaboration with the GIS and the MBC to prepare and carry out sensitisation programme for the public on the dangers of rockfall including conditions under which the track would be closed.
- (i) To ensure that the private company responsible for providing security services at the Signal Mountain is aware of this protocol and maintain a movement book to record movement in and out of persons and vehicles.
- (j) To keep an updated database of all authorised organisations having installations and facilities on top of the mountain.
- (k) To identify and label two suitable locations (one at start of the track and one on the top the mountain) to be use as Assembly Areas.
- (l) To ensure with the NDRRMC that regular simulation exercises are conducted with concerned stakeholders.

Watch

- (a) LEU to conduct surveys along the track and report any anomalies to the NDRRMC/NEOC/ Ministry.
- (b) LEU to ensure that all signage are in good order and visible to the public.
- (c) Security services at the entrance to maintain a movement book to record movement in and out of persons and vehicles.
- (d) To inform vehicles owners on the parking to be prepared to leave the parking area.

Warning/Closure of the Track

- (a) To arrange for the closure of the track.
- (b) To ensure that all vehicles in the parking area are removed.

Termination

- (a) LEU to survey the track and report any anomalies.
- (b) LEU to ensure that all damaged signage are replaced.
- (c) To ensure that all debris/rocks are removed by the LEU before the re-opening of the track.
- (d) To delegate an officer from the LEU to undertake a joint survey with a team comprising of CCPL, Forestry Service and Police/SMF under the lead of the LMU.
- (e) To issue communiqué on the re-opening of the track.
- (f) To ensure that the private company responsible for providing security services at the Signal Mountain is aware when to open the track.

2.3 NDRRMC/ NEOC

General Preparedness

- (a) To coordinate and monitor preparedness actions at national level by responsible organisations.
- (b) To plan and conduct regular rockfall simulation exercises as per the Annual Simulation Calendar.

Watch

- (a) To monitor closely the threshold of rainfall and wind warning for the closure of the track through the AWS data received from the MMS.
- (b) To issue communiqué warning the population of the risks and dangers of eventual rockfall at Signal Mountain.
- (c) To monitor the situation and maintain line of communication with all concerned stakeholders.

Warning / Closure of the Track

- (a) To activate NEOC and convene members, depending on the situation.
- (b) To issue communiqué warning the public of the closure of the track.
- (c) To ensure that track users have been informed of the closure of the track.
- (d) To ensure that the track has been closed.

Termination

- (a) To ensure that identified loose rocks areas have been stabilised, the track is clear and greenlight obtained from concerned Authorities before the re-opening of the track.
- (b) To issue communiqué informing the public of re-opening of track.

2.4 Ministry of Public Infrastructure, L & T (Public Infrastructure) - Landslide Management Unit

General Preparedness

- (a) To arrange for regular site visits with concerned stakeholders to assess the situation at Signal Hill.
- (b) To advise the Ministry of Environment and Sustainable Development on appropriate countermeasure works for eliminating or reducing the risk of rockfall.

Watch

- (a) Be ready to provide technical assistance, if required.

Warning/Closure of the Track

- (a) To provide technical assistance, as required.

Termination

- (a) To be the leading agency for the composite team comprising of NDRRMC, LEU, CCPL, Forestry Service, SMF and Police for surveying the Signal Mountain track before its re-opening.

2.5 City Council of Port Louis/LEOC

General Preparedness

- (a) To regularly clean and maintain cut-off drains along Signal Mountain starting from Pagoda up to Rajiv Gandhi Science Centre/Pailles which passes through Marie Reine de La Paix and La Butte. This should also include Ruisseau Creole and Le Pouce Stream.

Watch

- (a) To activate LEOC, if required.

Warning / Closure of the Track

- (a) To activate LEOC for coordination and monitoring of the situation at Signal Mountain.
- (b) To assist concerned Authorities in warning the public of the risk of rockfall.
- (c) To be ready to assist the first responders with any manpower and logistic facilities available at the CCPL, if required.

Termination

- (a) To undertake a joint survey of the Signal Mountain track with a team comprising of NDRRMC, LEU, Forestry Service, SMF and Police representatives under the lead of the LMU.
- (b) To carry out survey of the cut-off drains and ensure that debris and obstructions are removed.

2.6 Forestry Service

General Preparedness

- (a) To carry out surveys on a weekly basis to identify areas of possible rockfall due to tree roots.
- (b) To maintain fire lanes.
- (c) To inform NDRRMC/ MoESD when areas with loosening of rocks due to roots have been identified.
- (d) Carry out tree planting which would prevent soil erosion.

Watch

- (a) To conduct surveys to identify places/areas of weakness where rockfall can occur.

Warning

- (a) To provide assistance as and when required.

Termination

- (a) To undertake a joint survey with a team comprising of NDRRMC, LEU, CCPL Police and SMF representatives under the lead of the LMU.

2.7 Police

General Preparedness

- (a) To sensitise the public on the risk of rockfall through community policing.

Watch

- (a) PIOR to inform Officials as per Annex on the triggering of the different warning stages (Watch, Warning and Termination).
- (b) PIOR to arrange for police helicopter with rescue team to be on standby at Line-Barracks.
- (c) Line-Barracks Police station to advise the public to be on the alert and stand ready to evacuate the health track when advised to do so.
- (d) To inform all service providers having facilities on top on the impending danger.
- (e) Ensure that vehicles owners in the parking area are informed and to be ready to move away when required.
- (f) To carry out patrols along the health track.

Warning / Closure of the track

- (a) Line-Barracks Police station to inform the public of the closure of the health track after receipt of information from NDRRMC/NEOC that the Warning Stage has been reached.
- (b) Line-Barracks Police station to ensure closure of the track and help to evacuate the public in place.
- (c) Line-Barracks Police station to warn users of the health track through loudspeakers or other means to report at the assembly area and then vacate the area.
- (d) To inform all the service providers having facilities on top on the closure of the track to vacate the area.
- (e) Line-Barracks Police station to arrange for regular patrols along the health track to prevent people from using the track.

Termination

- (a) To undertake a joint survey with a team comprising of NDRRMC, CCPL, LEU, and Forestry Service representatives under the lead of the LMU.
- (b) To ensure that the track can safely be reopened after the termination stage.

2.8 Special Mobile Force (SMF)

General Preparedness

- (a) Assist LEU and LMU for surveys

Watch

- (a) Keep teams on stand-by at L-Barracks ready for support to any authorities

Warning

- (a) Assist Police in warning the track users.
- (b) Carry out evacuation and search and rescue.

Termination

- (a) Assist in removing obstruction and clearing of debris.
- (b) To undertake a joint survey with a team comprising of NDRRMC, CCPL, LEU, Forestry Service and Police representatives under the lead of the LMU.

2.9 Police Helicopter Squadron

General Preparedness

- (a) To identify possible safe landing areas on top of Signal Mountain.

Watch

- (a) Police helicopter with rescue team on standby at Line-Barracks.

Warning / Closure of the track

- (a) To assist in warning persons and track users through aerial sweep of the Signal Mountain area.
- (b) To assist in ensuring that the Signal Mountain area is sanitised.
- (c) To be ready to carry out any urgent evacuation, if required.

Termination

- (a) To assist in the survey under the lead of LMU by performing an aerial sweep of the Signal Mountain area.
- (b) To be ready to provide assistance, if required.

2.10 Mauritius Fire and Rescue Service (MFRS)

General Preparedness

- (a) Assist in sensitisation of the public on the risk of rockfall at Signal Mountain.

Watch

- (a) Keep team on standby and ready to support other authorities.

Warning

- (a) Assist Police in warning the track users.
- (b) Carry out evacuation and search and rescue.

2.11 Ministry of Health and Quality of Life

Watch

- (a) SAMU Team on standby for casualty evacuation and be ready to despatch ambulances adequately staffed and equipped.

Warning

- (a) To make special arrangements and provide adequate number of medical and para-medical personnel to cater for any casualties at the Casualty Unit of the Jeetoo Hospital.

2.12 Mauritius Broadcasting Cooperation

- (a) To arrange for immediate broadcast and for its rebroadcast of communiqués (closing and re-opening of the track).

2.13 Central Electricity Board (CEB)

Watch

- (a) To be ready to switch off the power supply along the mountain.

Warning

- (a) To switch off the power supply along the track as would be assessed by the CEB.

Termination

- (a) To carry out repairs, if any and restore the power supply along the track.

2.14 Central Water Authority (CWA)

Watch

- (a) To be ready to close valves of water pipelines along or the track/mountain.

Warning

- (a) To close valves of water pipelines along or the track/mountain, as would be assessed by the CWA.

Termination

- (a) To carry out repairs, if any and restore the water supply along the track.

2.15 Service Providers (having facilities on top of mountain)

General Preparedness

- (a) To develop contingency plan in case of road closure to top of mountain to ensure service continuity.

Watch

- (a) To ensure that any urgent maintenance or routine activities on critical facilities are completed on priority basis.
- (b) To keep track of the evolution of the situation.

Warning

- (a) To evacuate facility on top of mountain, if occupied.
- (b) To evacuate parking area.
- (c) To activate service continuity plan, if required.

3.0 In Case of Sudden Rockfall

When there is a sudden Rockfall, the Warning Stage would be triggered by the NDRRMC. Actions under the Warning Stage would directly apply.

4.0 Distribution of Rockfall Communiqué

Rockfall Communiqué will be broadcast by the MBC, the Press, the Private Radios, the telephone system including Mauritius Telecom Call Centre.

5.0 Special Arrangements during Cyclone Warning.

After the issue of a Cyclone Warning Class II, the health track will be closed.

Annex

List of Officials to be informed in case of rockfall at Signal Mountain
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1. The Minister of Ministry of Social Security, National Solidarity, and Environment and Sustainable Development (Environment and Sustainable Development Division)
2. The Secretary to Cabinet & Head of the Civil Service
3. The Senior Chief Executive, Ministry of Defence
4. Permanent Secretary, PMO
5. Commissioner of Police
6. Commanding Officer, Special Mobile Force
7. NDRRMC
8. Mauritius Meteorological Services
9. Chief Fire Officer, Mauritius Fire and Rescue Service
10. Conservator of Forests
11. Lord Mayor and the CE, CCPL
12. The Senior Chief Executive/Permanent Secretary of the following:
 - (a) Ministry of Social Security, National Solidarity, and Environment and Sustainable Development (Environment and Sustainable Development Division);
 - (b) Ministry of Public infrastructure and Land Transport;
 - (c) Ministry of Local Government;
13. Director/Deputy Director and Principal/Senior Engineer at the Ministry of Public Infrastructure.
14. Divisional Police Headquarter Port Louis (South)
15. Chief Executive Officer, MCML.
16. Port Master, Mauritius Ports Authority.
17. Central Water Authority.
18. Central Electricity Board.
19. Mauritius Telecom
20. Emtel

List of Acronyms

AWS	Automatic Weather Station
CCPL	City Council of Port-Louis
CEB	Central Electricity Board
CWA	Central Water Authority
GIS	Government Information Service
JICA	Japanese International Cooperation Agency
LEOC	Local Emergency Operations Command
LEU	Living Environment Unit
LMU	Landslide Management Unit
MBC	Mauritius Broadcasting Cooperation
MCML	Multi Carrier Mauritius Limited
NDRRMC	National Disaster Risk Reduction and Management Centre
NEOC	National Emergency Operations Command
MFRS	Mauritius Fire and Rescue Services
MMS	Mauritius Meteorological Services
PIOR	Police Information and Operations Room
SAMU	Services Ambulance Medicalises d'Urgence
SMF	Special Mobile Force