Date of Submission	22.07.25

IPL Project (IPL-264) Annual Report Form

Period of activity under report
from 1 January 2024 to 31 December 2024

1. **Project Number and Title: IPL-264 :**Study on Suitable Tools for Modeling and Analysing Rain Induced Slope failure in Sri Lankan Residual Soil

2. **Main Project Fields**
   Slope behavior modeling

3. **Name of Project Leader** Ms.S S I Kodagoda- B. Sc.(Civil Engineering), M. Eng. (Geotechnical Engineering), C Eng, MIESL

4. Affiliation:: Civil Engineer/Additional General Manager - Natural Resources Management and Laboratory Services (NRM & LS),
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   Core members of the Project:
   Ms. H M. J. M. K Herath- B. Sc. (Geology Special), M. Sc. (Water Resources Management) MIMM
   Mr. H. M. M. S. Jayaweera–B. Sc. (Geology Special),
   ~~Mr. T. S. Wickramasooriya –B.Sc(Civil Eng); CEng, MIESL~~
   Mr. A. A. Virajh Dias –B.Sc(Civil Eng); CEng, PG.Dip; MASCE,MIESL
   Ms. M A D C Lakmali. B tech(Civil Eng), PG Dip (Geotech Eng), AMISL

5. **Objectives** (5 lines maximum)
   The objective of this research is to find out the applicability of available slope stability analysis tools for rain induced slope failure in Sri Lankan residual soil.

6. Study Area

Mountainous area of Sri Lanka covering the Central, Sabaragamuwa, and Western province

7. **Project Duration-Original Duration:** (January 2022-December 2023)

Proposed Duration-(January 2022-December 2025)

Please extend the duration to December 2025

8. Report

1) Progress in the project (30 lines maximum)

Sampling site was selected in Mathugama area belonging to Western Province. Preliminary investigations were carried out to verify that the slope consist of a homogeneous soil for simplifying the analytical procedure and to reduce uncertainties. Slopes were prepared and a rain of 100mm/Day was simulated. Behavior was observed. Subsurface investigation was done. Insitu testing were carried out to derive shear strength parameters. Undisturbed samples were selected for testing for shear strength parameters at the laboratory. The slopes were modelled and analysed using available tools.

A. Limit equilibrium methods

B. Finite Element /Finite Difference methods

C. Hydrodynamic coupling models

D. Probabilistic methods

E. GIS based methods

For initial anlysis the following methods were used based on the Limit equilibrium concept.

Morgenstern-price method
Spencer Method
Bishop Method
Janbu Method
Ordinary Method

The results were compared with the field observations with related to slope failure. Sensitivity analysis was carried out.

The analysis with FEM methods (PLAXIS) provided similar results.

Rain simulation on slopes could not be achieved due to technical difficulties. Therefore it was decided to back analyse slopes that failed due to saturation during heavy rains.

2) Planned future activities or statement of completion of the Project (15 lines maximum)

a Selection of failed slopes due to saturation and collection of data including topography, subsurface profile, rainfall data, and failure characteristics

b. Model and analysis with available methods and tools for samples in a

c. Comparison of results of analysis with field observations

d. Building up recommendations on suitable methods of analysis for rain induced slope failure in Sri Lankan residual soil

3) Beneficiaries of Project for Science, Education and/or Society (15 lines maximum)

The landslide professionals, academics, researchers, planners and people residing in landslide prone areas in Sri Lanka specially in Western, Sabaragamuwa and Central Province

4) Results (15 line maximum, e.g. publications)

Suitability of the methods based on Limit equilibrium concept were ranked according to the sensitivity. A homogeneous soil slope was used for this (Mathugama sample)

Analysis Method	**Suitability Ranking According to the Sensitivity**
Morgenstern-price method	4
Spencer Method	3
Bishop Method	2
Janbu Method	1
Ordinary Method	5

PLAXIS based on Finite element method also provided results similar to the observations

Note:

1) If you will change items 2-7 from the proposal, please write the revised content in Red.
2) Please fill and submit this form to ICL Network <icl-network@landslides.org>
3) Reporting year must be one or two years (Maximum).