



**UPDATED POLICIES AND
PROCEDURES
FOR
ENGINEERING CONTROL OF
HILL-SITE DEVELOPMENTS**

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INSTITUTION OF ENGINEERS MALAYSIA

Executive Summary

UPDATED POLICIES AND PROCEDURES FOR ENGINEERING CONTROL OF HILL-SITE DEVELOPMENTS

This document presents an update to the original recommendations by the Task Force of the Institution of Engineers, Malaysia (IEM) titled “Policies and Procedures for Mitigating the Risk of Landslide on Hill-Site Development” dated 4 April 2000.

It has been necessitated by numerous incidences of landslides around the country impacting residential buildings resulting in fatalities culminating in the disastrous Bukit Antarabangsa landslide of 6 December 2008 in which 5 persons died, many persons injured, 14 bungalows demolished and numerous homes were declared unsafe. Other reported landslides had damaged properties and disrupted infrastructures.

The following are recommendations after due considerations of all factors for safety in hill-site developments:

- 1) Under existing legislations, the Local Authorities are entrusted with the certification of the safety status of structures and building sites. It is recommended that the Local Authorities shall act on the advice of the new federal agency on all technical matters as elaborated in Item 2.
- 2) The formation of a new centralized federal agency called Agency for Control of Developments with Slopes (ACDS) is recommended. This Agency having regulatory role shall not be placed in private hands. The Agency shall have the following roles:
 - a. The Agency shall investigate and advise the Local Authorities on approval and control of the safety of all future developments on or adjoining slope sites.
 - b. The Agency shall monitor and track the implementation of registered recommended mandatory maintenance procedures/programme and to advise the Local Authorities to implement such maintenance procedures/programmes in the event that the relevant responsible parties fail to do so.

- c. All developments, falling under the jurisdiction of the Agency, shall be required to obtain the consent of the Agency prior to the development being issued with the required certification for occupation by the Local Authorities.
- d. All proposed land use conversions to residential and commercial purposes in the country shall take into account the hill-site safety issues as stated in this paper and shall follow advice from the Agency.
- e. If necessary, the technical department in the Local Authority may be required to be upgraded in order to have efficient communications with the Agency for effective implementation.

3) An adapted version of the Slope Classification system used in Hong Kong, is recommended to be adopted exclusively by all approving and enforcement agencies to ensure consistency and ease of communications. The suitability for development shall be as in the following table:

Slope Class	Suitability for Development	Details	Engineering Evaluation
1	Suitable	NATURAL TERRAIN - gradient $\leq 15^\circ$ OR CUT SLOPES - gradient $< 15^\circ$, Gross Height $< 30\text{m}$	Normal
2	Suitable	Crest of ridges OR NATURAL TERRAIN - $15^\circ \leq$ gradient $< 25^\circ$ for areas with no signs of past instabilities OR NATURAL TERRAIN - \square gradient $\leq 15^\circ$ for areas with signs of past instabilities	Normal
3	Suitability of site to be assessed with detailed engineering studies	NATURAL TERRAIN - $25^\circ \leq$ gradient $< 35^\circ$ for areas with no signs of instabilities OR NATURAL TERRAIN - $15^\circ \leq$ gradient $< 25^\circ$ for areas with signs of past instabilities	Independent Review Required by Engineer other than the Submitting Engineer
4	Normally Discouraged. Under exceptional circumstances, the Developer with his Building Consultant Professionals may liaise closely with the Local Authorities and the Agency to establish that a given site is safe for development: all in accordance with the practices recommended in this PP.	NATURAL TERRAIN - gradient $\geq 35^\circ$ for areas with no signs of past instabilities OR NATURAL TERRAIN - $25^\circ \leq$ gradient $< 35^\circ$ for areas with signs of past instabilities	Independent Review Required by Engineer other than the Submitting Engineer

- 4) Any Qualified Person who undertakes the review of design documents for slope stability and slope drainage works prepared by the Submitting Engineer shall, after certifying his satisfactory acceptance of the design, be required to continue to audit their construction for compliance and, upon satisfactory completion of construction, to endorse the as-built records (complete with recommended mandatory maintenance procedures/programmes) prepared and endorsed by the Submitting Engineer for submission to and registration with the Agency and Local Authority.
- 5) Notwithstanding the above, the landowner shall be solely responsible for the maintenance, safety and integrity of his property and the consequential damages to the adjacent properties resulted from slope instability in his/her properties.
- 6) All new developments located on or adjoining slope sites of Class 3 and Class 4 slopes shall have engineering evaluations for safety reviewed independently by Qualified Persons other than the Submitting Engineer.

All new developments requiring retaining walls more than 3.0 m. height with or without surcharge shall have the engineering design of such elements reviewed independently by Qualified Persons other than the Submitting Engineer.

- 7) All approved developments located on or adjoining slope sites of Class 3 and Class 4 slopes be reviewed independently on urgent basis by Qualified Persons other than the Submitting Engineers to determine if upgrading to the safety of any slope at any such development is required to be implemented and to advise the Agency and Local Authority to order such works before permitting building construction works to continue.

All approved developments (in process of construction) requiring retaining walls more than 3.0 m. height with or without surcharge shall have the engineering design of such elements reviewed and assessed by Qualified Persons other than the Submitting Engineer to determine if upgrading to the integrity of any wall at any such development is required to be implemented and to advise the Agency and Local Authority to order such works before permitting building construction works to continue.

- 8) All existing completed developments located on or adjoining slope sites of Class 3 and Class 4 slopes be urgently assessed by Qualified Persons other than the Submitting

Engineers to determine if upgrading to the safety of any slope at any such development is required to be implemented and to advise the Agency and Local Authority to order such works immediately.

All existing completed developments with retaining walls more than 3.0 m. height with or without surcharge shall have the engineering design of such elements assessed by Qualified Persons other than the Submitting Engineer to determine if upgrading to any wall is necessary and to advise the Agency and Local Authority to order such works immediately.

Any alterations to an existing completed construction shall be referred back to the Agency.

- 9) Uncompacted tipped fill construction of development platforms including filled up slopes shall be disallowed. All fills must meet compaction/density requirements for engineered fills.
- 10) All surface drains on slopes shall be designed and constructed capable of self-cleansing for soil particle sizes up to 1 mm under the 3 month return period flow.
- 11) Geotechnical engineering modules in undergraduate civil engineering courses must include the form of soil mechanics appropriate for use in slope stability evaluations.
- 12) A Qualified Person (as defined in the Street, Drainage and Building Act) in the context of this paper shall possess the relevant geotechnical engineering experience and expertise. The relevant experience should include that in the field of Project Management, Civil Engineering Construction processes, Structural Engineering, Earthworks Construction, Surface and Sub-surface Drainage and other fields deemed necessary by the Agency.
 - a. An existing Accredited Checker should be further examined to have similar relevant experience as stated above.
 - b. Further, to serve the needs of this country, the list of qualified Accredited Checker needs to be significantly expanded to service the immense requirements of the country.
 - c. The IEM Geotechnical Division being an Independent expert entity should participate in setting up proper Guidelines on qualification of Accredited Checkers to suit the needs for the country; and the BEM thus informed.

The IEM is convinced that if the above recommendations are implemented, the Mitigation of Landslide Hazards in this country would be advanced.