

THE RTA GUIDE TO SLOPE RISK ANALYSIS VERSION 3.1

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ABSTRACT

The RTA Guide to Slope Risk Analysis presents a procedure for analysing geotechnical risks associated with slopes adjacent to main roads in NSW. The procedure analyses the risk associated with actual or potential failure mechanisms which have been identified for a slope, using a series of defined ratings, which are combined through a risk matrix to generate an Assessed Risk Level (ARL) for the slope. The ratings are correlated to conditional probabilities for the likelihood and consequences of failure. Risk to life and economic risk are both analysed. Some of the methods used to allocate the ratings are presented. The inherent limits to the precision of risk analysis procedures are also discussed.

1 INTRODUCTION

The paper describes the *RTA Guide to Slope Risk Analysis Version 3.1*. The procedure has been developed for the purpose of analysing geotechnical risks associated with slopes, including retaining structures, adjacent to main roads in NSW. It is intended to be used in setting priorities for further work, which may take the form of investigation, monitoring, remediation or other measures as considered appropriate. The mandatory part of the procedure, together with an example of its use, is presented in *Appendix A*.

2 BACKGROUND

The development of a systematic slope risk analysis procedure by the RTA first started in the early 1990's. The early procedures (*Guide to a Slope Risk Rating System, Versions 1 and 2*), completed in 1994/5 were based on weighted scoring of slope attributes and a subjective assessment of consequences, combined using a risk matrix based on hazard and consequences, of the type subsequently used in AS4360 (1999). Data collection was intended to be undertaken by maintenance personnel, followed by desk analysis by a geotechnical practitioner. Proposed actions based on the resulting risk levels were directed towards setting priorities for inspection by a geotechnical practitioner, but were poorly defined. The procedure was used in a very limited way prior to late 1997. In late 1997 and early 1998 Version 2 was used statewide to assess about 2500 slopes. Review of the results of this programme indicated that the reproducibility of the analyses was poor and that the risk levels derived were not sufficiently accurate to set priorities for slope remediation and maintenance programmes.

Development of a new procedure commenced in mid 1999. Prior to its adoption, it was reviewed by independent experts (Dr Fred Baynes (FJB) and Professor Ian Lee (IKL)). The first edition of the new procedure (Versions 3.0/3.01 of the *RTA Guide to Slope Risk Assessment*) was used in late 2000 for analysis of about 600 slopes (later increased to over 700). This work was undertaken by a panel of consultants (seven external to the RTA, one internal) and involved about 25 practitioners. Initially the reproducibility of results (for sites analysed by the independent experts) was unsatisfactory. This necessitated substantial revision to definitions and allocation methods, followed by re-assessment of the results. The effects of the changes are discussed by Baynes et al (2002). Incorporation of these changes into the base document (and some further changes resulting from additional development work), followed by substantial rearrangement of the document, gave rise to Version 3.1 of the *RTA Guide to Slope Risk Analysis*.

3 PRINCIPLES OF OPERATION

The main function of the procedure is to facilitate the setting of priorities for further work. There are a number of essential requirements for a procedure of this type:

- It must be applicable to a large number of sites, covering a great range of conditions and be capable of being used by many practitioners, while still producing consistent results. Earlier versions were mainly oriented towards assessing cuttings. Very few embankments or natural slopes and no retaining structures were assessed. The new method had to be suitable for all of these types of slope.

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