

PROPERTY MANAGEMENT SYSTEM FOR GEOTECHNICAL RISKS

Decisions related to risk that are not addressed in the prevailing building codes are explicit or implied by the reactions made to a known peril. However, it has been our experience that judgment of the owner's, developer's, or government's handling of various geotechnical risks can be somewhat arbitrary. This is because there has been insufficient examination done to establish the risk management protocol. Therefore, more intelligent management of property with geotechnical issues could be of significant value. This requires a more detailed understanding of the elements of the associated risk. This is particularly important when one considers significant risk remediation costs necessary to address the geotechnical threat. The protocol to addressing such risks should be based on both the likelihood and consequences of the situation. An example of the distribution of risk for a certain geotechnical threat is provided in Figure 1. With these risk characteristics given, a standard response protocol can be established by developing a risk response matrix, which can be individualized to the incumbent overall risk management philosophy. This can be summarized in a chart correlating the overall risk (likelihood + consequences) to the response protocol. An example of this response matrix is depicted in Figure 2.

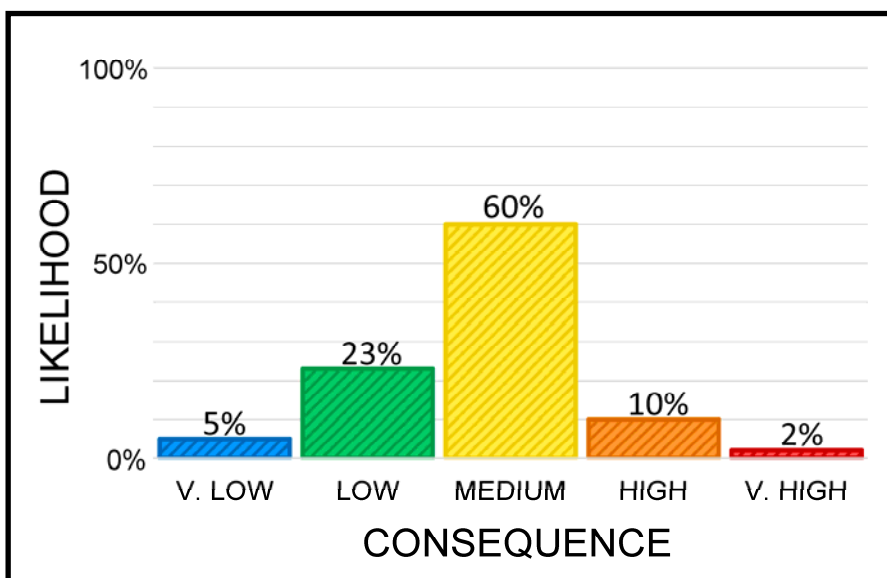


FIGURE 1 EXAMPLE OF DISTRIBUTION OF PROJECT RISK

The use of a well-defined risk response matrix allows the property owner/manager to set a consistent risk protocol resulting in better control of the risk of geo-construction or geo-hazards. It is important to recognize that the zones of risk tolerance may change depending upon the property conditions and considerations of the owner/manager. Therefore, input on the tolerance levels for various likelihoods of different

damage (or consequence) conditions must be fleshed out. This type of evaluation would be most important for geotechnical perils, as existing building codes do not sufficiently cover these risks, or they are addressed with less specificity. Ample building codes, however, exist for the vast majority of the various aspects of the design of engineered structures for the safety, health and welfare of the public and performance of the structure. These codes establish the industry-accepted practices to meet the stated code objectives.

In geotechnical engineering, the likelihood is established by comparing the level of loading to resistance to failure. Especially in earth sciences, both the loading and resistance are only known to

varying degrees of confidence. Considering the range in value of these variables results in the likelihood distribution (or probability) as shown in Figure 1, and also may indirectly relate to the extent of the consequences. The consequences would be essentially related to the resulting damage conditions, such as various intensities of aesthetic, functional, structural, and environmental damage (see Update Issue 40). These damages can also cause hazards, business disruption, loss of customer base, and property devaluation. It is important to note that in some geotechnical situations failure only results in severe consequences and thus would be reflected with a more polarized risk matrix chart.

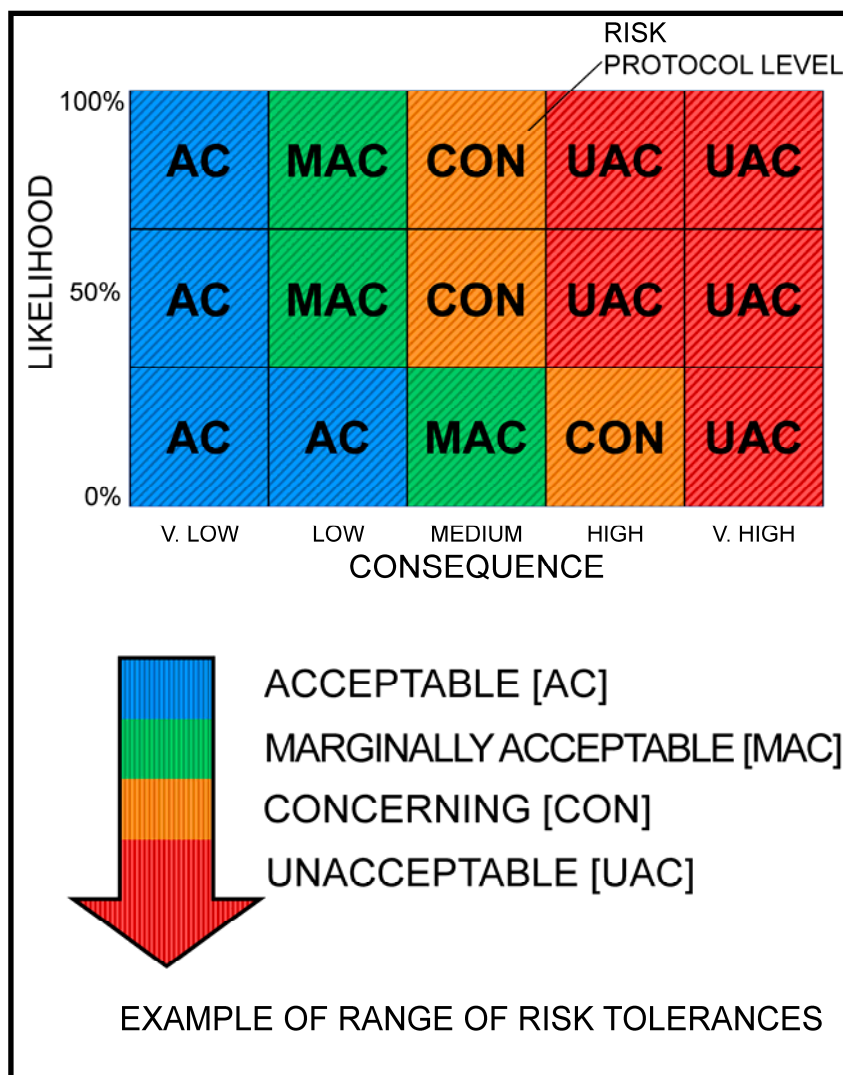


FIGURE 2 ILLUSTRATION OF MATRIX OF RISK RESPONSE PROTOCOL (MODIFIED AFTER API PRACTICE 580, 2009)

SUMMARY

For geotechnical issues, property risk management is most cost-effectively and intelligently addressed by a sufficiently detailed risk analysis, especially when risk remediation costs are expected to be high. This can be accomplished by the preparation of a risk response matrix so the problem can be most intelligently evaluated. Such an approach would provide a more consistent and confident means in confronting and addressing geotechnical remediation.

Other MEA Publications that may be of Interest:

[UPDATE #40: The Importance of Estimating Damage Potential](#)

[UPDATE #14: Establishing Mine Subsidence Risk](#)

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FOR MORE INFORMATION: There is a significant amount of additional information that is available on the above subject. For more information, please contact Dr. Marino at the address listed below.

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