

International Association for Engineering Geology and the Environment



IAEG C 25 - Use of engineering geological models

Proposal to C25 Committee re the way forward

Following discussions on the periphery of the IAEG meeting in Chengdu, I would like to propose that the initial work of C25 should be to produce a short, well illustrated, training manual on the development of Conceptual Models.

For preliminary discussion purposes I would suggest what engineering geologists produce is a GROUND MODEL. The detail of which depends on the data available. The CONCEPTUAL (GROUND) MODEL (scoping) is based on published data. The OBSERVATIONAL (GROUND) MODEL (verification) is based on site specific data finally the ANALYTICAL (GROUND) MODEL is used as the basis for evaluating the design.

The conceptual model is the initial engineering geological model produced from the basis of existing data. The geological map is a fundamental building block of the model. Maps are available for any location around the world, at increasingly smaller scales in remoter areas but never the less the entire planet has been mapped at one scale or another. With varying scale comes varying uncertainty. Maps generally show formations i.e. units with specific geological environments and structural data (i.e. the rock forming and rock modifying of Fookes's paper).

The key input of an engineering geologist is the interpretation of "pure" geological information into a ground model applicable to the engineering project under consideration. This interpretation is based on knowledge, precedents, empiricism and experience.

In addition to geological maps are published papers. With the internet other data is now available e.g. worldwide DEMs, Google earth etc and these new data sources should be incorporated into the conceptual model.

Additional data that can be used to supplement this is existing GI, API, previous reports etc. (ie the results of a full desk study). Such data provides site specific data i.e. it becomes observational. For the purpose of this document and simplicity it may be beneficial to assume that no other information is available so it remains purely "conceptual".

The document should provide examples of project types and key engineering geological parameters required, in particular example of where these were not considered and problems occurred.

I think it would also be beneficial to show that the model approach should be used regardless of the project or setting. There is possibly a misunderstanding in the geotechnical community that such models are only relevant in complex ground or for large projects.

The release date for the 1st draft of the manual would be September 2010, to coincide with the IAEG meeting in Auckland. With this in mind I also suggest we submit an abstract to the conference so that the work of C25 and the manual can be presented in a short paper.

Hopefully this document will be the first in a number of useful products the committee can produce.

The following is some initial thoughts for discussion based on conversations at Chengdu and I would be grateful for your thoughts and initial feedback within 2 weeks. The black are suggested headings and the blue some initial thoughts. Once we have agreed the draft contents I suggest we divide the work between us... maybe 2 or 3 per section to get a broad view. . I think we should aim for an initial draft of each section within say 4mths.

Development of Conceptual Models

Objective: To provide guidelines and examples of the development and use of the conceptual model. This would meet all the terms of reference for C25.

Draft Content

1. Introduction to C25 & Committee
2. Definition of Terms. We have a wealth of terms for the concept of modelling depending on their nature and timing within a project e.g. conceptual, observational, geological, engineering geological, ground, analytical, geotechnical etc. A brief review and synopsis of models together with a definition of the terms C25 are using.
3. Role of the Conceptual Model, what is it how it fits in with the Engineering Geological Model and its importance
4. The project requirements. A ground model should be a combination of the project and the geology. Models are both geological and project specific. The project type and its design/performance specifications will identify the key engineering geological parameters of concern.
5. Geological map interpretation (the foundation of the conceptual model) and its transformation into a Conceptual Model.
6. Certain geological settings/units are more problematic e.g. karst, active faults... should these be treated separately??
7. Identification of engineering parameters and documentation of possible variations
8. Identification, documentation and incorporation of uncertainty in the conceptual model. Quality of maps, quality of interpretation, lack of data, complex” geological environments etc
9. Types of Models; ground profiles, cross sections, 3D diagrams.
10. Case Studies & Examples