

# CHECKLIST FOR STABILITY ASSESSMENTS

## FACTUAL INFORMATION

### 1. INTRODUCTION

- Report prepared for who?
- Site Location
- Outline of proposed development<sup>(b)</sup>
- Comment on need for earthquake assessment

### 2. TOPOGRAPHY

- Outline current landform (slope shape, height gradient, irregularities, erosion, soil creep/terraces)
- Outline surface drainage patterns<sup>(b)</sup>
- Review aerial photos
- Comment on any previous earthworks
- Comment on any existing instability<sup>(c)</sup>
- Additional site features (e.g. vegetation/trees structures<sup>(b)</sup> retaining walls, roads/driveways, services)

### 3. SITE HISTORY

- Outline current/previous landuse
- Comment on previous siteworks<sup>(b)</sup>
- Reference "District Hazard Map"/GIS
- Comment on previous instability<sup>(c)</sup>
- Performance of existing structures
- Review aerial photos
- Comment on previous contamination<sup>(c)</sup>

### 4. GEOLOGY

- Describe geological setting
- Refer to relevant maps
- Geological influences on stability (e.g. bedding, weak materials, faults)
- Describe seismic setting

### 5. INVESTIGATIONS

- ▶ **FIELD**
  - Inspection by geotechnical specialist
  - Descriptions of soils/rock in borelogs (Ref.1)
  - Outcrop/cutting descriptions<sup>(c)</sup>
  - Record Extent of any cracking<sup>(c)</sup>
  - Other field tests (e.g. CPT, etc.)
  - Monitoring of ground movements<sup>(c)</sup>
  - Groundwater measurements and observations (seepage, subsurface erosion)<sup>(c)</sup>
- ▶ **LABORATORY**
  - Outline tests undertaken
  - Summarise results
  - Previous testing in local area

### 6. SUBSURFACE CONDITIONS

- Geological interpretation<sup>(c)</sup>
- Summarise subsoil conditions, e.g. extent of fill<sup>(c)</sup> topsoil, nature and distribution of soils/rock
- Describe soil strengths/density, likely behaviour - refer to tests and logs
- Highlight weak/sensitive/loose soils or rock defects
- Describe groundwater conditions, subsurface drainage, expected seasonal fluctuations

## APPENDICES

- Borelogs, Testpit Logs, Logs of Exposures (Ref.1)
- Laboratory Results
- Specifications for Remedial Works/Fills
- Site Photos

## INTERPRETATION/DISCUSSION

### 7. SLOPE STABILITY (Ref. 2,3,4)

- ▶ **ENGINEERING GEOLOGICAL ASSESSMENT:**
  - Discuss site features
  - Discuss geological setting/influences<sup>(e)</sup>
  - Influence of rainfall/groundwater
  - Reasons for landform (local, regional)
  - Likely slope failure mechanisms
  - Potential for Instability
  - Effects of the development on slopes<sup>(f)</sup>
  - Consequence of instability
  - Empirical assessment (qualitative)
  - Risk rating applied<sup>(a)</sup>
  - State whether stability analyses are required
- ▶ **GEOTECHNICAL ENGINEERING ANALYSES**
  - Geotechnical slope model correct?
  - Analytical method stated
  - Determination of critical section of slope
  - Assessment of strength parameters
  - Assessment of groundwater profile/rainfall
  - Back analysis of any existing failures
  - External loads due to the development
  - State need for seismic analysis
  - Normal FOS requirements:
    - Static (Design gwt) FOS  $\geq 1.5$
    - Static (Extreme gwt) FOS  $\geq 1.2$
    - Seismic (150 year EQ) FOS  $\geq 1.2$
  - Sensitive analyses for parameters required?
  - Results and comments

### 8. GEOTECHNICAL EFFECTS OF DEVELOPMENT

- Slope stability risk increased or reduced?
- Is the development feasible?
- Need to drain slopes (surface/subsurface)?
- Need to remove/upgrade fill?
- Subsurface drainage beneath fills?
- Need to retain slopes/secure rock faces?
- Foundation conditions/requirements
- Effect of stormwater/effluent disposal
- Effect of service lines rupture (e.g. SW, sewer)
- Effect of river/coastal erosion
- Seismic effects on development and slope
- Maintenance requirements for life of the development

### 9. CONCLUSIONS AND RECOMMENDATIONS

### 10. STATEMENT BY GEOTECHNICAL ASSESSOR AS TO THEIR ABILITY & QUALIFICATIONS TO PREPARE THIS GEOTECHNICAL ASSESSMENT

## DRAWINGS/FIGURES

- Site Plan<sup>(d)</sup>:  Borehole/Testpit Locations
- Outline of Proposed Development
- Site Engineering Geological Maps<sup>(d)</sup>
- Site Contours Maps<sup>(d)</sup> } Cuts and fills
- Cross Sections } indicated
- Geotechnical Model
- Stability Analyses Results

## REFERENCES

1. Guidelines for the Description of Soils & Rock, NZ Geomechanics Society (1985)
2. Assessment of Slope Stability at Building Sites, BRANZ Study SR4, (1987)
3. Slope Stability in Urban Development, DSIR Series 122 (1981)
4. Stability of House Sites & Foundations, Earthquake & War Damages Commission, NZ Geomechanics Society (1980)
5. Land Assessment for Development Suitability, Burns & Farquhar, NZ Geotechnical Symposium (1996)

## NOTES

- (a) This checklist is intended as a guide for typical stability investigation & assessments for residential developments. There may be additional requirements for specifically difficult sites, large scale developments and regional hazards
- (b) Indicate on site plan
- (c) Indicate on site engineering geological map
- (d) These plans/maps are best combined if possible
- (e) Ref.3 provides a valuable outline of stability problems peculiar to selected areas of NZ
- (f) Refer BRANZ document Fig 3 (ref.2 above), Stability House Sites and Foundations (ref. 4 above)
- (g) See 6.6 -"Risk Rating", Design of Permanent Slopes for Residential Development, Crawford & Millar for EQC (1998)