MAROOCHY SHIRE COUNCIL PLANNING SCHEME POLICY NO.4

Preparation of Geotechnical Reports

1. Introduction

1.1 Purpose

The purpose of this Planning Scheme Policy is:

- To ensure that development in any area of potential landslip has proper regard to factors affecting land stability; and
- To provide guidance on the preparation and assessment of geotechnical reports for certain types of development.
- To provide guidance on the geotechnical certifications required for certain types and stages of development.

1.2 Applicability

This Policy applies to any development involving works requiring the excavation or filling of land which:

- Has slopes generally greater than 20% (1:5) outside of the Buderim, Coolum and Blackall Range areas as shown on Regulatory Map 1.3 (2 of 2) (Steep Land); or
- Has slopes greater than 15% within the Buderim, Coolum and Blackall Range areas; or
- Is on a site identified on Regulatory Map 1.3 (1 of 2) Landslip Hazard as being of Moderate, High or Very High Landslip Hazard, or;
- In Council's opinion, may be subject to land instability.

Geotechnical investigations are to be part of all stages of a proposed development.

1.3 Background

The stability of land which is steep, erosion prone, or prone to slip can be adversely affected by:

- Earthworks (excavation and filling),
- The erection of buildings and other structures (like swimming pools, tennis courts, retaining walls, roads and driveways),
- On-site disposal of wastewater, and
- Other significant changes to natural drainage patterns.

Inappropriate development on potentially unstable land can have significant risks for property and human safety on the site itself, and in areas both above and downslope of the site. To ensure that such risks are avoided or minimised, Council's Planning Scheme provides for geotechnical reports to be prepared where development may affect or be affected by land instability.

Slope assessments of escarpment areas at Buderim and Mapleton/Maleny have been carried out and published, notably by Coffey and Partners (1981), W.F. Willmott (1983) and Golder Associates (2002) respectively.

Council recognises that site-specific studies are generally more accurate than broader regional or district studies and will assess each geotechnical report accordingly.

1.4 Expertise Required to Prepare a Geotechnical Report

The preparation of geotechnical investigation and report requires specialised skills.

An appropriately qualified professional that must prepare a geotechnical report ("Geotechnical Engineer") is a person holding a degree in civil engineering or engineering geology with current membership of a recognized professional institution and who's primary business (with a minimum of 5 years experience) is in the field of geotechnical engineering or engineering geology. It is highly desirable that the person has local experience with landslip areas, or demonstrable general experience with landslips and their mitigation and rehabilitation. The Geotechnical Engineer must hold and maintain professional indemnity insurance for any one occurrence of at least $20 million.

1.5 Geotechnical Reports Must be Addressed to Council

Geotechnical reports must be addressed to Maroochy Shire Council and clearly state that the report is for the use and reliance upon by Council.

2. Requirements of a Geotechnical Report

2.1 General

A geotechnical report must document investigations of:

(a) A description of the subject land and proposed development

(b) Description of existing conditions of the development site, including assessment of land stability and geotechnical constraints to development (as outlined in Section 2.3 below)

(c) The suitability of the site for the proposed development, having regard to the prevailing geological and topographic conditions. This includes an assessment of likely effects or impacts of the development upon slope stability and landslip potential

(d) Measures recommended to mitigate impacts, including siting, engineering and other measures required to ensure a satisfactory form of development. Such measures must not require high whole of life cycle costs, particularly deep soil drainage within single residential lots or public land

(e) Conclusions and recommendations (as outlined in Sections 2.4 and 2.5 below)

The extent and detail of investigation will depend upon the particular site characteristics and the nature of the development being proposed. Council will require each report to demonstrate a scope and depth of investigation appropriate to the specific proposal. The extent of the work carried out is to be determined by the Geotechnical Engineer, provided that the conclusion of the investigation is that the site, house, retaining wall or other features under assessment have a Factor of Safety of at least 1.5.

Contour plans are to have 1.0 m contours developed from low level aerial photographs using "objective" photogrammetric techniques.

Geotechnical reports are to reference the Australian Geomechanics Society (AGS) 'Landslide Risk Management Concepts and Guidelines' dated March 2007. This document includes 'Some Guidelines for Hillside Construction' which should be included in the geotechnical report.

The preferred format of a geotechnical report is outlined in Appendix 1.

2.2 Previous Geotechnical Reports

Where a geotechnical report has already been provided as support documentation to Council for previous applications over the subject land (i.e. reconfiguring a lot or material change of use), these documents must be clearly referenced in the report prepared as support documentation for the subsequent application (i.e. operational work or building work). Such support documentation is to be available to the Council and be current and specifically relevant to the proposed development.

The guidance in this Policy outlines all matters to be addressed in a geotechnical report, on the basis that such support documentation (earlier geotechnical reports) is not available. In the event that geotechnical reports and certifications for the previous applications are available items already covered in these earlier reports / certifications may be referenced and covered in less detail.

2.3 Investigation of Existing Conditions

The geotechnical report must include an investigation of existing site conditions. This is to include an assessment of the existing stability of the subject land and details of geotechnical constraints on building and/or other development works on the site. The investigation of existing conditions is to include descriptions of:

(a) Existing geology (surface and subsurface materials, soil/rock stratigraphy) and geomorphology (slopes, ground contours, natural features, terrain analysis, landslip features) both locally and regionally in the area of interest. This may include review of information available from published materials, including Regulatory Map No. 1.3 (1 of 2 and 2 of 2), aerial photography, geological maps and reports (i.e. the Geological Survey of Queensland Record Series).

Field investigations and tests using excavators, drill rigs and/or seismic techniques will be required, particularly to assess the following factors:

- Depth of soil overburden within proposed works areas (including roads, infrastructure, building sites, potential swimming pools, tennis courts, garage, access driveways and the like).
- Classification of surface and subsurface materials to determine:

  (1) Erosion potential;

  (2) Foundation conditions that could affect structural performance;

  (3) Suitability for wastewater disposal; and

  (4) Any other relevant characteristics.

(b) Evidence of previous instability (i.e. irregular contours, hummocky topography, scarp faces in area of tension crack(s), curved and/or non-vertical tree trunks, broken kerb and gutters, cracked or uneven roadway surfaces, distressed houses or other buildings). Classification of any existing slips (type, severity and likely mode of failure) should be determined.

(c) Extent and type of any existing occurrences of erosion.

(d) Assessment of surface drainage patterns and characteristics (rapid surface runoff, presence of pools / ponds).

(e) Assessment of sub-surface drainage characteristics (i.e. presence of water table, springs, swampy

areas, wet grass types, presence /depth to / special conditions (artesian) of groundwater, and possible presence of confined aquifer beneath site). Field investigations and tests using excavators, drill rigs and/or seismic techniques will be required to assess groundwater conditions and their likelihood of developing artesian conditions during periods of adverse weather.

(f) Existing vegetation cover.

(g) Any existing site improvements (i.e. buildings, other structures, earthworks).

The results of all field and laboratory tests must be included in the geotechnical report, including the location and level (including datum) of field investigations such as boreholes, trench pits and core penetrometer soundings.

2.4 Conclusions

The geotechnical report must include conclusions about the overall suitability of the land for the proposed development. These are to include clear statements of:

(a) Whether all existing / proposed lots are presently stable;

(b) Whether all lots, and associated completed buildings (i.e. detached house) and infrastructure, will remain stable in the long term – that is, has a factor of safety against failure of at least 1.5; and

(c) Whether any conditions need to be placed on the development of lot/s to maintain long term stability.

2.5 Recommendations

The geotechnical report must include recommendations that clearly outline the following:

(a) Whether the site has any history of landslips

(b) Whether the proposed development (including all lots and buildings where applicable) will alter the present state of stability of the subject land

(c) Whether any portion of the subject land should be excluded from the development and included in natural, undisturbed or rehabilitated areas

(d) Whether the proposed development (including all lots and buildings where applicable) will adversely affect the current state of stability of adjoining land

(e) Whether the proposed development (including all lots and buildings where applicable) should allow cuts and fills and if so, to what depth

(f) Whether retaining structures are required and if so, provide necessary foundation design parameters, including drainage requirements

(g) Whether any special design features are required to stabilise or maintain the stability of the subject land, or portions of the subject land (including each lot where applicable)

(h) Whether any special surface and/or subsurface drainage measures need to be taken to improve or maintain the stability of the subject land, or portions of the subject land (including each lot where applicable)

(i) Whether on site disposal of liquids should be allowed

(j) Whether any follow-up inspections are required by the Geotechnical Engineer during construction

The recommendations must also provide guidance on appropriate measures required to make the site suitable for the proposed development, including:

- Preferred locations for buildings, other structures, driveways, etc
- Foundation requirements such as bearing pressures, piling parameters, special techniques for expansive clays, etc
- Pavement types and design
- Construction methods to avoid problem areas associated with loose materials and groundwater seepage
- Preferred excavation / retention / stabilisation techniques and suitability of excavated materials for use in on-site earthworks
- Surface and subsurface drainage requirements. Deep soil drainage within single residential lots or public land is not acceptable to Council
- Preferred methods of wastewater disposal
- Vegetation protection and revegetation requirements

3. Required Certifications by Geotechnical Engineer

3.1 General

Formal certifications by a Geotechnical Engineer will be relied upon by Council to make judgements on the suitability of developing land for residential purposes and on approving stages of developments.

Certifications must be prepared by a Geotechnical Engineer and be addressed to Maroochy Shire

Council. Where a member of an engineering company, certification should be by the engineering company or an appropriate officer or employee of the engineering company on behalf of the company.

Additional certifications may be required by Council in special circumstances.

3.2 Reconfiguring a Lot

3.2.1 Council's endorsement of the plan of survey

(a) Certification that:

(1) A stable building area exists on each lot;

(2) Stable driveway crossovers / driveways and services can be constructed to service each lot in accordance with Maroochy Council Standard Drawings R-0050, R-0056 or AS 2890;

(3) Each roadway cutting or fill can be retained or treated to maintain its long-term stability;

(4) All necessary services (water mains, stormwater drains and sewer lines and the like) can be installed within the natural slopes or fills without detrimentally affecting the long-term stability of the natural or altered slopes;

(5) The proposed roadworks, services and house development earthworks will not interfere with the natural seepage of water from the slopes;

(6) The proposed works, including provision of services, will not adversely affect the stability of the stable building areas; and

(7) The stable building area on each block will remain stable over the long term.

Analyses must show a minimum factor of safety against landslip of 1.5.

(b) Certification that the works have been designed according to the Geotechnical Engineer's recommendations and have a minimum factor of safety against landslip of 1.5.

3.3 Material Change of Use

3.3.1 Prior to Commencement of Use

(a) Certification that the design works associated with the use have been undertaken according to the Geotechnical Engineer's recommendations and have a minimum factor of safety against landslip of 1.5.

3.4 Operational Work

3.4.1 With application

(a) Certification that the operational work plans address all likely geotechnical risks associated with construction works proposed for the site, and that the works undertaken in accordance with the plans will not pose any significant risk to the stability of the site or adjacent properties. Analyses must show a minimum factor of safety against landslip of 1.5.

(b) Certification that the stability of the road and driveway cuts, as designed, have been analysed using conservative soil parameters and that the net impact of the cuts is such that it will not adversely affect the stability of the road or the surrounding areas. Analyses must show a minimum factor of safety against landslip of 1.5.

(c) Certification that all cuts have been designed and analysed using conservative soil parameters and that the net impact of the cuts is such that it will not adversely affect the stability of the site or the surrounding areas. Analyses must show a minimum factor of safety against landslip of 1.5.

(d) Certification that any retaining walls are designed to carry any load that could reasonably be applied. Particular consideration must be given to possible home-sites and driveways. A plan showing the carrying capacity of all the proposed retaining walls is required to assist future construction within the development. Analyses must show a minimum factor of safety against landslip of 1.5.

3.4.2 Upon completion of works

(a) Certification that the works have been constructed according to the Geotechnical Engineer's recommendations and have a minimum factor of safety against landslip of 1.5.

3.5 Building Work

3.5.1 To be provided with application

(a) Certification that the building plans address all likely geotechnical risks associated with construction works proposed for the site, and that the works undertaken in accordance with the plans will not pose any significant risk to the stability of the site or adjacent

properties. Analyses must show a minimum factor of safety against landslip of 1.5.

(b) Certification that the footing design is appropriate to support the structure under the existing and potential site conditions and that the footing system and associated cuts will not adversely affect the stability of the site or the surrounding areas. Analyses must show a minimum factor of safety against landslip of 1.5.

(c) Certification that all cuts have been designed and analysed using conservative soil parameters and that the net impact of the cuts is such that it will not adversely affect the stability of the site or the surrounding areas. Analyses must show a minimum factor of safety against landslip of 1.5.

(d) Certification that the retaining walls are designed to carry any load that could reasonably be applied. Analyses must show a minimum factor of safety against landslip of 1.5.

(e) Building plans that have been countersigned by the Geotechnical Engineer to the effect that any special conditions/design features required by the Geotechnical Engineer have been included in the design. Analyses must show a minimum factor of safety against landslip of 1.5.

3.5.2 Prior to Final Inspection Certificate

(a) Certification that the works have been constructed according to the Geotechnical Engineer's recommendations and have a minimum factor of safety against landslip of 1.5.

Appendix 1: Preferred Format of Geotechnical Report

The report must be presented in a format suitable to the individual proposal and illustrated by photographs and sketches as appropriate. A suggested typical report format is as follows:

1. **Introduction**
   - 1.1 Details of Development
   - 1.2 Site Location and Description (including survey co-ordinates/co-ordinate system)
   - 1.3 Method and Scope of Investigations
   - 1.4 Qualifications of Responsible Individual(s) and/or Company
2. **Description of existing conditions**
   - 2.1 Geology (local and regional)
   - 2.2 Topography
   - 2.3 Groundwater
   - 2.4 Surface Drainage
   - 2.5 Vegetation
   - 2.6 Buildings, Other Structures, etc
3. **Assessment of land stability**
   - 3.1 Existing Conditions
   - 3.2 Geotechnical Constraints to Development
4. **Description of proposed development**
   - 4.1 Site Layout
   - 4.2 Proposed Development Components
   - 4.3 Potential Geotechnical Effects
5. **Assessment of development impacts**
   - 5.1 Site Layout
   - 5.2 Roadworks, Driveways and Other Pavements
   - 5.3 Earthworks (excavation, materials usage)
   - 5.4 Foundations
   - 5.5 Surface Drainage
   - 5.6 Wastewater (treatment and disposal)
   - 5.7 Overall Effect of Development on Stability
6. **Measures recommended to mitigate impacts**
7. **Summary and Conclusions**
8. **Site Plan**

APPENDIX – Field and Laboratory Test Results