

PART 2: EARTHWORKS AND GEOTECHNICAL REQUIREMENTS LAND STABILITY, FOUNDATIONS AND EARTHWORKS

WDC has the following documents:

- ~~Institute of Geological & Nuclear Sciences (IGNS) Reports. (Copies held by WDC Emergency Manager):~~

Report No. Title

~~2A,B Active Geological Structures, Earthquake Scenarios~~

~~3 A Numerical Assessment of the Earthquake Hazard in the Manawatu Wanganui Region~~

~~4A Geological Setting & Earthquake Hazards, Lifeline Vulnerability & Analysis of Possible Damage~~

~~4B Characteristics of Near Surface Geological Conditions in Urban Areas of Manawatu Wanganui Region~~

~~4C Measurement of Earthquake Ground Shaking in Palmerston North & Wanganui~~

~~4D Assessment of Liquefaction induced Ground Failure Susceptibility in Manawatu Wanganui Region~~

~~4E Ground Shaking Hazard Assessment for Urban Centres of Manawatu Wanganui Region~~

- ~~Aerial photography – current and historical vertical aerial photography of the urban area is held by WDC. WDC also has rural aerial photography. Old stereo pairs are held by WDC Planning Services. The Regional Council holds district wide aerial photography.~~

2.1 Scope

2.2 General

2.3 Design Technical responsibilities

2.3.2 Preliminary site evaluation

Add the following new clauses:

(c) Low impact design factors:

~~The preliminary site evaluation needs to take into account low impact design factors. These include consideration of maintaining and improving natural waterway features and optimising waterway crossing locations. Protection of well-drained soils and natural soakage areas also need to be taken into account.~~

(d) Stream instability

~~There is a potential for instability through changes to the current ground conditions, such as stream erosion;~~

2.3.3 Construction control testing

Commented [SC1]: Now in 4404

Commented [SC2]: Now in 4404

2.4 Approval of proposed works Planning and design

Add new paragraph:

Landform sections need to take into account low impact design principles including retention of existing landforms and natural features where possible, and avoiding earthworks where there are existing habitats of indigenous species, wetlands, or areas of high natural character. The design shall take into account the following factors in making the selection of the final choice of the landform.

- (a) ~~The choice of suitable landform may be specific to a particular site. An earthworks approach that respects and reflects the natural topography of the site is preferred. Considerations for carrying out earthworks include:~~
 - (i) ~~The minimisation of the risk of damage to property occurring through ground movement in the form of slips, subsidence, creep, erosion, or settlement.~~
 - (ii) ~~The minimisation of the risk of damage to property occurring through flooding, or surface water run-off.~~
 - (iii) ~~The development of a more desirable roading pattern with improved accessibility to and within the site and the creation of a better sense of orientation and identity for the area as a whole.~~
 - (iv) ~~The efficiency of overall land utilisation including the quality of individual sites and amenity areas around buildings, the economics of providing engineering services, and the standard of roading and on-site vehicular access.~~
 - (v) ~~The need to create suitably graded areas for playing fields and other community facilities; and~~
 - (vi) ~~The enhancement of the general environmental character of the area.~~
- (b) ~~The general nature and shape of the ground including:~~
 - (i) ~~The geological nature and distribution of soils and rock.~~
 - (ii) ~~Existing and proposed drainage conditions, and the likely effects on groundwater.~~
 - (iii) ~~Previous history of ground movements in similar soils in the area.~~
 - (iv) ~~Performance of comparable cuts and fills (if any) in adjacent areas, and~~
 - (v) ~~Air photography and other sources of information which should be reviewed and incorporated into any slope stability assessment.~~
- (c) ~~Soil data as applicable for areas which:~~
 - (i) ~~Are intended to form in situ bases for fills.~~
 - (ii) ~~Area intended to yield material for the construction of fills.~~
 - (iii) ~~Are intended to be exposed as permanent batters, and~~
 - (iv) ~~Are to remain as permanent slopes or cut areas.~~

- (d) ~~Borings, probings, or open cuts as necessary to:~~
- ~~(i) Classify the soil strata by field and visual methods.~~
 - ~~(ii) Evaluate the likely extent and variation in depths of the principal soil types, and~~
 - ~~(iii) Establish the natural groundwater levels.~~
- (e) ~~Soil information required for:~~
- ~~(i) Further sampling and testing which may be required on representative soil types.~~
 - ~~(ii) Relating subsequent soil test properties to relevant strata over the site.~~
 - ~~(iii) Assessment and design for slope stability.~~
 - ~~(iv) Assessment and design for foundations suitable for the finished site, and~~
 - ~~(v) Assessment and design for road subgrades.~~

~~The test data appropriate in different areas should be determined by the geotechnical professional.~~

Commented [SC3]: Now in 4404

2.5 **Construction Stability criteria**

2.5.1 **Plan Pest Management**

Add the following new section:

The management response to minimise the potential for weed establishment can be controlled through identification of weeds that should not be tolerated on site because of their aggressiveness or persistence. Adequate site biosecurity is required for machinery and materials brought onto the site to ensure that weed propagules do not enter the site. This involves cleaning machinery prior to bringing it on to the site and ensuring that other materials brought on to the site, including gravels, are free of seeds and vegetation. Using locally sourced gravel and soils, or other materials where possible may reduce the potential for the introduction of new weeds to the area.

Commented [SC4]: New

2.6 **Final Documentation Special soil types**

2.6.2 **As-built drawings for earthworks and drainage**

Add the following sentences:

This is required where earthworks exceed 100 square metres and the depth exceeds 500mm. For fill areas compaction results are required in terms of Appendix I, Section 2.

See drawing CM - WDC-02 –Depth Contours Cut / Fill Areas in Appendix B

Commented [SC5]: Was 2.11.1.2

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Commented [SC6]: Was 2

2.7 ——— Compaction standards for fill material

2.8 ——— Erosion, sediment and dust control

2.9 ——— Seismic considerations

2.10 ——— Lifeline systems

2.11 ——— Final documentation

2.11.1 ——— Geotechnical completion report

2.11.2 ——— As-built drawings for earthworks and drainage

Add the following:

The Developer shall provide cut / fill contours to show changes in the original ground level. This is required where earthworks exceed 100 square metres and the depth exceeds 500mm. For fill areas compaction results are required in terms of Appendix I, Section 2.

Commented [SC7]: Now in 2.6.2

See drawing WDC-CM-02—Cut / Fill Depth Contours in Appendix A.

2.12 Construction

Add the following new clause:

~~Earthworks shall be carried out to the standards detailed in the approved specifications and drawings, and any requirements in a regional or district plan or consent issued by the LA.~~

~~The construction control testing shall be carried out by a testing laboratory or competent person under the control of the geo-professional, and to the recognised testing standards as deemed appropriate.~~

~~The testing laboratory shall have recognised registration or quality assurance qualifications.~~

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