
PART 2: EARTH WORKS AND ON SITE TREATMENT/DISPOSAL DEVICES**200 SCOPE**

200.1 This Part of this Standard sets out the requirements for the geotechnical reporting on proposed building sites and earthworks, and for the carrying out of the earthworks or preparation for foundations, including:

- (a) The assessment and protection of slope stability
- (b) The excavation and filling of land to form new contours
- (c) The suitability of both natural and filled ground for the founding of roads, buildings, services and other works
- (d) The control of erosion, siltation and dust during and after earthworks.

200.2 Because of the wide range of soil types, physical conditions and environmental factors applying in different areas it is not possible to specify precise requirements which will be applicable in all situations. The criteria set out in this section will be subject in each particular instance to the judgment of the Geotechnical Engineer.

201 PERFORMANCE CRITERIA

- Meet all criteria of the District Plan
- Be safe, stable and geotechnically sound
- Cater for surface and ground water flows
- Provide adequate foundation for roads and services
- Provide an accessible building platform for each allotment of a subdivision

202 DOCUMENTS REFERRED TO IN THIS SECTION

- NZS 4431:1989 : Code of practice for earth fill for residential development.
- Resource Management Act 1991.
- Rodney District Council General Bylaw 1998.
- Auckland Regional Council Technical Publication No. 58 3rd Edition 2004: "On-Site Wastewater Systems: Design and Management Manual".
- Rodney District Council's District Plan, including Proposed District Plan 2000 and all Plan changes and Variations once Notified.
- Rodney District Council/ARC "Toolbox of Methods for On Site Stormwater Mitigation/Disposal.
- The New Zealand Building Code.
- NZS 3604:1999.
- AS 2870-1996 Residential slabs and footings – Construction.
- ARC Technical Publication 90 "Erosion and Sediment Control of Earthworks".
- ARC Auckland Regional Plan – Air Land and Water.
- ARC Auckland Regional Plan – Sediment Control.
- Rodney District Council's Land Information Register.

203 GENERAL

- 203.1** The New Zealand Standard Code of Practice for Earthfill for Residential Development (NZS 4431) provides a means of compliance with Council's requirements for earthfills.
- 203.2** The Resource Management Act 1991 requires that the suitability of the land to be subdivided to be addressed. The District Plan (Rule 23.8.4) requires evidence of stable, flood free building sites prior to subdivision or development consent. This may require detailed appraisal of the stability and suitability of the land before lodgement of the development application.
- 203.3** Much of Rodney District is covered by expansive soils. The Council's Land Information Register records a desk-top survey of expansiveness (ref: LIR 10085). The **Developer** is required to identify the degree of expansiveness in terms of AS 2870:1996 and NZS 3604:1999 for all subdivisions creating five or more lots, and all subdivisions within areas recorded as Category D, (insufficient knowledge) in the Land Information Register. This requirement may only be waived by the Council's Consents **Engineer** (in writing), if he is satisfied that the existing records in the Land Information Register adequately address the expansiveness of the site(s).
- 203.4** Much of Rodney District is covered by Northland Allochthon formations. The Council's Land Information Register records a desk-top survey to identify these areas. (LIR 40891). Where Northland Allochthon is identified, either by the above document or in field observations, the **Developer** shall appoint a Geotechnical Engineer who shall carry out such investigations as are considered necessary and provide a report confirming the stability and suitability of the proposed lots prior to the approval of the scheme plan.
- 203.5** The **Developer** must ensure that the site is not subject to the jurisdiction of the Historic Places Trust.
- 203.6** The requirements of the Auckland Regional Council shall be met.

204 TECHNICAL RESPONSIBILITIES

- 204.1** Where any development involves the carrying out of bulk earthworks, the assessment of slope stability, or the detailed evaluation of the suitability of natural ground for the foundations of buildings, roads, services or other works, then a Geotechnical Engineer shall be appointed by the **Developer** to carry out the following functions:
- (a) Prior to detailed planning of any development to undertake a site inspection and such investigations of subsurface conditions as may be required to satisfy the requirements of the Resource Management Act 1991 and the District Plan (see section 203.2).
 - (b) At the time of application for resource consent for the development, to present a detailed geotechnical report setting out the findings of any site investigation, together with appropriate earthworks recommendations for the development of the site(s). The report should indicate any likely constraints on the erection of, and foundations for, future buildings on the site(s). The report should also address the findings of laboratory testing to determine the expansiveness of the soils, unless this requirement has been waived in writing by the Engineers Representative..
 - (c) Before work commences and during construction to determine the extent of further specialist Geotechnical Engineering services required (including investigation and geological work).
 - (d) Before and during construction the Geotechnical Engineer shall:
 - Determine the methods and frequency of construction control tests to be carried out.
 - Determine the reliability of the testing.
 - Evaluate the significance of test results and field inspection.
 - Assess the quality of the finished work.
 - Provide such regular and sufficient inspections to ensure that the requirements of (e) below are met.

(e) On completion, submit a statement of professional opinion as to "Suitability of Land for Building Development" in the form of Appendix "J" of this Standard.

204.2 All relevant tests shall be made by appropriately registered laboratories (or others as approved by the Engineer).

205 SITE INVESTIGATIONS

205.1 Preliminary Site Evaluation

205.1.1 The preliminary evaluation should be carried out in the context of the total surroundings of the site and should not be influenced by details of land tenure, territorial or other boundary considerations.

205.1.2 The Resource Management Act 1991 and the District Plan contain specific requirements for developments. The evaluation shall address these requirements.

205.1.3 Reference should be made to the Council's Land Information Register for any pertinent information already held on the subject site or adjacent sites.

203.1.4 Particular attention is drawn to the requirements of Rule 23.8.4 of Chapter 23 of the proposed District Plan 2000 with regard to building sites on proposed subdivisions

205.1.5 The NZ Building Code and NZS 3604:1999 require the expansiveness of the soils at the site to be addressed.

205.1.6 Where a Geotechnical Engineer has been appointed as required by Section 204.1, then at the time of submission of a scheme plan he shall submit to Council a written report setting out the particulars of any investigations carried out including details of contours, natural features and modifications proposed thereto; and shall furnish to Council a statement of professional opinion as to the suitability of the land for development with details of any special conditions that should be imposed.

205.2 Format Of Report

205.2.1 All Soils Reports including preliminary assessments, site investigations, effluent disposal evaluations, detailed geotechnical reports, earthworks design, earthworks completion reports and professional opinions will be filed in the Council's Land Information Register and cross-referenced in the associated data base. It is therefore important that the following information is clearly and accurately set out in any Soils Report:-

- (a) The current legal description of the site, Lot and Deposited Plan (DP) numbers;
- (b) A plan to a suitable scale (such as a copy of the scheme plan of development) showing the current legal boundaries, the proposed boundaries and lot numbers, the location of the identified building sites, physical features pertinent to the investigation, test bores and recommended building restrictions;
- (c) In the case of sites to be re-contoured, a plan to a suitable scale (such as a copy of the scheme plan of development) showing the current legal boundaries, the proposed boundaries and lot numbers, existing and proposed contours and the location, type and dimensions of proposed retaining structures. Significant variation from the proposed contours at a later stage may require a Variation to the resource consent.
- (d) Detailed part site plans to a larger scale as appropriate for clarity;
- (e) The investigated sites and recommended restrictions clearly dimensioned from the existing and proposed boundaries;
- (f) Bore logs for all test bores and details of any stability analyses carried out;
- (g) Recommendations for the design and execution of the earthworks and for the future development of the subdivided lots, including any restrictions on foundation types or the location of building;
- (h) Details showing the control of stormwater run-off during and post earthworks (until buildings are erected and connected to the reticulated stormwater system);

- (i) A conclusion clearly stating compliance with section 106 of the Resource Management Act 1991 and with the requirements of the relevant sections of the District Plan.

205.2.2 Should the Lot numbers on the approved survey plan differ from the proposed Lot numbers on the scheme plan, amended copies of the report and plans, clearly distinguished from the originals by date and reference numbers, shall be submitted.

205.2.3 All Reports and plans shall be submitted in duplicate.

205.3 Peer Review of Soils Report

205.3.1 The **Engineer** reserves the right to call for a Peer Review of the Soils Report in cases of serious stability concerns or conflict between the findings of the soils report and previous reports held in the Council's Land Information Register. The cost of the Peer Review shall be met by the **Developer**.

205.3.2 When the **Engineer** calls for a Peer Review of the Soils Report, the Geotechnical Engineer or **Developer**, as appropriate, shall nominate as Peer Reviewer, a geotechnical Chartered Professional Engineer. The acceptance of the nominated Peer Reviewer by the **Engineer** shall be obtained in writing before the Peer Review commences.

205.3.3 The Peer Review shall examine the appropriateness and completeness of the investigations and analyses applied in the soils report with respect to the site and its environs.

205.3.4 The Peer Reviewer may recommend or request additional investigations and/or analyses to clarify or confirm any concerns and these shall be addressed by the Geotechnical Engineer in writing to the **Engineer** and Peer Reviewer.

205.3.5 The Peer Reviewer shall provide a written report to the **Engineer** on the matters set out in section 205.3.1 and any other matters pertinent to the safe development of the site. The report shall include a conclusion as to the adequacy of the conclusion and recommendations of the Soils Report, and confirm the suitability of the land for the development, subject to the recommendations of the Soils Report and Peer Review.

205.3.6 The Peer Review report shall include the current legal description of the site (Lot and Deposited Plan (DP) numbers), clear reference to the report being reviewed and shall be submitted in duplicate.

206 PLANNING AND DESIGN

206.1 Landform

206.1.1 The final choice of landform should represent the most desirable compromise between the development pattern sought and the preservation of natural features and the natural quality of the landscape including the retention of natural watercourses, and significant vegetation. Reference should also be made to Proposed District Plan 2000, in particular for Significant Natural Areas (SNAs).

206.1.2 The final choice of landform is dependent on many factors which may be specific to a particular site. In general, unnecessary earthworks should be avoided, but may be necessary for the minimisation of the risk of instability, flooding, erosion and other matters addressed by section 106 of the Resource Management Act 1991 and the District Plan, as well as access and other factors of development design.

206.2 Retaining Structures

206.2.1 The District Plan, Chapter 18, contains Rules relating to urban earthworks. These include requirements for excavation and filling adjacent to boundaries and earthworks in general, and must be addressed as part of subdivision consents.

206.2.2 Any proposal involving retaining structures adjacent to existing or proposed boundaries should be documented in the application. Failure to do so will result in delays while additional resource consents are processed.

206.3 Erosion Control

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- 206.3.1** Development work shall be carried out in such a manner as to restrict soil erosion by water and wind action to acceptable levels, and in compliance with the Auckland Regional Council Technical Publication No. 90 "Erosion and Sediment Control Guidelines for Earthworks".
- 206.3.2** It is the **Developer's** responsibility to ensure that there is no increase in stormwater discharge and no deterioration in stormwater quality discharged over the lower boundary at any stage during the development, including post-development until such time as individual buildings and paved surfaces are constructed and discharges connected to the designed stormwater systems.
- 206.3.3** The location and details of all erosion and sediment control measures shall be included in the Engineering Plans. A copy of the Auckland Regional Council approval if required, shall be forwarded to the **Engineer** prior to his giving approval to commence any earthworks on site.
- 206.3.4** The discharge of sediment laden runoff from earthworks must comply with the Auckland Regional Council Plan for Sediment Control.
- 206.3.5** The diversion of natural water is only permitted for those activities listed in the current Auckland Regional Council Transitional Plan and proposed Air Land and Water Plan. All other diversions will require a Resource Consent from the Auckland Regional Council. The obtaining of and compliance with, the Resource Consent is the responsibility of the **Developer**.
- 206.3.6** Earthworks operations shall be carried out in such a manner that a dust nuisance is not created to adjoining properties. Without prejudice to the conditions of any Resource Consent the following practices shall be adopted in the planning, design and execution of developments involving earthworks:
- (a) Existing shelter belts, wind fences and standing vegetation shall be maintained in order to reduce wind erosion.
 - (b) In dry windy conditions haul roads shall be watered and in extreme conditions operations on site shall cease immediately if a dust nuisance to adjoining properties exists.
- 206.4 Provision for Permanent Services**
- 206.4.1** Where ground settlement is expected to occur, all service pipes installed within or under earthfill shall be designed and constructed to ensure adequate capacity, strength and water-tightness to withstand the loads due to settlement and to prevent leakage into the fill.
- 206.4.2** Where surface water could cause erosion of batters or instability through soakage into the soil, open interceptor drains shall be constructed in permanent materials. Benches in batter faces shall be sloped back and graded longitudinally to reduce spillage of stormwater over the batter. Water from stormwater systems shall be prevented from flowing into a fill or into natural ground near the top or sides of a fill and no stormwater soak pits shall be constructed in a fill whereby the stability of the fill might be impaired.
- 206.4.3** All drains required permanently to protect the stability of natural or man made slopes or to prevent flooding and erosion shall be inspected progressively as work proceeds and clearly identified as such on the 'As-built' drawings.
- 207 CONSTRUCTION PROCEDURES**
- 207.1 Inspection and Quality Control**
- 207.1.1** The Geotechnical Engineer shall provide an adequate level of inspection and testing, in order to enable him to evaluate properly the general quality of the finished work and to enable him to furnish a report as to the compliance of the work with these Standards and to issue Design Certification in the form of Appendix "G1".
- 207.2 Erosion Control**

207.2.1 All measures required under section 206.3 above shall be installed before earthworks commence on the site, and shall be extended and/or modified as may be required during the works to ensure that the requirements of section 206.3.2 are met at all times. The measures shall be maintained and cleaned out until complete non-erodible ground cover is fully re-established across the site.

208 FINAL DOCUMENTATION

208.1 'Asbuilt' Drawings

208.1.1 On completion of the earthworks an 'As-built' plan conforming to the requirements of Section 1 shall be prepared. It is a requirement to specify the location of the wastewater drainage (including both the location of and pipework for the treatment system and disposal field); and, allocated reserve areas, as matters that must be shown in the final asbuilt plans.

208.2 Earthworks Completion Report

208.2.1 On completion of construction the Geotechnical Engineer shall furnish the **Engineer** an Earthworks Completion Report together with the appropriate Statements of Professional Opinion. The Earthworks Completion Report will be filed in the Council's Land Information Register and cross-referenced in the associated data base. It is therefore important that the following information is clearly and accurately set out in any Soils Report.

- (a) The current legal description of the site, Lot and Deposited Plan (DP) numbers;
- (b) The Land Transfer (LT) number for the new Lots;
- (c) As-built plans of earthworks including lot boundaries, extent of filled ground, depth of fill contours, and all subsoil and underfill drainage systems;
- (d) A copy of the approved survey plan with identified building sites and any areas restricted for development clearly and accurately dimensioned from boundary pegs, signed by the Geotechnical Engineer.
- (e) Detailed part site plans to a larger scale should be included as appropriate for clarity;
- (f) Test reports, including site plans showing the test locations;
- (g) Confirmation of the expansiveness of the soils on the site(s) in terms of AS 2870-1996 including laboratory test results (unless previously waived in writing by the **Engineer's Representative**).
- (h) Recommendations for the design of future development on the subdivided lots, including any restrictions on foundation types or the location of buildings;
- (i) A Statement of Professional Opinion in the form prescribed in Appendix "J" Suitability of Land For Building Development of this Standard as to the suitability of earthworks and, where applicable, original ground for specified types of building construction, and that it complies with the relevant Rules in the District Plan.
- (j) Any development of sites requiring on-site treatment and disposal of sewage that has involved earthworks, shall also be subject to a complete re-evaluation pursuant to section 207 of this Standard.

208.2.2 All Reports and plans shall be submitted in duplicate.

209 ON-SITE EFFLUENT DISPOSAL

209.1 Site Evaluation

209.1.1 The Council's District Plan requires all sites that cannot be connected to a reticulated sewerage system to be capable of being adequately serviced by an on-site treatment and disposal system.

209.1.2 An Effluent Disposal Evaluation Report shall be submitted with the scheme plan of development for all such sites.

209.2 Evaluation Report

209.2.1 The effluent disposal evaluation shall be prepared by an engineer experienced in wastewater drainage treatment and disposal.

209.2.2 The Effluent Disposal Evaluation Report shall conform with the requirements of section 203.2 of this Standard, and shall address the following:

1. Provide evidence of the clearance to the ground watertable in the summer and winter periods. Unless proven otherwise, the winter ground water table shall be assumed at the surface. clearance shall conform with Table 5.2 of Auckland Regional Council Technical Publication No. 58 (3rd Edition, 2004).
2. Identify potential wet site conditions on any site(s) and the means of controlling stormwater.
3. Identify all watercourses, drains, overland flow paths and other natural water resources in the vicinity, which may be polluted by unsatisfactory operation of any system, and recommend protective measures required.
4. Provide 1m contours across all proposed disposal areas.
5. Address the porosity of the soil and the ability of the soil to receive, contain and treat effluent. Conventional trenches are only acceptable on Category 4 soils or better.
6. Provide a completed and signed Auckland Regional Council Technical Publication No. 58 (3rd Edition, 2004): "On-Site Wastewater Systems: Design and Management Manual" ARC Appendix E "On-site Wastewater Disposal Evaluation Investigation Checklist".
7. Recommend appropriate treatment and disposal systems for the site(s) on the basis of the maximum occupancy based on bedroom numbers in accordance with Table 5.1 of Auckland Regional Council Technical Publication No. 58 (3rd Edition, 2004), with a minimum system capacity for a 1 to 3 bedroom dwelling to be based on a 3-bedroom (5 person) dwelling on each site.
8. Identify effluent disposal areas and reserve areas clear of potential building and other development areas on each site. The reserve area shall conform to Table 5.3 of Auckland Regional Council Technical Publication No. 58 (3rd Edition, 2004):
9. Recognise and address the requirements of section 103.2.

209.2.3 When any earthworks are carried out over the identified disposal areas, a new report shall be submitted with the Earthworks Completion Report prior to issue of the Section 224(c) Certificate or Consents-Works Completion Certificate. Earthworks on proposed wastewater disposal and reserve areas must be minimised as far as practicable, and that topsoil must be retained and then reinstated in the same area.

210 **STORMWATER HYDROLOGICAL NEUTRALITY**

210.1 **Site Evaluation**

210.1.1 The Council's District Plan requires all Rural Residential sites to achieve stormwater hydrological neutrality. This may be by individual on-site systems or jointly owned and maintained private systems. (Refer to section 401.6).

210.1.2 A Stormwater Hydrological Neutrality Report shall be submitted with the scheme plan of development for all rural residential sites.

210.2 **Stormwater Hydrological Neutrality Report**

210.2.1 The Stormwater Hydrological Neutrality Report shall be prepared by an Engineer experienced in on-site stormwater management.

210.2.2 The Stormwater Hydrological Neutrality Report shall conform to the requirements of section 205.2 and shall address the following:

- Assessment of the flows (2-year, 10-year and 100-year return period storms) volumes and times of concentration from the subject area under pre-development conditions;
- Recommend appropriate systems to mitigate post-development flows, volumes and times of concentration to pre-development levels to achieve hydrological neutrality;
- Address the requirements of the document “The Management of Stormwater In Country Side Living Zones” (The Toolbox).

210.2.3 The Stormwater Hydrological Neutrality Report will be the basis of Consent Notices registered on the titles to control future development of the relevant lots.

211 EARTHWORKS ON INDIVIDUAL SITES

211.1 General

211.1 It is the responsibility of the **Developer** to ensure that any resource consents required under the District and Regional Plans are obtained before works commence. Particular note is drawn to District Plan requirements for cuts and fills adjacent to site boundaries, and to limits on volumes and surface area. (refer to Chapter 18, Urban Earthworks, or Chapter 7, Rural, Proposed District Plan 2000)

211.1.2 Permitted Activity urban earthworks under the District Plan are subject to compliance with the requirements of Rule 18.10.

211.1.3 All earthworks on individual sites shall comply with the requirements of section 206.3 and 207 above. Works to create a building platform or retaining structures adjacent to boundaries shall be carried out under the supervision of a suitably qualified and experienced geotechnical engineer.

212 CERTIFICATION ON COMPLETION

212.1 On completion, the supervising geotechnical Engineer shall certify the earthworks in the form of Appendix “G”. Such certification shall specifically recognise the proposed foundation system to be installed on the building platform, and if this is unknown, the certificate shall be accompanied by an Earthworks Completion Report setting out any limitations on the future development of the building platform.

212.1.2 On satisfactory completion of section 210.1, Council will issue a Consents-Works Completion Certificate for the purposes of a Building or Resource Consent if required.