AUS-SPEC

Infrastructure Specifications

0021 Site regrading

0021 SITE REGRADING

IMPORTANT: This document has been adapted from the NATSPEC suite of specification templates for use in the Cessnock City Council area by both Council and industry. NATSPEC regularly updates the base templates (currently in April and October each year), and Council may incorporate changes into its version of AUS-SPEC from time to time. To assist in highlighting any changes made by Council to the NATSPEC templates, the following conventions are used.

- See ANNEXURE M at the end of this document which contains (where practical) Cessnock City Council customisations (also known as 'office master' text). References to the Annexure are to also be inserted at relevant clauses in the main body of the document.
- Where content is added to the main body of the document, it is to be shown in brown text like this.
- Where content is deleted or excluded from the main body of the document, it is to be shown ~~struck through like this~~. Such clauses are to have no effect.

Where there is a conflict between main body text and Cessnock City Council specific clauses, Council's specific clauses shall prevail.

1 GENERAL

1.1 INTRODUCTION

Worksection application

Description: This worksection is applicable to the design and documentation requirements for site regrading for both Council works and land development and subdivisions.

1.2 RESPONSIBILITIES

General

Requirement: Provide design and documentation for site regrading works for land development and subdivisions.

1.3 CROSS REFERENCES

General

Requirement: This is not a self-contained design document, conform to the following worksection(s):

- *0010 Quality requirements for design.*
- *0012 Waterfront development.*
- *0022 Control of erosion and sedimentation (Design).*
- *0041 Geometric road design.*
- *0052 Geometric rural road design – unsealed.*
- *0074 Stormwater drainage (Design).*

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- ARI: Average recurrence interval.
- AEP: Annual Exceedance Probability
- EPA: Environmental protection agency.
- WAE: Work-as-executed.

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Advanced plants (species): Plant species containerised and established in 300 mm containers but less than 45 L containers.

2 PRE-DESIGN PLANNING

2.1 PLANNING

Site suitability for the proposed development

Initial appraisal: Determine if the natural state of the development site is suitable for the proposed development and whether site regrading is required to:

- Alleviate flooding.
- Fill gullies or create emergency flow paths after installation of underground stormwater systems.
- Improve stormwater run-off.
- Reduce excessively steep slopes, to allow construction of economical foundation solutions.
- Allow effective recreational use or provide improved access.
- Fill local unwanted depressions.
- Improve ground conditions where existing soils have plastic/reactive properties.

Land use restrictions

Constraints: Identify all constraints, natural or otherwise, which may apply to the site.

2.2 ENVIRONMENTAL INVESTIGATION AND PLANNING

Development precinct investigation

Requirement: Prepare a survey and geotechnical report to establish locations of site features, levels and grade, and soil conditions.

Soil properties: Investigate the development precinct soil condition to determine the following:

- Chemical characteristics and compatibility of the soils when they are in contact with foundations of buildings, roads, sewers and services for the development and the appropriate precautions that can be taken.
- Acid sulfate soils.
- Climatic conditions, such as frost susceptibility, especially for road subgrade construction.
- Soil salinity: Evaluate existing soil conditions in known salt affected areas, or areas found to be salt affected by the geotechnical investigations.

Embankments: Determine the stability and base/top levels of embankment.

Potential environmental impacts

Requirement: Check the development area/precinct for potential environmental impacts by the development including the following:

- Heritage items.
- Effects on water quality and inundation.
- Endangered species requiring protection.
- Wildlife habitat.

Details of potential impacts: If there are potential impacts, provide details of the issues and proposed control measures for minimising the impact and protecting the surrounding environment before starting design. This may be in the form of an environmental impact statement (EIS), to be included in the Preliminary design report.

2.3 CONSULTATION

Council and other authorities

Requirement: Consult with the Council and other relevant authorities during the preparation of design.

Council consultation: Liaise with the Council's officer(s) before starting design to identify design requirements, including the following:

- Haul routes: Consult to define acceptable routes for haulage and applicable load limits.
- Tree protection: Consult with the tree ~~preservation~~ management officer to identify requirements and restrictions relating to tree protection and site clearing.
- Waste disposal: Consult and obtain approval for cleared/excavated materials disposal facilities.
- Fill materials: Consult to establish restrictions, if any.
- Council bond security: Refer to Clause M4.

Other authorities: Consult with and seek approval for the development from the following state government authorities:

- Land and water resources department: Consult the authority to identify areas requiring action to prevent salination.
- EPA: Consult the EPA on sedimentation, siltation, erosion and salination control requirements.

Utilities services plans

Existing services in the development area/precinct: Liaise with the utility authorities affected by the scheme and if required, obtain service plans from the authorities of the proposed development area for above ground and below ground services. Plot these services on the relevant drawings, including the plan and cross-sectional views.

Location of subsurface utilities: Contact BEFORE YOU DIG AUSTRALIA to identify location of underground utility services pipes and cables.

Note: BEFORE YOU DIG AUSTRALIA is a free service, from anywhere in Australia, for identifying underground pipe and cables. See www.byda.com.au. It only provides information on utility services (power, water, gas and telecommunications) and not all utility service operators are part of the scheme. The plans provide information about the presence of a service, not the exact location.

Adjoining property owners

Protection of existing asset/infrastructure: Obtain drawings of existing infrastructure, including landscaping within and adjacent to the site. Consult with owners to identify protection requirements.

Property owner approval: After liaising with the EPA and obtaining approval from the Council for proposed sediment, siltation, erosion or salinity control measures, obtain written agreement from the adjoining property owners before carrying out construction work on their property.

Agreement records: Submit all agreements to the Council.

3 DESIGN CRITERIA

3.1 GENERAL

Design objective

Requirement: Design site regrading works for the proposed development/subdivision to:

- Provide an efficient and economical design.
- Enhance the environment of the site and maintain the site's natural features.
- Provide safe conditions for construction.
- Provide equal building conditions for all residential development allotments.
- Minimise impact on existing natural environment, adjoining properties and other works.
- Minimise regrading in heavily treed areas.
- Maintain or improve drainage, overland flow paths, riparian zones and existing watercourses.

Haulage: For areas where site regrading is required, design regrading requirements in conjunction with the roadworks design, taking into consideration the following objectives:

- Balancing cut to fill.
- Achieving economical works.
- Minimising the haulage of imported fill or spoil.
- Minimising adverse effect of bulk haulage on adjacent developments and infrastructure.

Related design requirements

~~Canal design: To *0012 Waterfront development*.~~

~~Control of erosion and sedimentation: To *0022 Control of erosion and sedimentation (Design).*~~

~~Road system design: To *0041 Geometric road design*.~~

~~Balancing earthwork volumes for road vertical alignment: To Austroads AGRD01 (2021) Appendix B Section B.4.3.~~

~~Drainage and run-off: To *0074 Stormwater drainage (Design).*~~

As per Clause 1.3.

Geotechnical design

Requirements: Incorporate all requirements and recommendations from the geotechnical investigation report.

Statutory performance requirements

Requirements: Address the objectives for site regrading in Council's Development Control Plan.

Salination prevention

Regrading strategies: Allow for strategies aimed at lowering the groundwater table and measures to prevent extension of salination.

3.2 DRAINAGE AND RUN-OFF

General

Surface water drainage: Design site regrading so that surface water flow naturally to roads or drainage reserves, without excessive concentration. Minimise the use of underground drainage systems with surface inlet pits.

Overland flow paths: Provide depressions for overland flow from low points and over major drainage lines, to direct stormwater for storms of up to a ~~100 year ARI.~~ 1% AEP

Flood prone areas

Inundation areas: In areas known to be affected by stormwater flows, assess the existing conditions in relation to the proposed development. Submit to the Council, data obtained and recommendations of contour adjustments required.

Areas abutting ~~100 year ARI~~ 1% AEP flood levels: ~~Design regrading to a minimum level of 0.5 m above the 100 year ARI flood levels. Make sure other areas are not affected by flooding.~~ Refer to the relevant Council Development Control Plan (DCP) for the site for minimum freeboard requirements. Identify these areas on the drawings with site specific requirements included.

Finished surface levels of building areas

Building area finished surface levels: Design surface gradients to the catchment area drainage system as follows:

- Desirable surface grading: 1.5%.
- Minimum surface grading: 1.0%.

Steep building areas: For building areas with natural ground slopes greater than 15%, obtain confirmation from a geotechnical engineer of the site's suitability for the proposed development. Include specific requirements on the drawings, address requirements included in **Site suitability for the proposed development**.

Piped gullies or depressions: Design finished surface levels to provide adequate cover depth over pipelines (if piped) and to direct surface stormwater flow to inlet pits (if depressions are retained in the finished surface contours).

Temporary diversion drains

Requirement: Design diversion drains to divert surface flows away from the regrading area, and minimise soil disturbance and material loss from the development site.

Control measures: Measures which can be used include but are not limited to the following:

- Trench stops at 30 m spacing along a trench with overtopping directed to the kerb.
- Blue metal or aggregate bags placed along the kerb and gutter at maximum 30 m spacing.
- Blue metal or aggregate bags placed around downstream drainage pits.

Constructional requirements: Refer to *1102 Control of erosion and sedimentation (Construction)* for further erosion and sediment control requirements.

Adjoining properties

Stormwater easement: If diverting or directing piped stormwater into adjoining properties is proposed, create drainage easement rights over adjoining lots to *0074 Stormwater drainage (Design)*.

3.3 CLEARING

Areas to be cleared

Requirement: Identify areas for clearing of the following:

- Low scrub.
- Fallen timber.

- Debris.
- Stumps.
- Large rocks.
- Roots and loose timber which may contribute to drain blockage.
- Trees the Council considers are approaching the end of their functional life or dangerous/hazardous for the proposed development.

Construction requirements: Refer to *1111 Clearing and grubbing* for clearing, grubbing and vegetation removal for site works.

Stripping and stockpiling

Stripping of topsoil: Design regrading so that topsoil stripping is minimised, taking into consideration the subsoil properties and earth moving plants required. For example, clay subsoil deteriorates when exposed to wet weather and quickly becomes unworkable.

Spoil stockpiling: Determine location and size of spoil stockpile, taking into consideration the following:

- The need to keep topsoil on site.
- Reusability of the topsoil.
- Locations where topsoil is to be replaced.
- Time period before topsoil is to be re-used.
- Construction working areas.
- Slope stability.

Maximum topsoil stockpiling period: Check suitability of topsoil

Disposal of cleared materials

Requirement: Identify materials for removal from the site, including all cleared materials, and allow for its disposal to regulatory requirements.

Spoil: Obtain approval from the Council for proposed excavated material disposal facilities.

3.4 FILLING AND EMBANKMENTS

Slope stability

Stabilisation measures: Allow for stabilising measures, including retaining walls, as appropriate for the development site conditions. Consider future access and maintenance requirements.

Slope angle: Determine safe angles for slopes based on material properties under the worst site conditions possible.

Trees

General: Consult with Council's tree management officer in relation to trees that may be affected by the development proposal.

Filling over tree butts: Where overfilling is required, allow for clearing/relocation of trees and replanting (with advanced species if cleared). Obtain approval from the Council for the type and number of trees for clearing, relocation and replanting.

Replanting: Allow for trees to be planted clear of probable future building locations, after filling is completed and graded. Include provisions for watering and maintenance during the contract period.

Trees requiring preservation: For trees selected for preservation, provide measures for protecting against damage caused by fill placement or other actions within the tree drip zone. Refer to AS 4970 (2009) for guidance on protecting trees on development sites.

Fill material

Properties: Sound clean material and free from large rock, stumps, organic matter and other debris.

Material selection: Select suitable fill materials based on following considerations:

- Purpose of embankment.
- Availability of local material.
- Consolidation and settlement properties of the fill material.
- Wet weather working.
- Plant equipment required on site.

Placing of fill: Fill placement over prepared areas cannot start without Council's permission. Include in the development documentation, requirements for obtaining Council's approval before starting.

Quality and compaction: Conform to the recommendations of AS 3798 (2007) and Austroads AGPT08 (2019) Section 2 for quality and section 4.7 for compaction.

Quantity: Design site regrading so that the balance between cut and fill is the most economical.

Restricted fill: If use of restricted fill is intended, obtain approval from the Council for material type and intended location before including in the development proposal. This is applicable to fill material comprising natural sands or industrial wastes/by-products.

Construction requirements: Refer to *1112 Earthworks (Road reserve)* for further fill material requirements.

Top dressing

Landscaping: Identify areas where fill placement will be required. Allow for dressing of clean arable topsoil, fertilised and sown with suitable grasses.

Re-use of topsoil: If possible, retain existing topsoil from the site and re-use in the same location.

Construction requirements: Refer to *0257 Landscape - road reserve and street trees* for further topsoil sowing and fertilisation requirements.

Special requirements

- Not Used

Retaining walls

Filling to the site boundary: If required, design retaining walls to sit fully inside the site. Submit the retaining wall design with site regrading design to the Council for approval.

Wall design: To be designed and certified by a professional structural engineer but only if the wall has a height greater than that specified in Council's Development Engineering Handbook.

Adjacent services: Design wall so that no imposed loads are applied directly to the adjacent service infrastructure. Make sure services are located outside the zone of influence of the wall.

4 DOCUMENTATION

4.1 GENERAL

Actions and document content

Standard: Conform to the recommendations of AS 3798 (2007) Section 3 for details for documenting earthworks design.

4.2 STATUTORY DOCUMENTATION REQUIREMENTS

Approvals

Requirement: Document any prerequisite for approval of the development advised by the following authorities:

- Council for:
  - Haul routes.
  - Tree clearing or relocation.
  - Waste disposal.
  - Fill materials.
  - Stormwater drainage and erosion and sediment control.
- Planning and water resources department for general land use and salination prevention measures.
- The EPA for other general environmental impact requirements.
- Utilities authority for any public or private utility affected by the development.

4.3 DRAWINGS

General

Requirement: Provide drawings defining the earthworks areas and specific treatments required.

Geotechnical testing stage: Provide drawings that show the location of site features in relation to the site boundaries, monuments, and other features for the purpose of testing.

Site regrading plan content

Requirements: Provide design drawings to include the following:

- Road longitudinal sections: With road construction details showing construction depths.

- Regrading layout: With finished levels as contours superimposed on existing ground contours. Include spot levels to clarify areas not covered by regrade contour and features associated with the regrading, such as retaining walls, banks or steps.
- Site cross section: Showing proposed and existing levels.
- Cut and fill areas: With cut areas clearly distinguished from the fill areas. Show the range of depth variations and earthwork quantities.
- EPA requirements: Incorporate sediment, siltation, erosion or salination control measures with references to the stage when measures will be provided.
- Haulage routes: Show details of haulage routes including the load limits for each route. A bond security may be required (see Clause 2.3 and Clause M4).
- Temporary diversion drains: Show the location of temporary drains required to divert surface flows away from the regrading area, including any erosion or sedimentation control treatment. Size drains to accommodate the volume of water to be diverted.
- Trees for preservation, removal, relocation and replanting.
- An annotation to the effect that all topsoil is to be retained onsite and utilised effectively to encourage revegetation.

Drawing presentation

Not Used.

4.4 SUPPORTING DESIGN DOCUMENTS

Design reports

Preliminary design report: Not Required. ~~Provide a report covering all geotechnical requirements, including the following:~~

~~- Site preparation and compaction requirements.~~

~~- Recommended minimum acceptable fill quality.~~

~~- Proposed regrading strategies.~~

~~Report guidelines: To Austroads AGRD01 (2021) Appendix B Section B.2.5 for further guidelines on report content.~~

~~Environmental impact statement: Include details of potential impacts and measures adopted for minimising the impact.~~

Calculations

Requirements: Provide a design report incorporating calculations and references supporting the earthworks design.

Specifications

Construction documentation: Prepare technical specifications using the AUS-SPEC Construction worksection *Templates* from the National Classification System workgroups 02, 03, 11 and 13.

Design certification

Certificate: Provide a signed and dated design certificate using the template in the *0010 Quality requirements for design* worksection as evidence that a suitably qualified professional has reviewed all the design documents, including program and plans for the development, and can verify that the site regrading requirements for the development site meet the Council and statutory requirements.

Other documentation

Watercourses: Provide documentation necessary from ~~the relevant authorities~~ Water NSW to support the filling of dams and watercourses.

4.5 WORK-AS-EXECUTED

Work-as-executed documents

Work-as-executed drawings: Provide an additional set of final construction drawings for the purpose of recording the work completed by the Contractor.

Drawing format: Provide in open digital (not requiring specific software) CAD format (DXF) as well as DWG and PDF copies.

Final certification of completed works

Requirement: 1112 Earthworks (Road reserve) worksection

Geotechnical report
Certification: Provide a geotechnical report certifying the development site with the proposed regrading works is suitable for the proposed development. Include any other supporting documents such as test results/certificates and survey data required to confirm this.

5 ANNEXURE A

5.1 REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

ARR	2019	Australian Rainfall and Runoff: A guide to flood estimation
AS 1726	2017	Geotechnical site investigations
AS 3798	2007	Guidelines on earthworks for commercial and residential developments
AS 4970	2009	Protection of trees on development sites
Austroads AGPT		Guide to pavement technology
Austroads AGPT08	2019	Pavement Construction
Austroads AGRD		Guide to road design
Austroads AGRD01	2021	Objectives of road design
IPWEA		Local Government Salinity Management Handbook
Cessnock City Council		AUS-SPEC Infrastructure Specifications
Cessnock City Council		Development Engineering Handbook
NSW OEH	2003	Roads and salinity

6 ANNEXURE M – CESSNOCK CITY COUNCIL SPECIFIC CLAUSES

M1.	Variations to or non-conformances with Council's AUS-SPEC are to be evaluated with reference to the procedure in Council's *Development Engineering Handbook*. Acceptance is to be obtained in writing from: a) an authorised representative of Council's Director of Infrastructure and Engineering Services.	**Variation procedure**
M2.	This specification applies in addition to any development consent (DA) conditions. If there is any inconsistency, the conditions of consent shall prevail.	**DA Conditions**
M3.	Refer to the Cessnock City Council Development Engineering Handbook for final inspection, works-as-executed and handover requirements.	**Completion**
M4.	(See Clause 2.3) A bond security may be required for example where works or haulage will occur on public property, to guarantee rectification of outstanding work or potential damage to infrastructure.	**Bond security**

7 AMENDMENT HISTORY

0	15/01/2024	First Published