



AUS-SPEC

Infrastructure Specifications

0281 Fire Access and Fire Trails

0281 FIRE ACCESS AND FIRE TRAILS

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 RESPONSIBILITIES

General

Requirement: Provide fire access ~~tracks and~~ trails, as documented, **and in accordance with the publication NSW Rural Fire Service Fire Trail Design, Construction and Maintenance Manual and this worksection**. Ensure that the work is undertaken to minimise the disturbance of the natural surroundings and to minimise the need for future maintenance.

1.2 CROSS REFERENCES

General

Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:

- 0136 General requirements (Construction).
- 0152 Schedule of rates (Construction).
- 0161 Quality management (Construction).
- 0257 Landscape - road reserve and street trees.

1.3 INTERPRETATION

Definitions

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

- Batter: The face of an embankment or cutting, produced as a result of earthmoving operations involving cutting and filling.
- Borrow area: An area or excavation from which soil, clay, sand, rock or gravel has been excavated for a specific purpose.
- Contour cultivation: Cultivation to prepare the rehabilitation area on the contour. On steep slopes the land is terraced or benched.
- Cross bank (whoa-boy): An earth hump constructed across a track so that runoff is effectively diverted from it. Cross banks are designed to handle larger flows than cross drains, using one of the following methods:
 - . Infall cross bank: Used to direct water off the track surface where it is inappropriate to direct water to the side of the road.
 - . Outfall cross bank: Used to remove water from table drains at outfall locations.
- Cross drains: Drains of various forms that hinder the flow of water down a track and divert it across the track's surface. The capacity of the drain is defined by its cross-section. Cross drains are

designed to handle smaller flows than cross banks but larger flows than can be controlled by crossfall drainage.

- Crossfall drainage: Drainage which occurs when the surface of a track has sufficient cross slope to cause water to flow across and off the surface, rather than along it. Stormwater drainage for unsealed tracks can be classified as follows:
 - . Crown: Where water sheds from both sides.
 - . Infall: Where water flows into the hillside.
 - . Outfall: Where flow is away from the hillside.
- Culvert: A pipe or similar structure used to direct water under the track.
- **Diversion bank (from Landcom 'Blue Book')**: An earth bank constructed across a slope for intercepting and diverting water. Typically constructed at the upper edges of cut slopes to collect water from nearby properties and divert it around the cut.
- Earth windrow: A soil ridge built along the track edge during construction or maintenance. Where used to direct runoff to a stable outlet, it is known as a windrow drain.
- Erosion classes in relation to soil types: Class A: Low soil erodibility. Brown and red soils derived from finer sediments and metasediments.
 - . Class B: High soil erodibility. Red soils on fine granites, fine sandstones and basalt.
 - . Class C: Very high soil erodibility. Grey and yellow soils derived from granites, sediment and metasediment, especially coarse grained types.
 - . Class D: Extreme soil erodibility. Unconsolidated sediment. This is unsuitable for fire access tracks.
- Fire access track: ~~Not used. A track constructed and/or maintained expressly for fire management purposes.~~
- Fire trail: A trail constructed to ensure firefighters can access fires and safely contain them. They are also used to assist with management of bushfire risk across the landscape and for the protection of the community and its assets.
- **Planning for Bushfire Protection (PBP)**: the Rural Fire Service guide to the required standard of bushfire protection measures in building and land developments in NSW, including subdivisions.
- **Rural Fire Service (NSW RFS)**: Statutory authority for firefighting operations and infrastructure standards in village and bushfire prone areas.
- Table drain: Excavated open channels, running parallel with and forming part of the track formation. Table drains direct runoff to disposal areas further downslope.

1.4 SUBMISSIONS

Authority approvals

Requirement: Submit details of all authority **approvals** before commencing the works for which the approval is granted, including the following:

- **DA, REF or** Vegetation clearing permit: Submit, if required.
- **Concurrence from the NSW Rural Fire Service (RFS).**

2 EXECUTION

2.1 GENERAL

Bushfire management

Bushfire management planning: Conform to ~~fire management manual requirements by the state fire authorities.~~ **the requirements of the latest edition of *Planning for Bushfire Protection (PBP)* by the NSW RFS. Importantly, *PBP 2009* Section 3.4.4 clarifies that fire trails are not an appropriate substitute for perimeter roads or property access roads in new bushfire prone subdivisions and developments.**

Connection to existing tracks

Connection: ~~Connect new fire access tracks~~ **Where new or upgraded fire trails are required, provide connectivity by suitable intersections with existing access tracks to the satisfaction of Council and Rural Fire Service.**

2.2 EROSION AND SEDIMENT CONTROL

General

Maintenance: Reduce the risk of erosion by establishing and maintaining low grass and ground cover vegetation, less than 0.3 m high, on the tracks in designated areas.

2.3 FIRE ACCESS TRACK AND TRAIL EROSION CONTROL MEASURES

Water divergent diversion banks

Requirement: To protect slopes prone to erosion or with exposed dispersive soils, construct diversion banks by forming from stripped topsoil, earth spoil, sandbags or straw bales. IECA recommends not to use straw bales for longer than 1 week. Do not strip topsoil from dispersive soils due to the high risk of accelerated erosion. Diversion banks should have a minimum desirable size of ~~Minimum~~ 400 mm high and 500 mm wide.

Water divergent diversion bank distance table

| Slope (°) | Bank distance apart (m) |
|-----------|-------------------------|
| 1 | 150 |
| 2 | 130 |
| 3 | 110 |
| 4 | 90 |
| 5 | 70 |

Preventing water erosion

Slopes below 5°: Contour cultivation.

Slopes between 5° and 10°: Combination of contour ripping or contour furrowing in conjunction with contour cultivation. Construct furrows and rips precisely on the contour:

- Contour ripping: Rip to a depth of 60 to 90 mm with single or multiple ripper (by bulldozer). Use two tines spaced 1 m apart, with individual rip lines spaced 2 to 6 m apart, depending on slope angle.
- Contour furrowing: Use a single tine, fitted with a mould board attachment, to lift soil from the furrow to form a small bank on the downhill side.

2.4 EARTHWORKS

Minimum disturbance

Requirement: Construct tracks with minimal disturbance to the soil and vegetation both on and adjacent to the track, by slashing or blading the surface vegetation. Do not blade soil, unless required to build track bench on side slopes to form drainage line approaches, or to make rough surfaces trafficable. Follow the contour of the land to reduce the amount of cut and fill. Maximum crossfall: 1:10.

Work adjacent to watercourses: Contain sediment and stabilise work area during construction and within 1 week of disturbance to the following:

- Temporary sediment traps: Construct devices to remove sediment from sediment-laden runoff flowing from areas of 0.5 ha or more before the runoff enters stormwater drainage systems, natural watercourses or adjacent land.
- Waste barriers: Construct and maintain to prevent debris from entering natural watercourses.
- Batter protection: Minimise scour of newly-formed batters during and after embankment by diverting runoff from the formation away from the batter until vegetation is established.
- Removal: Remove all measures when revegetation is established on formerly exposed areas before the end of the contract. Remove from the site, or otherwise dispose, all materials and components used for the temporary erosion and sedimentation control works, as documented and in conformance with regulatory authorities' requirements.

Work on swampy or unstable ground: Reinforce with synthetic earth geogrid.

Cut batters

Requirement: Construct cut batters as follows:

- Batters up to 1.5 m high for Class A soil: Cut vertically to reduce area of exposed disturbed soil.
- Batters higher than 1.5 m: Provide stabilisation measures including laying back, revegetation and drainage, if required.

- Dispersive soils: If encountered, grade batter to allow placement of a 200 mm (deep) layer of non-dispersive soil on the batter.

Fill batters

Requirement: Construct fill batters as follows:

- All soil classes: Not steeper than 2H:1V.
- Batters higher than 1.5 m on Class B, C and D soils: Provide stabilisation measures, such as drop down drains or hay mulching.
- Dispersive soils: If encountered, grade batter to allow placement of a 200 mm (deep) layer of non-dispersive soil on the batter.
- Vegetation debris or erosive materials: Do not use in fill batters.

Borrow sites

Requirement: Limit in size, minimise sediment leaving the borrow site and revegetate progressively as the site is worked out.

Location: Do not locate borrow sites near drainage lines or streams.

Stockpile topsoil

Requirement: Stockpile topsoil and litter (free of timber debris) in a recoverable location for respreading over disturbed areas.

Timber clearing

Clearing: Maximum 0.5 m on either side of the track (but with a minimum 6 m trafficable width clear of wood vegetation), including overhanging branches, to 5 m at least 4 m clear height in accordance with PBP.

Method: Clear by felling rather than dozing to limit the amount of soil disturbance.

Waste: Dispose of all vegetation debris matter off site.

2.5 CROSS BANKS

General

Requirement: Construct where water runs down the track on slopes with a gradient of 20% or less and as follows:

—Dimensions: 400 to 450 mm (high) x 500 mm (wide).

Cross banks spacing table

| Grade of track (%) | Maximum distance between banks (m) |
|--------------------|------------------------------------|
| Less than 2 | 120 |
| 2 to 4 | 60 |
| 4 to 8 | 30 |
| More than 8 | 15 |

Source: IECA Book 5 (2017). Also comply with the NSW Rural Fire Service Fire Trail Design, Construction and Maintenance Manual Table 4 which provides maximum cross bank spacing at steeper grades in soils with various erodibility classes

Cross bank outlet points

Requirement: To regional guidelines with adjustments made for existing track conditions and sited as follows:

- Free from blockages by stumps or rocks.
- Runoff spills into undisturbed vegetation without flowing back onto the track or discharge into a sediment trap.
- If the track runs parallel to a watercourse: Sheet water off the track through an adjoining riparian zone. Filter sediment from stormwater runoff before it enters the watercourse.
- If the track runs along a ridge: Discharge stormwater evenly off each side of the ridge.

Construction

Method: Use one of the following construction methods:

- Cut and fill: Rip lines across the track area at a grade of 0.3%, cut a **wide and** shallow channel along this line. Place excavated material on the downside of the channel, compact and smooth out to form a bank with **even smooth rolling** batters and **a level-top**.
- Imported soil material: Grade to a maximum of 0.3 to 0.5% along the up slope edge (**the line that water will take to drain across and away from the track formation**).

Cross bank dimensions:

As per Clause 2.5 General above.

- Length: ~~6 m~~ Desirable trough to crest distance of 6 to 10 m, being approximately two times the wheelbase of the design vehicle e.g. a typical 8.8m Medium Rigid truck may have a wheelbase up to 5m long. If a lesser bank width is to be provided, confirm it is traversable by the design vehicle given the gradients of the fire trail on approach and departure from the cross bank, using software or ground clearance templates. Refer to NSW RFS Fire Trail Design Section 3.19.
- Depth: Size to prevent runoff from overtopping the bank, **nominally 400 to 600 mm (height relative to invert level at the trough)**.
- Crest width: Size to allow for vehicle access over the cross bank.

Shaping and compacting: Shape bank with tractor blade to form a smooth and even bank with batters no steeper than 1V:5H. Track roll or wheel roll the length to obtain maximum compaction. Clean loose earth from the channel of the bank by sweeping with tractor blade.

2.6 DRAINAGE LINE CROSSING

Crossings

Requirement: Construct drainage line and watercourse crossings as documented and as follows:

- At right angles to the channel.
- Where the channel is straight, with well-defined banks.
- Do not use log dam crossings.
- Approaches to stream crossing: Cover with non-erodible materials, such as rock or gravel. If suitable material is not available, layout track and drainage to prevent sediment-laden water from running into the watercourse.

Protection of watercourse: Construct a cross bank immediately above the access cut. If access is longer than 15m, construct additional flow diversions down the cutting.

Material disposal: Remove cleared vegetation and other debris from the floodplain if it can cause damage to downstream structures when carried away by floodwaters.

Protection of embankments: Protect with suitable abutments, such as concrete, timber, logs or rocks.

Fords

Requirement: Construct fords, as documented.

Streams with a history of washouts: Provide a stabilised bed of synthetic 3D cellular mat filled with natural bedding material, for example. sand or gravel.

Culverts and turnouts

Requirement: Construct culverts and headwalls, as documented. **For construction of culverts and headwalls, see 1352 Pipe drainage, 1353 Precast box culverts and 1354 Drainage structures worksections.**

Alignment: To the natural alignment of the drainage line or watercourse.

Prohibited: Do not use culverts where there will be blockage from debris **as overtopping of the trail may increase the risk of washouts or embankment instability**. Preferably use bed level crossings or rock armoured spoon drains as recommended by the *NSW RFS Fire Trail Manual* Section 3.10 as these are unlikely to become blocked.

Water turn-outs: Construct where soil type, structure or slope is highly erodible, including where there is minimal vegetative cover and heavy rainfall.

Culverts/turnouts spacing table

| Road gradient | Soil type - maximum average spacing (m) | | | |
|---------------|---|--------------------------------|-----------------------|--------------|
| | Clay, silt, fine sand, ash | Sand, very fine gravel, pumice | Gravel with some sand | Clean gravel |
| 5% | 200 | 300 | 400 | 500 |
| 10% | 100 | 150 | 200 | 250 |

Source: Department of Fire and Emergency Services Authority of Western Australia (DFES) *WA Gov Firebreak*. Table 6.

Bridges

Requirement: Construct bridges, as documented in accordance with a design documented by a suitably experienced Professional engineer civil or structural (as defined in *0010 Quality requirements for design worksection*).

Temporary bridge crossings: Form from timber or culvert bridging slab, suspended between well anchored logs.

Disturbance

Requirement: Minimise soil and vegetation disturbance. Seed disturbed areas to *0257 Landscape - road reserve and street trees* to minimise erosion.

Waste material dumping: Do not dump timber, scrub, soil or debris in drainage lines and watercourses. Stack well above flood levels.

Tree and vegetation removal

Requirements: Conform to state legislation, regulations and the authorising bodies.

2.7 REVEGETATION

Disturbed areas

Built up areas: Provide revegetation as documented on the development/subdivision plan and to *0257 Landscape - road reserve and street trees*.

Application: Revegetate immediately following the disturbance while the soil is still loose, irrespective of the growing season. Apply a maintenance dressing of fertiliser and seed to suit revegetation works.

Revegetation method: Use one of the following methods:

- No revegetation required: Forest litter and native flora providing natural vegetation and stabilisation.
- Short-term revegetation: Preferably use local native or sterilised grass species to prevent introduction of exotics to the local ecosystem. Provide annual grasses (Wimmera ryegrass) or cereals, e.g. cereal or rye oats (autumn/winter) or millet (spring/summer), and fertiliser.
- Long-term revegetation: Preferably use local native or sterilised grass species to prevent introduction of exotics to the local ecosystem. Provide perennial grasses, with or without a cover crop such as oats, cereal rye oats (autumn/winter) or millet (spring/summer), and fertiliser.

3 ANNEXURE A

This Annexure applies to Council projects. For private development works use of this schedule is optional, at the Superintendent's discretion.

3.1 ANNEXURE – PAY ITEMS

| Pay items | Unit of measurement | Schedule rate inclusions |
|---|---|---|
| 0281.1 Fire access and fire trails | Linear metre measured along the centreline of track as documented | All activities required to construct the tracks including clearing, earthworks, batters, cross drains, banks and revegetation |

3.2 ANNEXURE - REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

| | | |
|---------------------------|------|---|
| IECA Book 5 | 2017 | Best practice erosion and sediment control - A field guide for construction site managers |
| Landcom 'Blue Book' | 2004 | Managing Urban Stormwater: Soils and Construction Volume 1, 4 th Edition |
| NSW Rural Fire Service | 2019 | Planning for Bushfire Protection |
| Soil Conservation Service | 2017 | NSW Rural Fire Service Fire Trail Design, Construction and Maintenance Manual |
| Cessnock City Council | | Development Engineering Handbook |

4 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 <i>Development Engineering Handbook</i> . 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 |

5 AMENDMENT HISTORY

| | | |
|---|------------|-----------------|
| 0 | 15/01/2024 | First Published |
|---|------------|-----------------|