



# RFS

# NSW Fire Trail Standards

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Version 2.0





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# 1. Introduction

## 1.1. Background

Bush fires have been a natural part of the landscape for many thousands of years. As communities have developed and properties and towns have been established, the risk of bush fires impacting on communities has increased.

Throughout NSW there are approximately 1.3 million properties on bush fire prone land. Firefighters rely on roads, trails and other tracks on public and private land to access the landscape to prevent, fight, manage and contain bush fires. It is critical to identify and maintain an effective network of accessible fire trails that suit the firefighting operations conducted across NSW.

Historically, decisions regarding the establishment and maintenance of fire trails have rested with land managers, guided by a cooperative framework established by the NSW Bush Fire Co-ordinating Committee (BFCC). A need for a different approach was identified to achieve a more consistent and strategic outcome across all the various land managers.

The *Rural Fires Act 1997 (NSW)* (the Act) was amended to provide a legislative basis for the establishment and maintenance of an enhanced network of fire trails and to create the ability for the RFS Commissioner (the Commissioner) to make fire trail standards.

This document constitutes the Fire Trail Standards (the Standards) made by the Commissioner pursuant to section 62K of the Act.

These Standards primarily define the criteria for development and certification of Strategic Fire Trails and aspects of these Standards may be applied differently in accordance with different influencing factors. The Standards also serve as a benchmark to inform the design and construction of all fire trails on land throughout the State.

These Standards should be read in conjunction with the *NSW Rural Fire Service Fire Trail Design, Construction and Maintenance Manual*.

## 1.2. Definitions

Terms and expressions as defined in the Act apply to the Standards. Key additional terms relevant to the Standards are included below:

- **Acceptable Solution:** The primary standard specified by the Commissioner for the certification of fire trails. All Strategic Fire Trails are to, as far as reasonably possibly, conform to the Acceptable Solution as outlined in these Standards.
- **Asset Attributes:** Physical attributes of fire trails that have less direct impact on operational factors of appliances.
- **Asset Performance Solution Criteria:** means the criteria of function that forms the basis for a Performance-Based Solution for the Asset Attributes.
- **BFCC:** Bush Fire Co-ordinating Committee.
- **BFMC:** Bush Fire Management Committee.
- **FAFT:** Fire Access and Fire Trail.
- **Land manager:** any person or agency who is legally responsible for the maintenance, use and development of resources for a section of land or piece of property. For the purposes of these Standards the RFS is the designated land manager for fire trails located on private land.
- **Operational Capability:** The ability to safely access an appliance's cabin and equipment and undertake firefighting operations.

- **Operational Confidence Attributes:** Fire trail attributes that directly impact on the operational factors applicable to fire trails. These attributes directly impact the movement of appliances.
- **Operations Performance Solution Criteria:** The three criteria that make up a Performance Solution for the Operational Attributes, namely Accessibility, Operations and Safety, and Environmental and Cultural.
- **Performance-Based Solution:** Supporting performance requirements that are acceptable under circumstances where the Acceptable Solution cannot be met. Performance-Based Solutions are the responsibility of the land manager, and the onus is on the land manager to maintain the specified performance level and provide evidence of conformance to these solutions.
- **Strategic Fire Trail:** A fire trail on any tenure identified by a BFMC during the FAFT planning process, or by the Commissioner, to be of significant value in the suppression or management of fire within the landscape. These may include multi-purpose trails.
- **Tactical Fire Trail:** A fire trail on any tenure identified by a BFMC during the FAFT planning process, or by the Commissioner, that supports the prevention and suppression of fire. These may include multi-purpose trails.
- **Track/Other:** means vehicular tracks (other than Strategic and Tactical Fire Trails), within the landscape that may be used in the event of a fire.
- **VCC:** stands for Vehicle Carrying Capacity and relates to the highest expected appliance category to safely traverse the fire trail (refer Appendix A for details).

### 1.3. The operating environment for fire trails

There are several key considerations that have been included in the development of these Standards that relate to the operating environment for the prevention and suppression of bush fires in NSW.

These include:

- the safety and protection of firefighters;
- the nature of incident management procedures in NSW and the use of Australasian Inter-service Incident Management System (AIIMS) across NSW, especially in relation to management of field operations;
- the nature of the fleet that provides primary response, ongoing firefighting and bush fire mitigation activities; and
- the ability of these assets in supporting effective firefighting operations in support of community protection.

Fire trail design should give consideration to the operational nature of the asset and how that can be maximised, whether through provision of attributes that support effective operations (water points, control points, staging areas) or the logistical ability to manage the movement of heavy plant.

Consideration should also be given to ensuring that the design and construction requirements are suitable for the firefighting capability within NSW. Matching these Standards with capability will ensure the most effective firefighting operations can be conducted. Across all combat agencies in NSW, the predominance of first response and ongoing ‘campaign’ firefighting is through the use of Category 1 (or equivalent) appliances. Given this, the design and construction of fire trails that allow for the passage of Category 1 (or equivalent) appliances should seek to meet the Standards for Category 1 VCC as a foundation, noting environmental and strategic limitations to some trails and the primary use of Category 7 and/or Category 9 appliances in appropriate locations (e.g. remote areas).

## 1.4. What is a fire trail for the purpose of these Standards?

There are a range of access ways across the landscape available for use by firefighters. These include public roads, tracks and trails or other roads used for land management, asset management or recreational purposes. The purpose of these Standards is to define criteria for the development and maintenance of fire trails for appliance use identified through the processes established by the Act and deemed necessary for the protection of the community and its assets.

These trails will be identified at a local level by the BFMC and recorded in a Fire Access and Fire Trail (FAFT) Plan, or 'Designated' by the Commissioner.

While these Standards are principally concerned with fire trails identified as 'Strategic' within FAFT Plans, it is recognised that other fire trails and access ways will continue to exist and serve an important role in bush fire suppression and bush fire management.

Generally, a Strategic trail holds the highest level of priority and value in the suppression and/or management of bush fires in a region. These trails are vital in accessing bush fires from key staging areas. This document prescribes the standards for the design, construction and maintenance of Strategic Fire Trails.

Tactical trails support the prevention and suppression of bush fires by allowing access to localised areas. Tactical trails do not require certification, but landowners are required to maintain their level of operational confidence. These Standards should be used to inform the design, construction and maintenance of Tactical trails.

These Standards are also to be used as a guide for the design, construction and maintenance of track/other trails identified in the FAFT Planning process.

## 1.5. Directions issued under s62L of the Act

Under s62L of the Act, the Commissioner may give a Direction, in writing, that a fire trail be established and maintained on specified public land in accordance with particulars deemed appropriate by the Commissioner. This may apply to a new and/or existing fire trail.

If a Direction under section 62L of the Act applies to a fire trail, the relevant public land manager must establish and maintain the fire trail in accordance with that Direction. For the avoidance of doubt, the particulars provided in a Direction issued under section 62L of the Act take precedence over any particulars provided for that fire trail in a FAFT Plan, including where a Direction is made after a FAFT Plan is approved.

## 2. Objectives of the Fire Trail Standards

### 2.1. Scope

These Standards provide requirements for identified fire trails on land throughout NSW, and in particular, to provide, as far as possible, a practical network of fire trails.

These Standards are to be used by organisations and land managers across NSW responsible for undertaking Fire Access and Fire Trail planning, design, construction and maintenance of fire trails.

The objectives of these Standards, in accordance with Section 62K of Act are (without limitation):

- to set out the structure and form of FAFT Plans, including to outline a process for recording changes to the FAFT Plans between the five-year rolling periods;
- to require a FAFT Plan to include a Treatment Register for fire trails that is approved by the Commissioner;
- to set minimum requirements for identified fire trails on land throughout NSW including by setting standards for fire trails that:
  - allow standard off-road capable appliances to safely and effectively traverse the landscape;
  - provide a consistent level of assurance to both drivers and crew leaders of their ability to safely operate on and from each fire trail;
  - require fire trails to be of an expected standard that is known and understood by firefighters, can be readily identified (including in limited visibility conditions) and are available when required;
  - support operational activities and requirements, maximises operational effectiveness, minimises adverse impacts on the environment and delivers value for money; and
  - maximise resource allocation and the available operating window (including time and range of conditions) across each fire trail for firefighting operations.

While these Standards refer to the requirements for certification of Strategic Fire Trails, there may be considerable benefit in fire trail design and construction allowing for the Standards to be exceeded. One such example is a new crossing structure that is able to provide a higher vehicular Gross Vehicle Mass (GVM) carrying capacity to allow for potential heavy plant movements. This approach is encouraged.

### 2.2. Assumptions and Limitations

These Standards have been prepared based on the following assumptions:

- The identified fire trail network will be used by suitably trained and competent firefighters capable of operating in the expected physical environment; and
- The existing fleet type and make up of appliances will be retained and be driven by licenced and competent drivers in accordance with local and state procedures.

These Standards have been prepared considering the following limitations:

- Fire trails as identified in these Standards are for the purposes of bush fire suppression and other fire management purposes. While it is recognised that fire trails may also be used for other purposes (including other land management and commercial purposes, forming a part of fire break and the like), such uses do not fall within the scope of these Standards;
- The design and construction Acceptable Solutions and Performance Solutions specified in these Standards cater for standard off-road capable appliances currently used in NSW.



## 3. Fire Access and Fire Trail (FAFT) Planning

### 3.1. FAFT Plan requirements

In order to provide a consistent approach to FAFT planning across NSW, the Act requires BFMCs to prepare a draft FAFT Plan for their area. FAFT Plans must be prepared in accordance with requirements set out in these Standards, BFCC Policies and otherwise as required by the Act.

FAFT Plans are to provide a structure for the identification of an integrated and strategic network of fire trails for the protection of the community and its assets, including environmental and cultural values.

The Act adds FAFT Plans to the suite of existing fire planning activities undertaken at the local level (such as bush fire risk management planning). A FAFT Plan identifies the appropriate means of accessing land to prevent, fight, manage or contain bush fires. The FAFT planning process will consider a wide range of factors that will review the adequacy of the firefighting network for firefighting to provide access for the protection of life, property and environmental and cultural values in an area.

A FAFT Plan shall:

- be prepared having regard to the relevant Bush Fire Risk Management Plan and Plan of Operations;
- be prepared in accordance with any RFS guidelines and in a form specified by the Commissioner;
- include all identified trails that form the fire trail network, along with other access ways; and
- be prepared with a planning horizon of five years.

A FAFT Plan shall comprise:

- a map showing:
  - a base layer containing all existing vehicular tracks, trails and roads;
  - the identified fire trail network comprising:
    - all Strategic fire trails;
    - all Tactical fire trails; and
    - other fire access ways, such as existing roads, tracks and trails that may be of use for fire management, but do not form part of the fire trail network.
- a schedule of the identified fire trails that constitute the fire trail network detailing:
  - Fire Trail Name;
  - Unique Identification Number;
  - Total Trail Length (km);
  - BFMC Classification (Strategic, Tactical, etc.);
  - Vehicle Carrying Capacity (VCC);
  - Trail Status;
  - Tenure; and
  - Other matters as determined by the Commissioner.

### 3.2. FAFT Plan amendment process

The basis of the FAFT Plan amendment process is to cater for improvements and allow for those improvements to be collated for inclusion in future iterations. It is expected that BFMCs and firefighting agencies may identify changes that provide an overall better outcome for firefighters and the community in the period between FAFT Plans.

Amendments to FAFT Plans can arise from a variety of sources:

- incorrect data at the initial development of plan, including omitted trails;
- ground-truthing and implementation planning identifies alternatives that provide better operational outcomes;
- private land holders not agreeing to trails being located on their property;
- implementation of the fire trail raises environmental or operational constraints that necessitate a change to the fire trail;
- experience and fire history identifies opportunities to improve the network;
- the need to ensure the mapped network is a consistent and effective routable network to support dispatch arrangements;
- as a result of a Direction by the Commissioner; and/or
- identification of new trails or existing trails that have substantially changed over time.

Amendments to FAFT Plans need to be managed having regard to the following factors:

- improvements and opportunities should continually be identified and logged into a FAFT Amendment Log to ensure it is a dynamic and responsive process;
- refinements and changes are expected to occur during implementation as physical works and environmental impact assessments are undertaken;
- a FAFT Plan including the associated mapping is a BFMC plan and cannot be unilaterally changed by any single agency or member. Any significant and final changes need to be endorsed by the BFMC; and
- FAFT Plan reviews need to take into consideration any changes made and logged during implementation, as well as any new changes and opportunities identified during the review process.

Amendments to FAFT Plans, once agreed or endorsed by the BFMC, should be recorded in a FAFT Amendment Log, in a form specified by the Commissioner.

### 3.3. Fire trail Treatment Register

A Treatment Register shall be prepared and submitted to the Commissioner for approval concurrently with the submission of a draft FAFT Plan.

A Treatment Register shall:

- be prepared in accordance with the Guideline for Preparation of FAFT Plans and in a format specified by the Commissioner; and
- detail planned fire trail works for the nominal five-year planning horizon of the FAFT Plan to improve the network over time.

## 4. A Performance-Based Approach

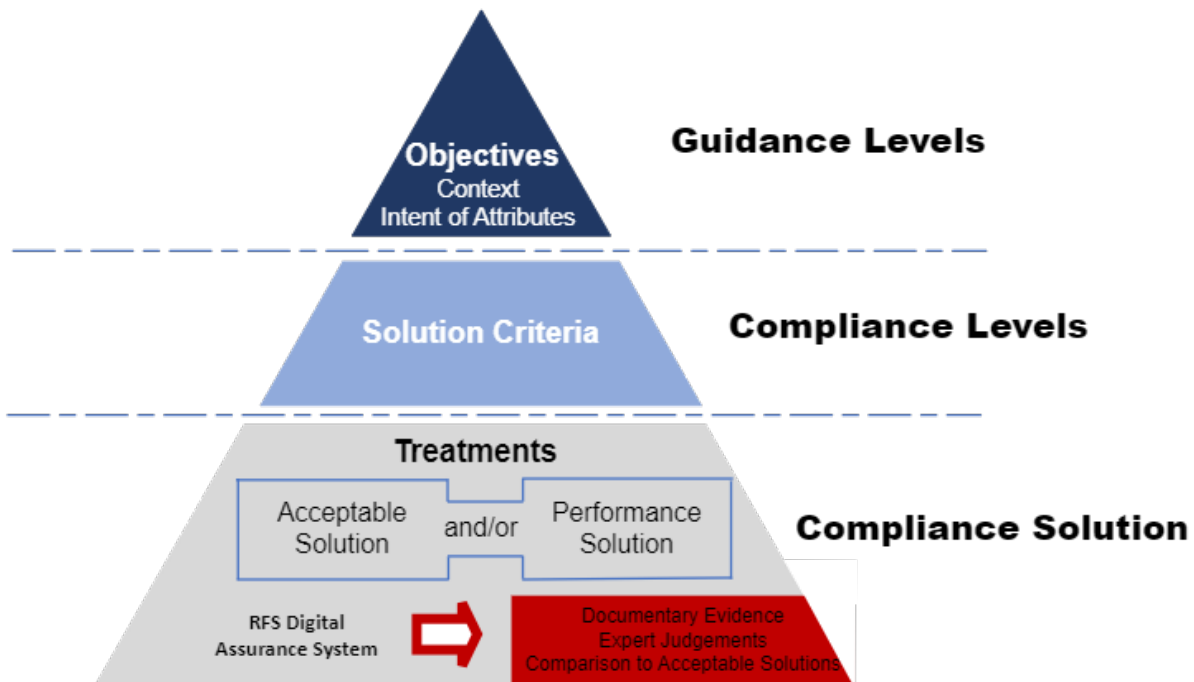
In the development of attribute solutions, this document uses a performance-based approach and identifies objectives and detailed solution criteria to satisfy the context and meet the intent for each attribute. Ultimately, any performance-based approach must demonstrate the maintenance of the safety and operational performance of firefighting resources.

This can be achieved by either applying the identified acceptable solutions, or by preparing a performance-based solution for each attribute. A performance-based solution must be designed to achieve the appropriate level of protection by tailoring an outcome that meets the relevant intent of the solution criteria.

The solution criteria can be satisfied in one of the following ways:

- adopting the acceptable solutions; or
- developing a performance-based solution; or
- a combination of the above.

The attribute solutions are described in Section 5 below.



### Acceptable Solutions:

Acceptable Solutions provide a prescriptive criteria to meet the attribute context and intent (where applicable).

### Performance Solutions:

Performance solutions allow flexibility and innovation in responding to site-specific opportunities and constraints while still meeting the identified solution criteria. They also allow the consideration of a broad range of issues and information, including trail accessibility, firefighting operations and safety, and environmental and cultural aspects of the trails.

When performance-based solutions are proposed, they must be considered on their merits and individual circumstances. In these circumstances, a process (through the RFS Digital Assurance System) can be undertaken, which would involve early agreement on the key elements and acceptance criteria from all stakeholders.

When developing a performance-based solution, several key factors should be considered:

- Specific Objectives: Clearly define the objectives of the fire trail attribute.
- Solution Criteria: Identify how the performance criteria will be used to assess the effectiveness of the solution. These criteria should align with the objectives of this document.
- Equivalent level of safety: Determine if the proposed performance-based solution provides an equivalent or higher level of safety compared to acceptable solutions. It should be demonstrated that the proposed design achieves the desired intent and is at least as effective as the acceptable solution approach.
- Stakeholder consultation: Engage with relevant stakeholders, including landowners and other agency experts. Seek their input and expertise throughout the process to ensure a comprehensive and practical solution. Consider their feedback in refining the solution and addressing any concerns.
- Documentation and communication: Document the performance-based solution thoroughly through use of the RFS Digital Assurance System, including the analysis, modelling results and rationale behind the decisions. Clearly communicate the proposed treatments to all stakeholders involved, ensuring they understand the intent, objectives and any unique considerations.
- Ongoing evaluation and maintenance: Recognise that fire trails are a dynamic asset and should be regularly evaluated and maintained. Develop a plan for periodic reviews of the performance-based solution to address any changes in the treatment required.

By considering these factors, a comprehensive and effective performance-based solution can be developed, tailored to the specific risks and characteristic of the site.

The onus is on the land manager (subject to any written agreement with the RFS) to demonstrate compliance with relevant provisions of these Standards.

Each fire trail must be assessed by the land manager against the Acceptable Solution or demonstrate compliance with all the listed Performance Solution criteria.

Performance Solutions should be reviewed in consultation with the relevant stakeholders, such as the RFS, land managers, private landowners and any relevant third parties (e.g., fire trail construction contractors).

## 4.1. Attributes

The Fire Trails Standards Attributes in Section 5 have been divided into two categories, being:

- Operational Confidence Attributes; and
- Asset Attributes.

The reason for this division is to ensure that fire trails meet firefighting requirements and are available for use by firefighters on an ongoing basis.

**Operational Confidence Attributes** are attributes that directly impact on the operational factors applicable to fire trails. These attributes directly impact the movement of appliances. Meeting the Acceptable Solutions and Performance Solutions, where applicable, of these attributes assists in creating and maintaining the strategic operational performance of the fire trail and safety of firefighters in a fire event. The Operational Confidence Attributes are:

- Trafficable Width;
- Clearance;
- Grade;

- Crossfall;
- Horizontal Curves;
- Passing Bays;
- Turnaround Bays;
- Crossing Structures;
- Trafficable Surface; and
- Corridor Hazards.

**Asset Attributes:** are physical attributes of fire trails that have less direct impact on operational appliances (but are necessary for trail longevity and safety). These attributes contribute to the physical condition of the fire trail. The asset attributes are:

- Operational Support Points;
- Water Management Systems:
  - Table and Mitre Drains;
  - Cross Banks; and
  - Spoon Drains;
- Pavement Materials;
- Trail Access and Access/Egress Points;
- Trail Signage; and
- Fixed Water Points.

For certification of a fire trail under section 62N of the Act, all fire trail attributes (i.e., both Operational Confidence Attributes and Assets Attributes), must comply with either:

- the Acceptable Solution; or
- **all** the Performance Solution Criteria for the relevant Performance Solution.

See Section 6 (“Certification and Condition Monitoring”) of this document for further details.

## 4.2. Planning/environmental approvals

Regardless of whether Acceptable Solution or Performance Solutions are adopted, or whether works relate to Operational Confidence Attributes or Asset Attributes, fire trail works are required to be undertaken in accordance with all applicable planning, environmental and other regulatory requirements.

Some of the key planning and environment approval mechanisms for fire trails may include:

- a Bush Fire Hazard Reduction Certificate issued in accordance with the Bush Fire Environmental Assessment Code; or
- a Review of Environmental Factors (REF) under Part 5 of the *Environmental Planning and Assessment Act 1979 (NSW)*; or
- other relevant environmental approval pathways.

Works on fire trails are to be conducted in accordance with the requirements of all relevant environmental and other regulatory approvals and legislation and are the responsibility of the Land Management Authority undertaking the works.

## 5. Fire Trail Attributes

The Acceptable Solutions and Performance Solutions for fire trail attributes have been developed for each appliance category and each fire trail classification within NSW. The specifications outlined in each attribute are based on the appliance category details contained in Appendix A.

These Standards provide for the categorisation of fire trails based on the type of appliance required to access an area. Three categories are provided:

- Category 1: A fire trail that can be safely traversed by a Category 1 firefighting appliance.
- Category 7: A fire trail that can be safely traversed by a Category 7 firefighting appliance.
- Category 9: A fire trail that can be safely traversed by a Category 9 firefighting appliance.

The primary purpose of trail classification is to ensure the appropriate management of the fire trail and the degree to which the standards are reasonably applied. Classification allows for more efficient use of limited resources by prioritising trails. Trail classifications are to be included in the FAFT Plan prepared by a local area BFMC or as otherwise determined by the RFS Commissioner.

The fire trail classification system allows for consistent resource allocation for all trails in the network according to priority. Understanding between trail managers, the RFS Commissioner and firefighters in the context of trail classification allows for uniformity in user expectations, operational capabilities and the provisions for an overall safe and economically viable trail network.

### 5.1. Heavy Vehicles

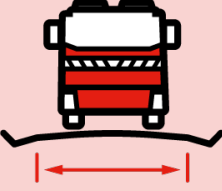
In NSW heavy vehicles are categorised dependent on the vehicle mass, dimension and configuration, or a combination of all three. While these standards do not outline the requirements for Heavy Vehicle movements on Fire Access and Fire Trails, it is acknowledged that firefighting operations can incorporate the use of heavy plant and bulk water appliances where the topography allows (including low loaders/floats). The appliance details are contained in Appendix A.




As a result, consideration should be made during design and construction of fire trails, in particular drainage structures such as cross banks (also referred to as roll overs), for the safe and effective transport of heavy vehicles, where appropriate, for the support of firefighting operations.

## 5.2. Operational Confidence Attributes

# Trail Width

Intent: The width of the trail provides for safe, reliable and unobstructed passage for a firefighting appliance within acceptable operational limits.

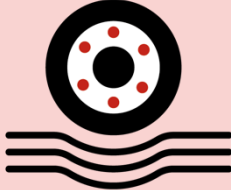
| Acceptable Solution  |   |  |   |
|--|---|--|---|
| Appliance Type:  | Category 1  | Category 7   | Category 9  |
| <p>Criteria:</p>  | <p><b>Option 1:</b><br/>The trail must have a minimum width of 4.0m. Where there is a curve with a radius &lt;30m, refer to Performance Solution.</p> <p><b>Option 2:</b><br/>If &lt;120m linear distance from the end of a passing bay to the start of the next passing bay, the width can be reduced to 3.5m. Where there is a curve with a radius &lt;30m, refer to Performance Solution.</p> <p>No more than 5% of the total length of the fire trail may be narrower than the Acceptable Solution.</p> | <p><b>Option 1:</b><br/>The trail must have a minimum width of 3.5m. Where there is a curve with a radius &lt;20m, refer to Performance Solution.</p> <p><b>Option 2:</b><br/>If &lt;120m linear distance from the end of a passing bay to the start of the next passing bay, the width can be reduced to 3m. Where there is a curve with a radius &lt;20m, refer to Performance Solution.</p> | <p><b>Option 1:</b><br/>The trail must have a minimum width of 3.0 m. Where there is a curve with a radius &lt;20m, refer to Performance Solution.</p> <p><b>Option 2:</b><br/>If &lt;120m linear distance from end of a passing bay to the start of the next passing bay, the width can be reduced to 2.5m. Where there is a curve with a radius &lt;20m, refer to Performance Solution.</p> |

| Performance Solution   |  |
|--|--|
| <p><b>Accessibility</b></p>                       | <p><b>Context:</b> Refer to Appendix A for minimum appliance dimensions. A narrower trail increases the risk of damage to the appliance and may impede operational movement of the appliance.</p> <p><b>Criteria:</b> The fire trail must provide a width for:</p> <ul style="list-style-type: none"> <li>– the unobstructed traversing of the terrain without damage to the appliance;</li> <li>– the traversing of the terrain at a speed appropriate for safe firefighting operations; and</li> <li>– the ability of an appliance to navigate the section without reversing manoeuvres.</li> </ul>  |
| <p><b>Operations</b></p>                          | <p><b>Context:</b> A narrow trail increases the risk of:</p> <ul style="list-style-type: none"> <li>– damage to the appliance;</li> <li>– low speeds leading to extended reaction times or reduced operating windows;</li> <li>– inaccessibility leading to poor tactical response;</li> <li>– routes becoming inaccessible due to higher obstruction risk; and</li> <li>– overgrown trails rendering them inaccessible and leading to more frequent maintenance.</li> </ul> <p><b>Criteria:</b></p> <ul style="list-style-type: none"> <li>– the fire trail must not be of a width that impedes the tactical movement of appliances;</li> <li>– the fire trail must not impede firefighting personnel’s access to the appliance (egress and ingress); and provides an unobstructed view for firefighters.</li> <li>–</li> </ul> |
| <p><b>Safety, Environmental and Cultural</b></p>  | <p><b>Context:</b> Insufficient trail width may:</p> <ul style="list-style-type: none"> <li>– increase risk to safety of firefighting personnel; and</li> <li>– increase risk to environment due to inability to suppress/fight fires.</li> </ul> <p><b>Criteria:</b> The fire trail is of a width that:</p> <ul style="list-style-type: none"> <li>– does not pose an increased risk to firefighting personnel safety in any way;</li> <li>– does not impact on evacuation of the area in any way;</li> <li>– considers any negative impacts on the surrounding environment; and</li> <li>– has appropriate signage (for example, longer sections of a fire trail that are narrower than the Acceptable Solution must be appropriately signposted).</li> <li>–</li> </ul>   |

# Trafficable Surface

Intent: The construction and formation of the trail is trafficable under all\* weather conditions for a firefighting appliance.

## Acceptable Solution

| Appliance Type:   | Category 1   | Category 7  | Category 9  |
|---|--|---|---|
| <b>Criteria:</b><br> | Trail surfaces under all* weather conditions must be able to carry: <ul style="list-style-type: none"> <li>– a Gross Appliance Mass of 15 tonnes; and</li> <li>– an Axle Load of 9 tonnes</li> </ul> | Trail surfaces under all* weather conditions must be able to carry: <ul style="list-style-type: none"> <li>– a Gross Appliance Mass of 8 tonnes; and</li> <li>– an Axle Load of 6 tonnes</li> </ul> | Trail surfaces under all* weather conditions must be able to carry: <ul style="list-style-type: none"> <li>– a Gross Appliance Mass of 4 tonnes; and</li> <li>– an Axle Load of 2 tonnes</li> </ul> |

## Performance Solution

### Accessibility



**Context:** An unsuitable trafficable surface could:

- cause damage to the appliance;
- prevent tactical movement by rendering areas unreachable; and
- lead to appliances being rendered immobile; and
- prevent evacuation of the area in case of an emergency.

**Criteria:** The fire trail trafficable surface must:

- be constructed and able to be maintained such that the surface is accessible under all\* conditions;
- provide sufficient traction to allow traversing of the terrain under all conditions (except for flood, storm surge and snowfall); and
- provide sufficient carrying capacity to ensure safe passage for appliances without losing traction or being rendered immobile.

### Operations



**Context:** An unsuitable trafficable surface could:

- prevent tactical movement and manoeuvres required for effective firefighting measures;
- require re-routing and time delays of appliances; and
- increase risk to surrounding areas should operations not be able to move in a predictable manner.

**Criteria:** The fire trail trafficable surface must:

- be free from major defects that may interfere with appliance operational speed; and
- allow for a safe working platform for personnel to access the appliance cabin and equipment.

### Safety, Environmental and Cultural



**Context:** An unsuitable trafficable surface could:

- pose and increased risk of damage to appliances;
- increase the risk of injury to firefighter personnel; and
- increase the propensity for accumulation of surface water if required drainage measures are not adhered to.

**Criteria:** The trafficable surface must:

- ensure a safe working environment for personnel and should have sufficient integrity for its expected term of use in the event of an incident;
- be free of contaminants; and
- incorporate, as far as possible local and sustainable materials.


\*Expected weather conditions (i.e., not during flood, storm surge or snowfall)



# Clearance

Intent: A cleared corridor is provided around the trail to permit the unobstructed passage of a firefighting appliance and enable firefighters to egress and access equipment in the vehicle. In providing clearance, consideration for vegetation regrowth is required so that a minimum 1m clearance is provided at all times (including between maintenance activities). Greater vegetation clearance should be considered at locations where visibility may be reduced.

## Acceptable Solution

| Appliance Type:   | Category 1  | Category 7   | Category 9  |
|---|---|--|---|
| <b>Criteria:</b><br> | The trail must have: <ul style="list-style-type: none"> <li>– an envelope free of obstructions, including dense vegetation, to allow for unimpeded operations;</li> <li>– a minimum vertical clearance of 4m above the trafficable surface; and</li> <li>– a minimum horizontal clearance of 3m from the trafficable surface centreline.</li> </ul> | The trail must have: <ul style="list-style-type: none"> <li>– an envelope free of obstructions, including dense vegetation, to allow for unimpeded operations;</li> <li>– a minimum vertical clearance of 4m above the trafficable surface; and</li> <li>– a minimum horizontal clearance of 2.75m from the trafficable surface centreline.</li> </ul> | The trail must have: <ul style="list-style-type: none"> <li>– an envelope free of obstructions, including dense vegetation, to allow for unimpeded operations;</li> <li>– a minimum vertical clearance of 4m above the trafficable surface; and</li> <li>– a minimum horizontal clearance of 2.5m from the trafficable surface centreline.</li> </ul> |

## Performance Solution

### Accessibility



**Context:** Insufficient clearance could impede forward and night time visibility and impact on the effective movement of appliances.

**Criteria:** The fire trail clearance must:

- provide a cleared envelope free from obstructions preventing access or thoroughfare;
- provide sufficient clearance from protrusions that could cause damage to the appliance;
- in the event of overgrowth, be of such a nature to allow safe thoroughfare of the appliance; and
- enable clear visibility for free forward movement of appliances.

### Operations



**Context:** Insufficient clearance could pose risk to appliances and personnel by restricting movement and introducing obstructions.

**Criteria:** The fire trail trafficable surface must:

- allow appliances to travel at an operational speed (inline with the conditions on the trail);
- allow personnel unimpeded access to appliance cabin and equipment; and
- afford suitable footing and freedom of movement for personnel.

### Safety, Environmental and Cultural



**Context:** Insufficient clearance could:

- increase risk of ignition and flare up; and
- increase the risk of fire jumping over appliances and personnel;
- increase the risk of overrun.

*If not managed correctly:*

- increasing the trail clearance could cause loss of habitat;
- increasing trail clearance could possibly impact culturally sensitive sites; and
- trails could act as a barrier impeding wildlife movement.

**Criteria:** In all cases, the fire trail clearance must:

- provide sufficient space for the safe access to the appliance by personnel, except where there are significant environmental constraints. In this case, alternative clearance solutions may be considered in consultation with the RFS;
- be achieved and maintained through environmentally conscious and responsible methods; and
- be achieved and maintained in accordance with relevant environmental approvals.

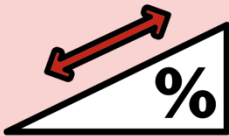
# Grade

Intent: The vertical profile of the trail provides for traction and safe working angle within the physical operational capability of a firefighting appliance (including design that does not impede the undercarriage of an appliance).

## Acceptable Solution

Appliance Type: All Categories

Criteria: There is no defined grade criteria, refer to Performance Solution.



## Performance Solution

### Accessibility



**Context:** Unacceptable trail grades<sup>1</sup> could:

- cause loss of traction and impede effective movement of the appliances; and
- cause damage to or loss of operational capability of the appliance.

**Criteria:** The grade of the trail must:

- provide sufficient traction for a fully laden appliance while ascending and descending;
- provide a safe working angle that does not impede physical operational capability of the appliance; and
- not exceed the physical ground clearance capabilities of the appliance.

### Operations



**Context:** Unacceptable trail grades<sup>1</sup> may:

- pose an unstable working angle from which firefighters must access and operate appliance equipment;
- increase the risk of injury to personnel during egress or access to appliances; and
- reduce effective operating speeds.

**Criteria:** The grade of the trail must ensure that:

- a fully laden appliance is capable of traversing the terrain; and
- operational capability of the appliance and personnel are not adversely impacted.

### Safety, Environmental and Cultural



**Context:** Poor trail grades<sup>2</sup> may:

- increase or stagnate stormwater velocity and increase the risk of erosion; and
- cause bottoming out and damage to both the appliance and the trail.

**Criteria:** The grade of the trail must:

- minimise impacts to the environment and reduce earthworks required; and
- possess appropriate surface water management.

<sup>1</sup> Unacceptable Trail Grades: The trail is badly damaged. Most, if not all, drainage structures are non-functional. Major repair or reconstruction works are now required.

<sup>2</sup> Poor Trail Grades: Trail is still usable, BUT significant reduction in trafficability. Low Range, Low gear is required. Significant evidence of compromised drainage, resulting in rutting, scouring and loss of material from the carriage way. Major repair or remediation works are now required.

# Crossfall

Intent: The vertical profile of the trail provides for traction and safe working angle with the physical operational capability of a firefighting appliance (including design that does not impede the undercarriage of an appliance).

## Acceptable Solution

**Appliance Type:** All Categories

**Criteria:** Unless transitioning between cross sections, the crossfall of the trail is no more than 6 degrees (10.5%).



## Performance Solution

### Accessibility



**Context:** Inadequate crossfall may:

- increase the risk of poor traction; and
- increase the risk of rollover as quick lateral shifts can cause sloshing within the appliance's water tank.

**Criteria:**

- The crossfall of the trail must provide sufficient traction for fully laden appliances while ascending and descending; and
- Ensure the risk of roll over and uncontrolled movement of appliances is managed

### Operations



**Context:** See Accessibility.

**Criteria:**

- Crossfall of the trail must provide a stable foundation for appliances and personnel to ensure operational capability.

### Safety, Environmental and Cultural



**Context:** Inadequate crossfall may:

- increase the risk of rollover as quick lateral shifts can cause sloshing within the appliance's water tank;
- increase the potential for an appliance to slide sideways on the trail during wet conditions, posing risks to personnel and appliances; and.
- pose risk of injury to personnel alighting from appliances.

**Criteria:** The crossfall of the trail:

- must provide sufficient traction for fully laden appliances;
- ensure that the risk of rollover and uncontrolled movement of vehicles is managed; and
- safety of personnel in firefighting operations is managed.

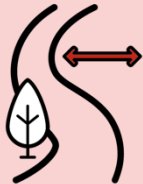
# Horizontal Curves

Intent: The design of the trail provides for safe, manoeuvrable and operationally effective passage by a firefighting appliance within acceptable operational limits.

## Acceptable Solution

Appliance Type: All Categories

Criteria: There is no defined criteria for horizontal curves, refer to Performance Solution.



## Performance Solution

### Accessibility



**Context:** *Tight curves may not:*

- allow for an appliance to manoeuvre in line with its capabilities;
- restrict visibility of oncoming traffic or personnel; and
- increase risk of roll over.

**Criteria:** The horizontal curves must allow the relevant appliance to navigate through a curve in a single movement without coming to a stop or having to reverse.

### Operations



**Context:** *Multiple tight curves can:*

**Criteria:**

- impede safe travel speed, reducing operational effectiveness;
- impact hazard reduction ignition or back burning operations; and
- increase risk to personnel working on the ground, where appliances are unable to identify hazards when travelling around sharp curves.

### Safety, Environmental and Cultural



**Context:** *Poorly designed and constructed curves may:*

- have an unnecessary environmental impact;
- impede appliance movement, posing a safety risk to operators during an emergency scenario; and
- impede personnel's ability to react to hazards as a result of poor visibility.

**Criteria:** The horizontal curves shall:

- allow for appropriate sight distances to any identified hazards; and
- minimise environmental impact by following natural contours of the land when possible.

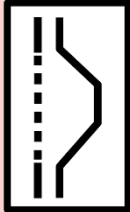
# Passing Bays

Intent: The trail provides for two firefighting appliances to pass at appropriate operational and safe intervals.

## Acceptable Solution

Appliance Type: All Categories

Criteria:



A passing bay is defined as a constructed bay or widening of the trafficable surface to provide access under all weather conditions and provide capability for appliance passing. Passing Bays must be constructed no more than **250m between the end of one bay and the start of another along the trail, and with one in five bays permitted to be up to 300m apart** (no two consecutive bays can be greater than 250m apart).

A passing bay must comprise:

- pavement materials to match the trafficable surface;
- an area large enough to allow the appliance to enter and exit without requiring a reversing manoeuvre; or
- where a turnaround bay is used as a passing bay, it must allow for the safe positioning of the appliance, parallel to and off the main carriageway; and
- a space that allows the safe passing of another appliance while firefighters are working.

### Category 1

Capacity for passing bays is to be a widened trafficable surface of at least 6 metres.

### Category 7

Capacity for passing bays is to be a widened trafficable surface of at least 5.5 metres.

### Category 9

Capacity for passing bays is to be a widened trafficable surface of at least 5 metres.

## Performance Solution

Accessibility



**Context:** Poorly constructed passing bays or inadequate spacing may:

- impede strategic movement of appliances; and
- render an appliance immovable due to insufficient structural support.

**Criteria:** A passing bay must:

- allow for the effective and safe passing of two appliances without avoidable delays to operations;
- be capable of supporting the required appliance mass and axle load;
- allow for the free flow of multiple appliances on the fire trail; and
- allow for the access and passing of appliances without reversing.

Operations



**Context:** Poorly constructed passing bays or inadequate spacing could:

- impede access to appliance equipment; and
- increase risk of appliance congestion and operational delay.

**Criteria:** A passing bay must:

- ensure unimpeded access to the appliance cabin and equipment off the trail and away from vegetation; and
- provide opportunities for appliances to pass at appropriate intervals for continuous operational movement.

Safety,  
Environmental  
and Cultural







**Context:** Poorly constructed or maintained passing bays could:

- have increased risk of vegetation ignition from stationary appliances;
- introduce delays of appliances using the trail as an escape route;
- pose significant risk to personnel by creating traffic jams in an emergency situation; and
- be hard to identify.

**Criteria:** A passing bay must be designed and constructed to minimise environmental impact.

# Turnaround Bays


Intent: The trail provides for a turning manoeuvre for a firefighting appliance to return in the direction from which it came from, at appropriate intervals.




| Acceptable Solution   |   |  |  |
|---|---|--|--|
| Appliance Type:   | Category 1  | Category 7   | Category 9   |
| <p>Criteria:</p>                             | <p>Turnaround bays are to be constructed as surfaces to provide access under all weather conditions and must be provided every 500m along the trail, where a trail changes VCC and at the termination of a trail. Each turnaround bay must enable the whole vehicle to be off the trafficable trail and:</p> <ul style="list-style-type: none"> <li>– be constructed with an area clear of the trafficable surface at least 6m wide and 6m deep, which is accessible for a three-point turn or u-turn; OR</li> <li>– have a turning circle which has a minimum outer diameter of 22m.</li> </ul>  | <p>Turnaround bays are to be constructed as surfaces to provide access under all weather conditions and must be provided every 500m along the trail, where a trail changes VCC and at the termination of a trail. Each turnaround bay must enable the whole vehicle to be off the trafficable trail and:</p> <ul style="list-style-type: none"> <li>– be constructed with an area clear of the trafficable surface at least 5.5m wide and 6m deep, which is accessible for a three-point turn or u-turn; OR</li> <li>– have a turning circle which has a minimum outer diameter of 17m.</li> </ul> | <p>Turnaround bays are to be constructed as surfaces to provide access under all weather conditions and must be provided every 500m along the trail, where a trail changes VCC and at the termination of a trail. Each turnaround bay must enable the whole vehicle to be off the trafficable trail and:</p> <ul style="list-style-type: none"> <li>– be constructed with an area clear of the trafficable surface at least 5.5m wide and 6m deep, which is accessible for a three-point turn or u-turn; OR</li> <li>– have a turning circle which has a minimum outer diameter of 16m.</li> </ul> |
| Performance Solution  |   |  |  |
| <p>Accessibility</p>                       | <p><b>Context:</b> Poorly constructed turnaround bays could:</p> <ul style="list-style-type: none"> <li>– restrict tactical movement of appliances due to trail termination and insufficient turning space; and</li> <li>– lead to trail obstruction due to immobile appliances.</li> </ul> <p><b>Criteria:</b> The turnaround bays must be:</p> <ul style="list-style-type: none"> <li>– large enough to allow for the relevant appliance to return in the direction from where it came through a three-point turning manoeuvre;</li> <li>– provide sufficient space for the relevant appliance to change direction without obstructing the fire trail; and</li> <li>– present at the end of each fire trail.</li> </ul> |  |  |
| <p>Operations</p>                          | <p><b>Context:</b> Poorly constructed or inadequately spaced turnaround bays could:</p> <ul style="list-style-type: none"> <li>– restrict directional change opportunities, introducing operational delays; and</li> <li>– impede access to an appliance when bay is used as a passing bay.</li> </ul> <p><b>Criteria:</b> The turnaround bays must:</p> <ul style="list-style-type: none"> <li>– provide tactical manoeuvrability locations for appliances;</li> <li>– provide sufficient space for personnel to access firefighting equipment and implement likely firefighting tactics; and</li> <li>– not prevent thoroughfare of other appliances along the fire trail.</li> </ul>                                   |  |  |
| <p>Safety, Environmental and Cultural</p>  | <p><b>Context:</b> Poorly constructed, spaced or maintained turnaround bays could lead to:</p> <ul style="list-style-type: none"> <li>– delays for appliances using the trail as an escape route due to trail blockage; and</li> <li>– the loss of habitat and detrimental environmental impacts.</li> </ul> <p><b>Criteria:</b> The turnaround bays must:</p> <ul style="list-style-type: none"> <li>– provide directional change opportunities particularly when an escape route is required; and</li> <li>– be constructed to minimise environmental impact.</li> </ul>  |  |  |

# Engineered Culverts and Bridges

## (Major Crossing Structures)

Intent: The structures are adequate to ensure the crossing of a drainage feature of a trail to provide safe, functional passage of firefighting appliances.

| <u>Acceptable Solution</u>  |   |   |   |
|---|---|---|---|
| Appliance Type:   | Category 1  | Category 7  | Category 9  |
| <p><b>Criteria:</b></p>                                    | <p>Crossing structures must:</p> <ul style="list-style-type: none"> <li>– have appropriate guidepost delineation for safe visibility; and</li> <li>– be able to carry:               <ul style="list-style-type: none"> <li>– a Gross Appliance Mass of 15 tonnes; and</li> <li>– an Axle Load of 9 tonnes.</li> </ul> </li> </ul> <p>Where new crossing structures can provide a higher vehicular GVM carrying capacity, then this is strongly encouraged.</p> | <p>Crossing structures must:</p> <ul style="list-style-type: none"> <li>– have appropriate guidepost delineation for safe visibility; and</li> <li>– be able to carry:               <ul style="list-style-type: none"> <li>– a Gross Appliance Mass of 15 tonnes; and</li> <li>– an Axle Load of 6 tonnes.</li> </ul> </li> </ul> <p>Where new crossing structures can provide a higher vehicular GVM carrying capacity, then this is strongly encouraged.</p> | <p>Crossing structures must:</p> <ul style="list-style-type: none"> <li>– have appropriate guidepost delineation for safe visibility; and</li> <li>– be able to carry:               <ul style="list-style-type: none"> <li>– a Gross Appliance Mass of 15 tonnes; and</li> <li>– an Axle Load of 2 tonnes.</li> </ul> </li> </ul> <p>Where new crossing structures can provide a higher vehicular GVM carrying capacity, then this is strongly encouraged.</p> |
| <p>Refer to NSW Rural Fire Service Fire Trail Design, Construction and Maintenance Manual for guidance on types of crossing structures.</p> |   |   |   |

| <u>Performance Solution</u>  |  |
|--|--|
| <p><b>Accessibility</b></p>                       | <p><b>Context:</b> <i>Inadequate crossing structures could render the entire trail non-functional.</i></p> <p><b>Criteria:</b> Crossing structures must:</p> <ul style="list-style-type: none"> <li>– possess adequate bearing capacity for safe crossing of appliances;</li> <li>– have adequate width to allow movement of the relevant appliance; and</li> <li>– allow for the effective strategic movement of appliances.</li> </ul>   |
| <p><b>Operations</b></p>                          | <p><b>Context:</b> <i>Inadequate crossing structures may:</i></p> <ul style="list-style-type: none"> <li>– provide limited options for alternative routes if closed from traffic;</li> <li>– impede tactical movement of appliances; and</li> <li>– lead to appliances being stranded on parts of a fire trail should the crossing structure be damaged and rendered un-crossable.</li> </ul> <p><b>Criteria:</b> Crossing structures must:</p> <ul style="list-style-type: none"> <li>– not impede the operational capability of appliances; and</li> <li>– not affect the trail's integration with the network.</li> </ul>   |
| <p><b>Safety, Environmental and Cultural</b></p>  | <p><b>Context:</b> <i>Poorly designed crossings could:</i></p> <ul style="list-style-type: none"> <li>– impede the natural flow of water, impacting the surrounding environment; and</li> <li>– lead to unexpected closures and isolate appliances and personnel already on the trail.</li> </ul> <p><b>Criteria:</b> Crossing structures must:</p> <ul style="list-style-type: none"> <li>– be clearly delineated;</li> <li>– have appropriate guidepost delineation for safe visibility;</li> <li>– allow for unobstructed flow of natural watercourses (unless in accordance with a relevant water authority approval); and</li> <li>– not divert natural flow of the watercourse (unless in accordance with a relevant water authority approval).</li> </ul> |

# Bed Level Crossings and Piped Culverts

## (Minor Crossing Structures)

Intent: The structures are adequate to ensure the crossing of a drainage feature of a trail to provide safe, functional passage of firefighting appliances.

### Acceptable Solution

**Appliance Type:** All Categories

**Criteria:**



Crossing structures must:

- be able to carry a Gross Appliance Mass of 15 tonnes; and
- have appropriate guidepost delineation for safe visibility.

Refer to *NSW Rural Fire Service Fire Trail Design, Construction and Maintenance Manual* for guidance on types of crossing structures.

### Performance Solution

**Accessibility**



**Context:** *Inadequate crossing structures could render the entire trail non-functional.*

**Criteria:** Crossing structures shall:

- possess adequate bearing capacity for safe crossing of appliances;
- have adequate width to allow movement of the relevant appliance; and
- allow for the effective strategic movement of appliances.

**Operations**



**Context:** *Inadequate crossing structures may:*

- provide limited options for alternative routes if closed from traffic;
- impede tactical movement of appliances; and
- lead to appliances being stranded on parts of a fire trail should the crossing structure be damaged and rendered un-crossable.

**Criteria:** Crossing structures shall:

- not impede the operational capability of appliances; and
- not affect the trail's integration with the network.

**Safety,  
Environmental  
and Cultural**



**Context:** *Poorly designed crossings could:*

- impede the natural flow of water, impacting the surrounding environment; and
- lead to unexpected closures and isolate appliances and personnel already on the trail.

**Criteria:** Crossing structures must:

- have appropriate guidepost delineation for safe visibility;
- allow for unobstructed flow of natural watercourses (unless in accordance with a relevant water authority approval); and
- not divert natural flow of the watercourse (unless in accordance with a relevant water authority approval).



# Corridor Hazards

Intent: The trail provides for a low safety risk to reduce obstruction or damage to firefighting appliances from uncontrolled hazards, e.g., overhanging tree limbs or rock falls.

## Acceptable Solution

Appliance Type: All Categories

Criteria: There is no defined criteria for corridor hazards, refer to Performance Solution.



## Performance Solution

Accessibility



**Context:** Uncontrolled corridor hazards can impede movement of appliances, potentially cause trail closure and potentially damage appliances.

**Criteria:** Corridor hazards must:

- be identified by appropriate signage or spatially; and
- be assessed for their potential risk and, if deemed significant, be rectified such that the risk for the trail becoming inaccessible is reduced to an acceptable level.

Operations



**Context:** Corridor hazards, such as overhanging trees or narrow passes, can impact firefighters being able to perform operations safely and effectively.

**Criteria:** Corridor hazards must be:

- addressed such that impacts to the whole fire trail network are minimised;
- controlled if they pose a risk to firefighters being able to perform operations safely and effectively; and
- prioritised based on the importance of the trail within the network and the severity of the hazard.

Safety,  
Environmental  
and Cultural



**Context:** Hazards increase risk of injury to firefighters and damage to appliances. A balance between safety and effectiveness of operations and environmental and cultural impact is required, and any risk to safety arising from a hazard should be identified by agencies during an incident.

**Criteria:** Corridor hazard management must examine:

- trees and tree limbs to extend beyond the cleared area of a fire trail, which presents a safety risk. These are generally mature trees with:
  - a lean towards the trail and weaknesses in their root structure; and/or
  - branches with weaknesses which extend over the trail; and
- mature trees (high potential) to be environmentally and culturally sensitive. Therefore, the environmental cost of removing the tree partially or fully must be considered against the safety risk; and
- areas with a history of instability such as batter failure or rock falls require inspection schedules to minimise the risk of damage to appliances and personnel.

## 5.3. Asset Attributes

# Operational Support Points

Intent: The assets are locatable, accessible and of appropriate dimension and construction for the access and use for firefighting appliances within operational limits.

### Acceptable Solution

**Appliance Type:** All Categories

**Criteria:**



Functionally, operational support points (OSP) may include, but are not limited to, coordination, aerial support, welfare, logistics support, refuge, turning circle, communications support, bulk water points, amenities and resupply operations.

Operational support points are to be:

- identified and mapped<sup>3</sup>;
- located in strategic and accessible locations with respect to the trail network, historic fires and anticipated future operations;
- constructed with pavement materials that support the proposed usage;
- of appropriate dimensions for functional requirements (refer to Performance Solution); and
- if a trail is >10km, at least one SMALL OSP is required on the trail (strategically placed).

### Performance Solution

**Accessibility**



**Context:** Poor construction and preparation of the site could lead to ineffective fire response and tactical planning.

**Criteria:** The operational support point must:

- comprise clear pathways for appliances to enter and exit the OSP onto the trail or road network;
- have a surface which can support the load of anticipated appliances and structures; and
- have appropriate dimensions and be strategically located for:

**SMALL OSP:**

- control point; or
- bulk water point; or
- staging a strike team of appliances.

**MEDIUM OSP** – combination of:

- control point; and/or
- helicopter point; and/or
- staging more than one strike team of appliances; and/or
- catering/amenities support.

<sup>3</sup> This is an operational benefit for use in the FAFT spatial data overlay which can be used for operational decision making.

# Water Management Systems

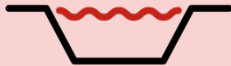
Intent: The trail is drained effectively to manage water flows and prevent damage to the trafficable surface.

## Acceptable Solution

**Appliance Type:** All Categories

**Criteria:**

There is no defined criteria for water management systems, refer to Performance Solution.



## Performance Solution

**Accessibility**



**Context:** Poor water management systems may:

- damage or destroy the trail;
- lead to damage of the trafficable surface, which can impede the movement and manoeuvrability of appliances;
- damage the surrounding area due to concentrated water flow leading to scouring and erosion;
- alter the environmental surroundings; and
- cause ponding of water on the fire trail.

**Criteria:** Water management systems must:

- be constructed so that appliances do not damage the trail or water management structures such as cross banks, or render the trail inaccessible after reasonable repeated use;
- not exceed the break over angle of ground clearance of appliances; and
- manage surface runoff to prevent damage to the water management systems, trafficable surface and the surrounding area.

Refer to the *Fire Trail Design, Construction and Maintenance Manual* for further guidance.

# Pavement Materials

Intent: The trail surface needs to be appropriate for all\* weather conditions to ensure safe, long term, operational movement of appliances.

## Acceptable Solution

**Appliance Type:** All Categories

**Criteria:**



Pavement materials need to be appropriate for all\* weather conditions. Refer to Performance Solutions.

## Performance Solution

**Accessibility**



**Context:** The fire trail pavement materials could:

- prevent tactical movement of appliances if the trail is in poor condition due to poorly performing materials;
- result in a weak structure that can deform, posing a risk to tactical movement and fire response; and/or
- cause damage to appliances if not adequate to manage load and movement volume.

**Criteria:** The fire trail carriageway pavement materials must:

- provide a structure with a consistent trafficable surface;
- not deteriorate with anticipated usage under the movement of appliances across the terrain; and
- not contain environmentally damaging and/or hazardous materials.

\*Expected weather conditions, i.e., not during flood, storm surge or snowfall

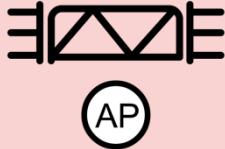
# Trail Access and Access/Egress Points

Intent: The access is provided to manage the safety of firefighters and appliances, and the accessibility to and longevity of the trail.

## Acceptable Solution

**Appliance Type:** All Categories

**Criteria:**



- Where gates are required, there must be at least one passing bay located adjacent to the access point;
- have sufficient set back and vegetation clearance around the gate and access point for safe egress into oncoming traffic; and
- Any gate or control mechanism installed across a trail shall:
  - be operable by a single person in a practical timeframe;
  - be a sufficient distance from the adjoining road edge to allow for safe parking of appliance out of traffic and for safe egress from the trail into oncoming traffic; and
  - have fencing setbacks as required around the access.

## Performance Solution

**Accessibility**



**Context:** *Unauthorised closure of the fire trail may:*

- prevent appliances from entering/exiting the trail;
- impede the effective tactical movement and fire response of appliances; and
- unauthorised access may lead to damage to the fire trail, rendering it unsafe or untrafficable.

**Criteria:** Where gates are required, the fire trail entrance/exit must:

- be clearly identifiable by personnel, including having appropriate guidepost delineation for safe visibility (including during night operations);
- be a functional entry and exit point for the relevant appliance category;
- be positioned to allow for the safe refuge of an appliance from traffic;
- have sufficient set back and vegetation clearance around the gate and access point for safe egress into oncoming traffic;
- consist of a lock mechanism, which must not unreasonably impede access of appliances into the trail; and
- consist of a trail access/egress gate of sturdy construction that is both weather and vandal resistant.

# Trail Signage

Intent: Signs ensure that trails are easily identified, hazards are marked in advance and critical points are subjects of focus.

## Acceptable Solution

**Appliance Type:** All Categories

**Criteria:**



Standardised signs as per Appendix B should be installed and maintained throughout the fire trail network. Signs ensure that trails are easily identified, hazards are marked in advance and critical points are subjects of focus.

Signage that improves operational capability is to be installed, such as reflectors for night time operations.

Trail Signage must be placed at the last exit point of the trail for any 'no through' trail to denote a lack of alternative escape route.

## Performance Solution

**Accessibility**



**Context:** Inadequate fire trail directional signage could cause extensive delay in the tactical movement of appliances.

**Criteria:** The fire trail signage must be:

- signposted (outlining the fire trail name) at each entry point and intersection of another fire trail;
- adequate to convey current information on the fire trail classification and warnings; and
- suitable and acceptable to private landholders to ensure privacy and reduce potential unauthorised access.

If existing signage blades with correct trail name are in place and in good condition, the addition of the appropriate "VCC Blade" only directly underneath the existing name blade is a suitable solution.

# Fixed Water Points

Intent: The fixed water point assets are locatable, accessible and of appropriate dimension and construction for use by firefighting appliances within operational limits.

## Acceptable Solution

**Appliance Type:** All Categories

**Criteria:**



Where fixed water points exist, they are to be:

- identified and mapped<sup>4</sup>;
- located in strategic locations with respect to the trail network, historic fires and anticipated future operations;
- water points must allow for safe positioning of an appliance to conduct water resupply operations;
- access to fixed water points is to be constructed with pavement materials that support the proposed usage; and
- of appropriate dimensions for functional requirements (refer to Performance Solution).

## Performance Solution

**Accessibility**



**Context:** Poor construction and preparation of the site including inaccessible or elusive fixed water points could lead to ineffective operational capability.

**Criteria:** Fixed water points:

- must not obstruct pathways for appliances to enter and exit onto the trail or road network;
- must facilitate access using standard appliance equipment for draughting;
- must have a surface that can support the load of anticipated appliances and structures; and
- must have appropriate dimensions and be strategically located for water resupply.

<sup>4</sup> This is an operational benefit for use in the FAFT Spatial data overlay which can be used for operational decision making.

## 6. Certification and Condition Monitoring

### 6.1. Certification

A fire trail may only be certified end to end (tenure blind) by the Commissioner under the Act if it fully complies with these Standards at the time of the certification.

The Commissioner may certify the following trails:

- a. a fire trail situated on public land – if the fire trail is the subject of a direction under section 62L, or
- b. a fire trail situated on private land – if the fire trail is the subject of an agreement under section 62M, or
- c. an existing fire trail situated on public land – if the fire trail is referred to in a FAFT Plan, or
- d. an existing fire trail situated on private land – if the fire trail is referred to in a FAFT Plan and the fire trail is the subject of an agreement for the establishment of a fire trail entered into before the commencement of this section.

To be eligible for certification:

- The fire trail must meet each attribute either to an Acceptable Solution or, where a performance solution is applied, this must adhere to all of the performance solution criteria for that attribute; and
- the land manager (or the RFS for private land) responsible for the fire trail must have utilised and adequately completed the relevant sections of the RFS Fire Trail Digital Assurance System (or such alternative as the RFS may advise) prior to requesting the Commissioner certify any fire trail under the Act.

### 6.2. Condition monitoring

Ensuring that fire trails are available for use is a key component of achieving a practical network of fire trails. Condition monitoring should therefore be undertaken regularly, and as a minimum:

- prior to bush fire season; and
- after extreme weather events such as severe storms, flooding or heavy rain, natural disaster declaration or extreme winds (for fire trails identified as likely to be affected).

A land manager shall provide to the Commissioner annually a statement as to the condition of each designated, and registered fire trail on its land, and whether each of those trails meet these Standards. The statement must be made in the form as specified by the Commissioner.

Where a fire trail is located on private land, arrangements for any inspection will be made having regard to any agreement between the Commissioner and the landowner.

The Act gives powers to the Commissioner to undertake inspections of fire trails on both public and private land. At least an annual assessment of all other fire trails (i.e., those that are not designated or registered) in a FAFT Plan should be undertaken by the responsible agency and a condition report provided to the BFMC.

### 6.3. Maintenance of registered fire trails

Fire trails must be maintained to the condition certified for the life of the trail, ensuring it continues to meet the selected Acceptable Solution or Performance Solutions at time of registration.



It is the duty of the owner, occupier or land manager of the land on which a designated or registered fire trail is situated to ensure ongoing availability and maintenance. In the event that the fire trail is situated on private land, the responsibility resides with the RFS.

#### **6.4. Legacy of existing fire trails**

Fire trails that are registered, or on which works have commenced at the time of publication of these standards, will be legaced and required to meet the standards at the time of registration or commencement of works. Legacy arrangements will remain in place until a time determined by the Commissioner.

## 7. Document Review

The Fire Trail Standards may be reviewed and amended by the Commissioner as required. A review must be undertaken within three years of publication.

# Appendix A: Firefighting Appliance Specifications

## Category 1 Firefighting appliance specifications

Table A.1: Category 1 Firefighting appliance specifications

| Unit                          | Measurement                           |
|-------------------------------|---------------------------------------|
| Length                        | 8,000mm                               |
| Width                         | 2,450mm                               |
| Mirror length                 | 450mm                                 |
| Height                        | 3,900mm (including 600mm for aerials) |
| Ground clearance              | 380mm                                 |
| Approach angle                | 25°                                   |
| Departure angle               | 28°                                   |
| Wheelbase                     | 4,250mm                               |
| Turning circle – wall to wall | 18m diameter                          |
| Weight                        | 14,200kg                              |
| Maximum axle loading          | 9,000kg                               |

## Category 7 Firefighting appliance specifications

Table A.2: Category 7 Firefighting appliance specifications

| Unit                          | Measurement                           |
|-------------------------------|---------------------------------------|
| Length                        | 6,250mm                               |
| Width                         | 2,230mm                               |
| Mirror length                 | 450mm                                 |
| Height                        | 3,350mm (including 600mm for aerials) |
| Ground clearance              | 380mm                                 |
| Approach angle                | 25°                                   |
| Departure angle               | 28°                                   |
| Wheelbase                     | 3,395mm                               |
| Turning circle – wall to wall | 14m diameter                          |
| Weight                        | 7,500kg                               |
| Maximum axle loading          | 5,600kg                               |

## Category 9 Firefighting appliance specifications

**Table A.3: Category 9 Firefighting appliance specifications**

| Unit                          | Measurement                           |
|-------------------------------|---------------------------------------|
| Length                        | 5,500mm                               |
| Width                         | 1,900mm                               |
| Mirror length                 | 450mm                                 |
| Height                        | 2,800mm (including 600mm for aerials) |
| Ground clearance              | 320mm                                 |
| Approach angle                | 27°                                   |
| Departure angle               | 23°                                   |
| Wheelbase                     | 3,180mm                               |
| Turning circle – wall to wall | 14m diameter                          |
| Weight                        | 3,780kg                               |
| Maximum axle loading          | 2,000kg                               |

## Additional Appliances

## Category 6 and 13 Firefighting appliance specifications

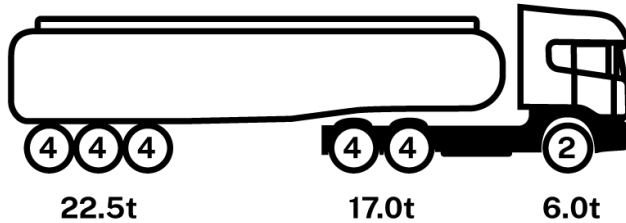
**Table A.4: Category 6 and 13 Firefighting appliance specifications (Heavy Rigid Bulk Water Tanker)**

| Unit                          | Measurement                           |
|-------------------------------|---------------------------------------|
| Length                        | 8,700mm                               |
| Width                         | 2,400mm                               |
| Mirror length                 | 450mm                                 |
| Height                        | 3,600mm (including 600mm for aerials) |
| Ground clearance              | 300mm                                 |
| Approach angle                | 13°                                   |
| Departure angle               | 23°                                   |
| Wheelbase                     | 4,410mm                               |
| Turning circle – wall to wall | 19m diameter                          |
| Weight                        | 22,500kg                              |
| Maximum axle loading          | 16,500kg                              |

## Semi-trailer Watercart appliance specifications

**Table A.5: Semi-trailer appliance specifications (Articulated Water Tanker)**

| Unit                           | Measurement    |
|--------------------------------|----------------|
| Length                         | Up to 19,000mm |
| Maximum Total Combination Mass | Up to 45,500kg |

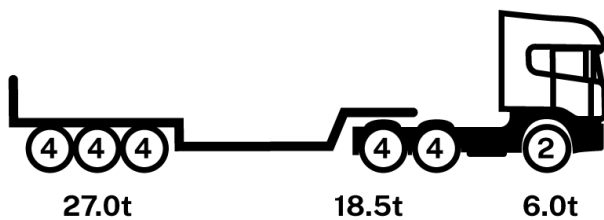


Semi-trailer appliance design example (axle masses included)

## Low loader appliance specifications

**Table A.6: Low loader appliance specifications (Heavy Plant Float)**










| Unit                           | Measurement    |
|--------------------------------|----------------|
| Length                         | Up to 30,000mm |
| Maximum Total Combination Mass | Up to 51,500kg |











Low loader appliance design example (axle masses included)

# Appendix B: Fire Trail Signage

## Strategic Fire Trail Signs

| Primary Fire Trail Directional Signs<br>- Single end mounted post                 | Bi-Directional Fire Trail Signs<br>- Centre mounted post                           | Certified Indicative Signs<br>- Single end mounted post                             |
|---|--|---|
|  |  |  |
|  |  |  |
|  |  |  |

## Tactical Fire Trail Signs

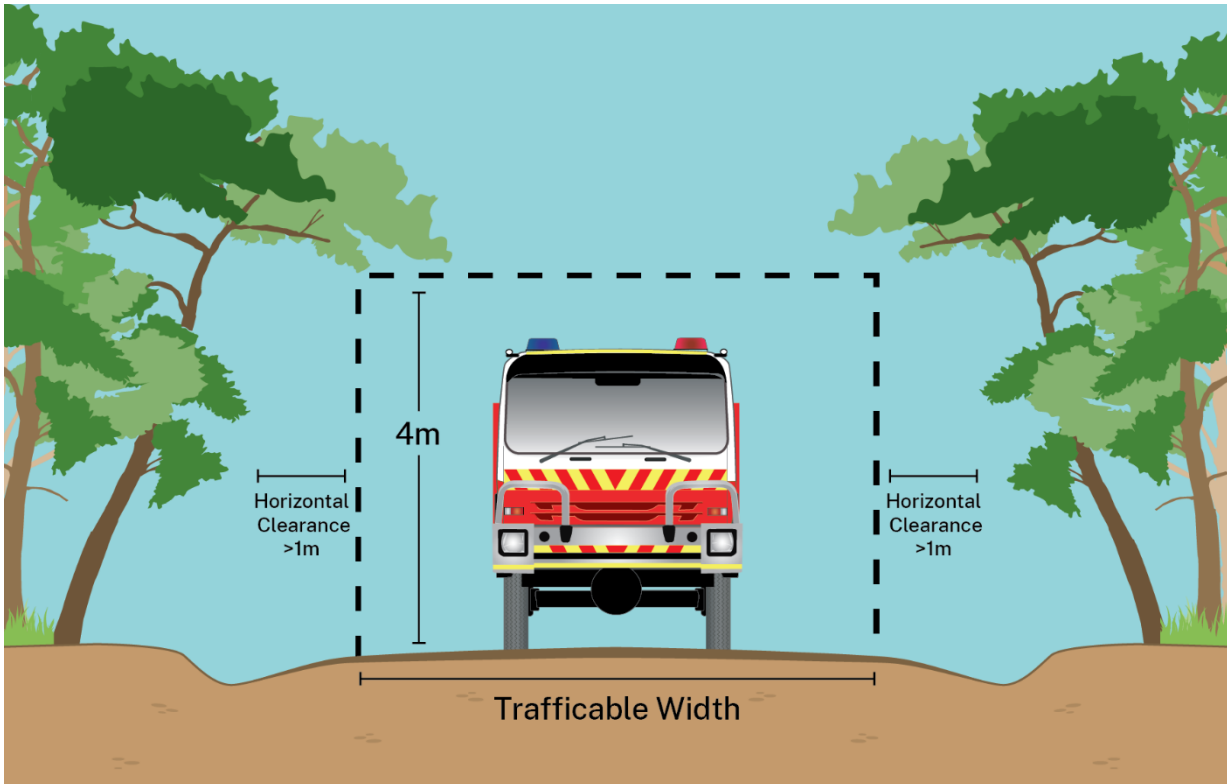
| Primary Fire Trail Directional Signs<br>- Single end mounted post                   | Bi-Directional Fire Trail Signs<br>- Centre mounted post                             | Tactical Indicative Signs<br>- Single end mounted post                                |
|---|--|---|
|  |  |  |
|  |  |  |
|  |  |  |

## Appendix C: Attribute Considerations

This appendix is a guide to provide best practice samples and options for consideration when planning, designing and constructing fire trails to meet the Acceptable Solutions contained in this standard. This appendix provides figures to illustrate appropriate best practice techniques for identified attributes, however, given the variability in any given landscape, the figures may not cover all applications.

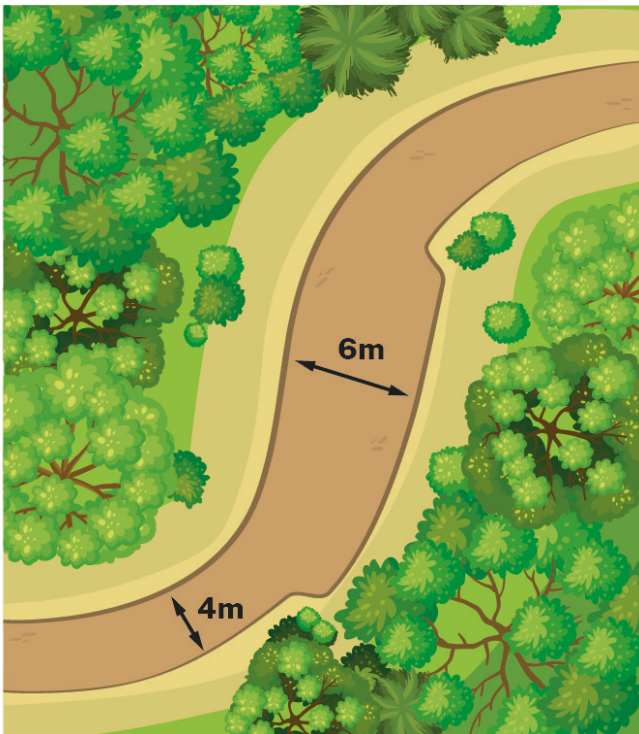
For further details, refer to the *RFS Fire Trail Design, Construction and Maintenance Manual*.

### C.1. Clearance



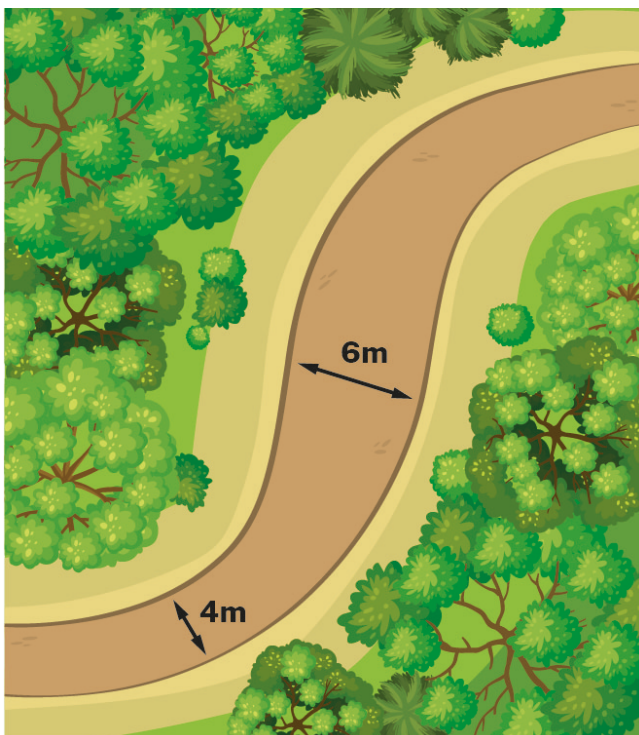
A cleared corridor around the trail is required for unobstructed passage and visibility of appliances for firefighting operations. This includes 4m above the trafficable surface and no less than 1m horizontal clearance at all times (including between maintenance activities).

## C.2. Passing Bays



### Formed Passing Bay

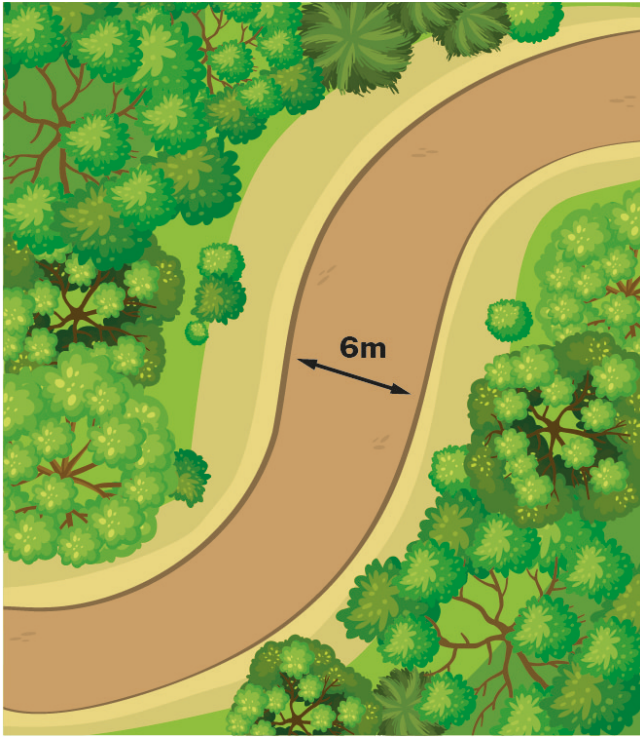
(e.g., Cat 1 trail dimensions)  
Formed and defined bay which allows for entry and exit in a single movement.



### Widened Trail

Undefined bay expressed as a widened section of trafficable surface that allows for entry and exit in a single movement.





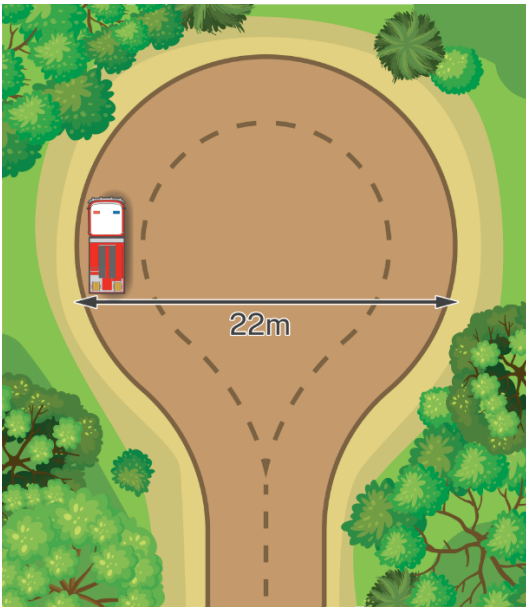
## Widened Trail Width

Trafficable surface of  $\geq 6\text{m}$

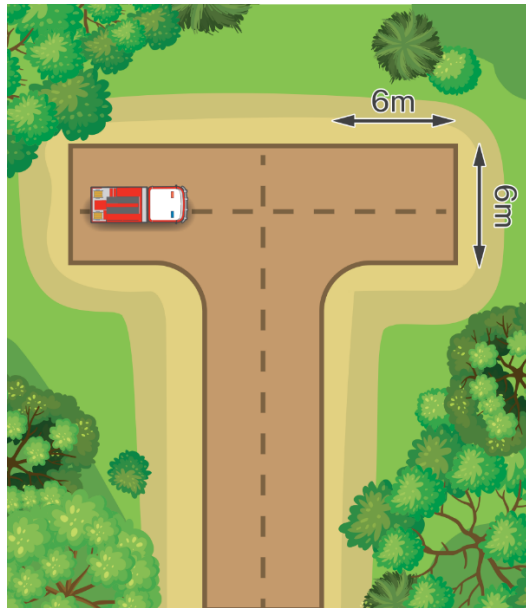
Bays are not defined but passing can occur frequently along the length of the trail.

### C.3. Turnaround Bays

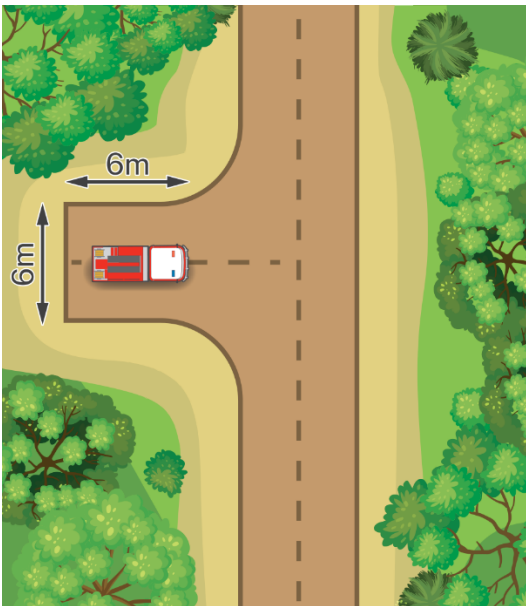
Various configurations are available to meet the attribute criteria for turnaround bays, as long as the dimension criteria are met for the Fire Trail Category. Images below represent a Category 1 Fire Trail for dimensions.



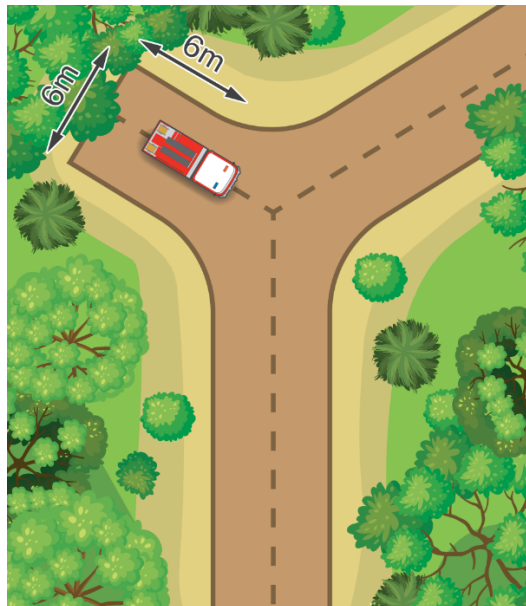
Turning Circle



T-configuration (termination of trail)



T-configuration (mid trail)



Y-configuration (mid or termination of trail)

## C.4. Water Management Systems

Various aspects form the attribute for water management systems on trails. Effective surface drainage is required on fire trails to control runoff.

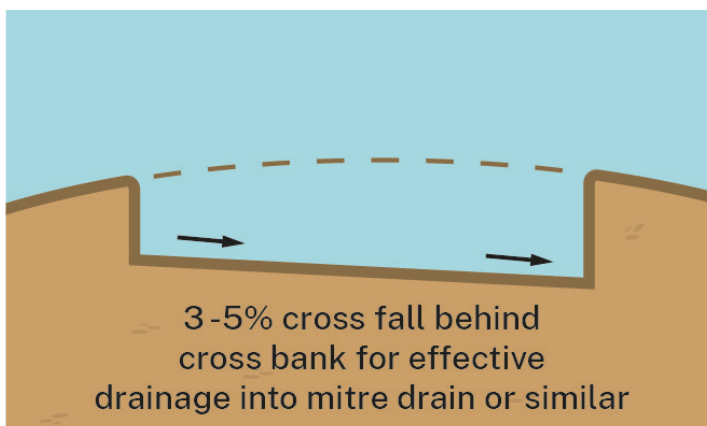
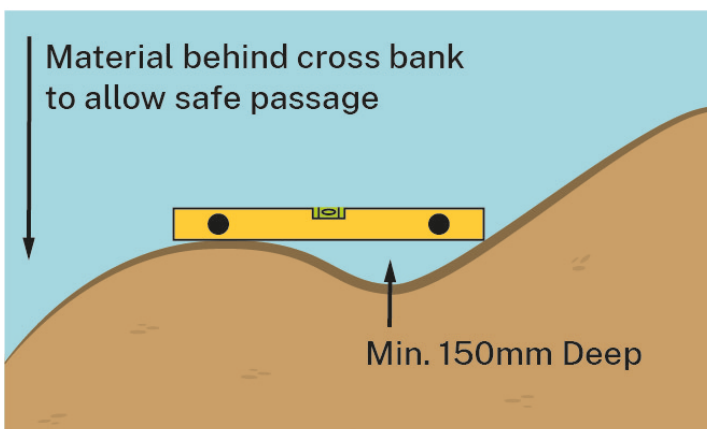
### Crowning

Drainage is easiest on tracks that are “crowned”, as this allows water to be shed to both sides of the track.



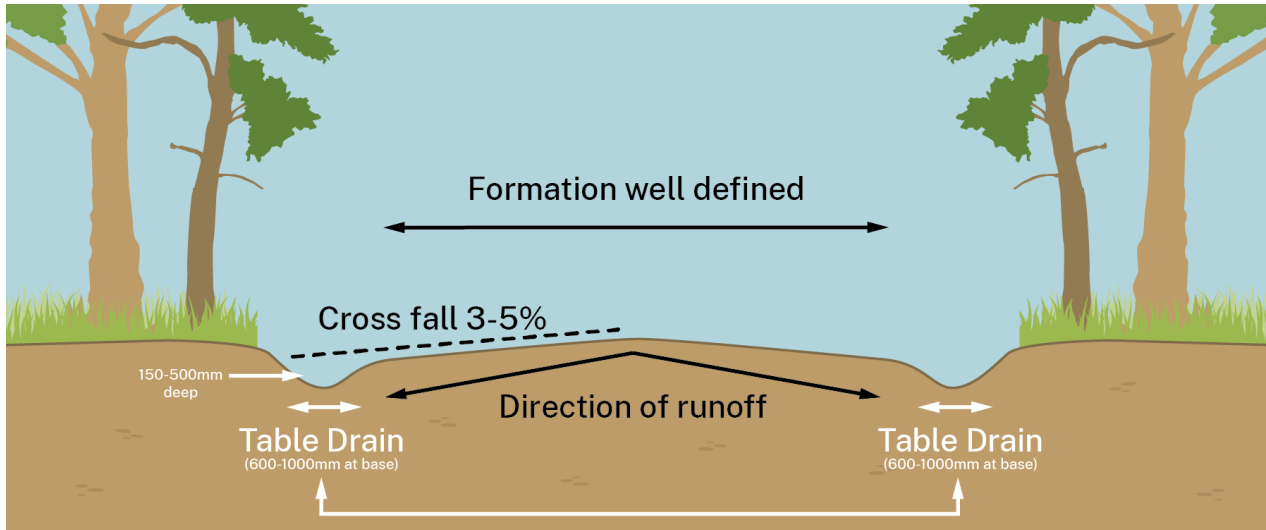
### Cross Bank Design

Cross banks (also referred to as roll overs) can be constructed across the fire trail to intercept runoff and direct it across the trail surface for drainage.



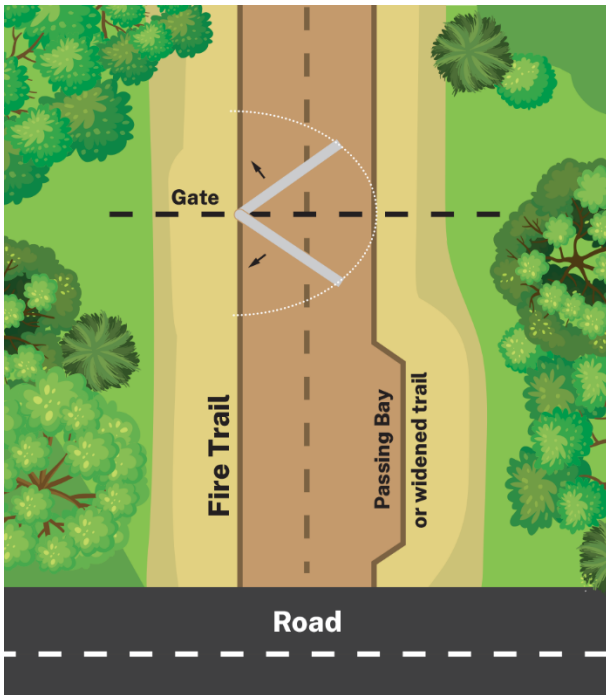
## Table Drains

Table drains need to have depth and capacity to accommodate volume with frequent drainage outlets such as mitre drains.



## C.5. Trail Access and Access Points

A passing bay is required to be located adjacent to a trail gate (or access point) to ensure appliance and firefighter safety, by enabling the appliance to be a sufficient distance (completely withdrawn) from the adjoining road edge during access.









# RFS

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