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Department of **Fire & Emergency Services**

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Authorised Assistant Director Fire Engineering

GL-15: DFES Fire Safety Performance Solutions Framework and Recommendations

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1. Introduction

A Performance Solution is a method of complying with one or more Performance Requirements other than through a Deemed-to-Satisfy (DTS) Solution. It may comprise all or part of a solution and may be used in combination with DTS provisions.

DFES supports the use of Performance Solutions where they are underpinned by sound fire-safety engineering principles, clearly documented assumptions, appropriate evidence and robust analysis.

As an advisory referral agency, DFES provides operational advice at the concept stage and during its review of the Performance-Based Design Brief (PBDB) and Fire Engineering Report (FER). DFES advice and comments do not constitute a peer review. It remains the responsibility of the building surveyor and design team to ensure that the proposed building design satisfies the applicable NCC Performance Requirements, including those relating to fire brigade intervention, and appropriately addresses the FES Commissioner's Operational Requirements Guidelines (ORGs).

DFES endorses the use of the Australian Fire Engineering Guidelines (AFEG), published by the Australian Building Codes Board (ABCB), read together with the applicable requirements of the NCC and relevant Australasian Fire and Emergency Service Authorities Council (AFAC) doctrine.

This guideline outlines DFES expectations for fire-safety-engineered Performance Solutions submitted for advice. It focuses on core principles, minimum documentation expectations and matters relevant to the FES Commissioner's Operational Requirements.

Detailed DFES consultation, process and lodgement requirements are addressed in BEB Guideline GL-07. The NCC and AFEG establish the governing and technical framework for the development, assessment and documentation of Performance Solutions. This guideline does not repeat that material except where necessary to explain DFES operational expectations.

2. Purpose and Scope

This guideline provides support and guidance to fire engineering and design teams preparing Performance Solutions for submission to DFES. It applies to Performance Solutions that influence fire brigade operations, firefighters' safety, or any fire-safety outcomes relevant to the FES Commissioner's Operational Requirements.

3. Consultation Principles

The NCC Volume One Section A2G2(4) states in part: "*Where a Performance Requirement is proposed to be satisfied by a Performance Solution, the following steps must be undertaken: (a) Prepare a performance-based design brief in consultation with relevant stakeholders.*"

Where a Performance Solution is proposed, DFES should be consulted as a relevant stakeholder on matters affecting fire brigade operations. Early consultation with DFES helps ensure that the proposed design can meet DFES operational requirements.

Early consultation with DFES under NCC Clause A2G2(4), including consultation on a PBDB or FER, is separate from the statutory process under regulation 18B of the Building Regulations 2012. Subject to the exceptions in regulation 18B(2) - (4), a building surveyor must provide the FES Commissioner with plans and specifications for a Class 2 to Class 9 building, in sufficient detail to allow assessment of compliance with the FES Commissioner's Operational Requirements, at least 15 business days before signing the Certificate of Design Compliance.

Early consultation does not replace or satisfy this statutory requirement. Refer to BEB Guideline GL-07 for detailed requirements relating to applicability, exceptions, lodgement and DFES responses.

Where DFES has provided written advice on a submitted PBDB or FER and the building design subsequently requires additional or revised Performance Solutions, DFES BEB should be contacted to confirm whether preliminary consultation and/or a revised PBDB is required before progressing to the FER.

4. Preliminary Consultation

Preliminary consultation may occur via email or through a meeting. For complex designs, atypical firefighting provisions or buildings involving vulnerable occupants, a meeting must be booked using the BEB Fire Engineering Meeting Request.

DFES recommends that the following stakeholders attend pre-PBDB meetings:

- Fire safety engineer;
- Building surveyor;
- Fire services / fire protection consultant;
- Architect or designer;
- Building owner(s) / building management;
- Occupant or client representative;
- Building services engineer(s), as required;
- Builder(s) / developer(s);
- Project manager(s);
- Permit Authority or other approving authority;

In preparation for the meeting, the following matters should be addressed to ensure DFES can provide effective preliminary advice:

- Relevant design documents, including hydrant and booster locations, coverage, and associated details, should be provided for discussion, particularly where Performance Solution(s) involving the building's wet fire systems are proposed;
- The latest architectural, services, and fire services plans, along with a current hydrant flow and pressure test report (where relevant), are recommended to support accurate and efficient discussion;
- Special hazards should be identified during the meeting-booking process so that the appropriate DFES representatives can be notified and attend;
- Details of special-hazard materials, including type, quantity, behaviour under fire conditions, and water run-off management measures, should be provided and discussed during the meeting.

For up to three straightforward Performance Solutions, an email to fireengineers@dfes.wa.gov.au may replace a meeting. To allow the DFES Fire Engineering Team to determine the appropriate consultation pathway and provide accurate advice, the email should include:

- Building address;
- Previous DFES project reference (if known: xxxxx-xx or xxxxx-xx-x);
- Description of the building and its occupants;
- Description of existing and proposed non-compliances, with reference to relevant NCC clauses, Performance Requirements, and Australian Standards;
- For existing buildings, confirmation that the proposal does not impact the existing fire strategy;
- Proposed methods of analysis and the proposed design approach;
- Relevant plans and drawings;
- A current and complete hydrant flow and pressure test report (if relevant).

Note that DFES reserves the right to request a meeting where, in its view, the project's complexity or number of Performance Solutions warrants it.

5. Performance-Based Design Brief

The PBDB establishes the agreed basis for analysis and sets out the scope of the Performance Solutions. It must identify the relevant Performance Requirements, proposed assessment methods, key assumptions, and any matters requiring stakeholder alignment.

The PBDB should clearly identify operational matters relevant to DFES, including fire brigade access, intervention conditions, evacuation assumptions where relevant to rescue, and any dependencies on management, maintenance, or future building use.

At the PBDB stage, the overarching fire safety strategy for the building should be defined. This strategy outlines the philosophy and approach that will be adopted to achieve the required level of performance. Particular attention should be given to matters affecting firefighting operations – including water supply, hydrant system performance, fire brigade access, and expected intervention conditions – as well as to the evacuation strategy and the management regimes necessary to support it.

A reasonable amount of time should be allowed for DFES BEB to provide the FES Commissioner's preliminary advice on the fire safety strategy contained within the PBDB. This advice should be considered before completing the FER.

A formal response to the preliminary advice letter should be emailed to BEBadmin@dfes.wa.gov.au or provided as an appendix in a revised PBDB or in the FER.

The PBDB should align in principle with the Australian Fire Engineering Guidelines (AFEG).

In alignment with the AFEG principles, and consistent with DFES processes and record-keeping practices, a separate PBDB and FER is generally required for each building, even if they are located on the same allotment.

A single PBDB and FER covering multiple buildings may be considered where one or more of the following apply:

- the buildings are effectively identical in design, fire strategy, and Performance Solutions and are located on the same allotment; or
- the buildings are treated as a single building under NCC provisions (e.g. a united building); or
- the buildings form part of a single, integrated fire safety system with shared Performance Solutions, such that compliance must be demonstrated at a system-wide level. This may apply to buildings located on the same site or on adjoining sites.

In all cases, the basis for a combined submission should be clearly justified in the PBDB and FER.

6. Fire Engineering Report

The FER must be final, complete, and clearly describe the final design. Options or unresolved pathways should not be included.

Where a building is already subject to existing Performance Solutions, the FER should demonstrate that the proposal has been considered holistically and does not adversely affect the overall fire safety strategy.

The FER should clearly explain the Performance Solutions, the assessment methods used, the assumptions adopted, the evidence relied upon, and the outcomes achieved. It should also identify any ongoing maintenance, management, commissioning, or use conditions necessary for the Performance Solutions to remain valid. The report must be transparent, internally consistent, and proportionate to the complexity and consequence of the proposal. Further DFES guidance on verification, reliability, and reassessment triggers is provided in Appendix F.

Where Expert Judgement is relied upon as an Assessment Method, the report should explain why its use is appropriate and document the expert's relevant qualifications, experience, assumptions, evidence and reasoning. For projects to which NCC 2025 or a subsequent edition of the NCC applies, Expert Judgement under A2G2(2)(c) must not be used to assess compliance with any Performance Requirement identified in the limitation to A2G2. Professional judgement may still inform the analysis, but compliance must be demonstrated using an Assessment Method permitted by A2G2.

Any data, research, product information, certificates, or other evidence relied upon should be clearly referenced and included where necessary to support the proposal. Full sets of architectural or other relevant plans must be lodged with the FER to ensure the design can be understood in its final form. Only documents directly relevant to the Performance Solutions, and necessary to understand the approach holistically, should be appended. Refer to BEB Guideline GL-07 for further details.

Where a single FER is proposed to cover multiple buildings, this should be consistent with the requirements set out in Section 5 and clearly justified.

Where a report is revised, all changes (e.g. using Track Changes, text in bold and/or underlined, or similar) should be clearly identified so that the basis and effect of the revision can be readily understood.

7. Holistic Design Considerations and Methods of Analysis

7.1 Interdependent Fire Safety Factors

Performance Solutions should be assessed holistically. The analysis must reflect the interdependence of fire development, suppression, smoke movement, egress, structural response, fire brigade intervention, and any management measures on which the design relies.

A Performance Solution should facilitate fire brigade intervention. In doing so, firefighters must be afforded a reasonable time to rescue any remaining occupants before conditions in the building or structure become untenable or unsafe for firefighting operations.

DFES advocates the use of sprinklers in the occupancies listed in NCC Clauses E1D4–E1D13. Fire sprinkler systems provide a high degree of protection to life and property and significantly assist fire-suppression activities and the safety of DFES firefighters.

7.2 Selection and Limits of Assessment Methods

Assessment methods must be appropriate for the non-compliance being addressed and used within their demonstrated limits. Simplified methods may be suitable for straightforward issues, but more detailed analysis may be required where outcomes depend on complex geometry, interacting systems, or conditions affecting occupants and firefighters.

7.3 Testing and Analytical Methods

Testing of systems or assemblies that replicate real-life conditions (as far as practicable) is the DFES-preferred approach.

Where analytical methods are used (e.g. Eurocode, CFD modelling, etc.), they must remain within the validated limits of the software or calculation method (e.g. ventilation factors, compartment size). If these limits are exceeded, justification is needed or alternative methods should be adopted.

Where new work depends on or interfaces with existing systems, the FER should address the condition, suitability, and compatibility of those systems. This should include consideration of whether modifications to the existing system would trigger requirements to upgrade the system to current Australian Standards, and whether the proposed integration can be achieved without compromising system performance or compliance.

7.4 Future Building Use

Some Performance Solutions rely on a specific design intent that is expected to remain valid for the life of the building. However, buildings often change over time – through refurbishment, extensions, reclassification, or shifts in occupant characteristics. Where such changes are known or reasonably foreseeable at the design stage, the Performance Solution/s should be future-proofed. Retrofitting fire-safety systems or modifying the structure later may be impractical, overly burdensome, or not feasible, leaving limited options for maintaining compliance.

If a future change could invalidate the Performance Solution without requiring a new referral (such as when the use classification remains the same), then a clear and enforceable mechanism must be established (e.g. Conditional requirements on the Occupancy Permit). This mechanism should set out what must occur if conditions change, and it should also be recorded in the FER.

7.5 Special Hazards

Some buildings, structures, installations, and occupancies present elevated hazards for firefighters' intervention and may warrant additional protection beyond the baseline provisions. DFES generally expects Performance Solutions involving special hazards to address the operational consequences for firefighters' access, suppression, rescue, occupant evacuation, water supply, and incident duration.

Special hazards may arise from the building use, the processes undertaken within the building, the materials present, or the characteristics of the occupants. This may include situations where occupants are unable to self-evacuate or require significant assistance during an emergency.

Further DFES guidance on special hazards is provided in Appendix E.

7.6 Bushfire Prone Areas

The PBDB and FER should identify whether the subject building is located in a designated bushfire-prone area and whether Part G5 of the applicable edition of the NCC applies, having regard to the building classification and the circumstances of the proposal.

Where required under applicable planning or building legislation, policy or approval requirements, including *State Planning Policy 3.7 - Bushfire* and the associated *Planning for Bushfire Guidelines*, a Bushfire Attack Level (BAL) assessment and a Bushfire Management Plan (BMP) (when applicable) must be prepared by an appropriately qualified or accredited practitioner and submitted through the relevant planning or building approval process.

BAL assessments and BMPs are assessed or accepted through those processes by the relevant decision-maker. DFES BEB does not assess or approve these documents as part of its review of a PBDB or FER, but will consider them insofar as they establish bushfire design inputs, site constraints or management measures relevant to the Performance Solution.

An approved BAL assessment and BMP should be treated as project design inputs. A Performance Solution may propose an alternative to the applicable Deemed-to-Satisfy construction provisions, including AS 3959 or Specification 43. However, it should not rely on a BAL lower than that established by the approved BAL assessment, or conflict with the site, vegetation-management, asset-protection or other measures documented in the approved BMP, unless the revised assessment or plan has first been accepted through the relevant approval process.

DFES BEB's review under this guideline is limited to fire engineering assessments of Performance Solutions addressing NCC Performance Requirement G5P1 and/or G5P2, as applicable. Where a Deemed-to-Satisfy provision, including AS 3959 or Specification 43, is used as the comparison benchmark, the PBDB and FER should clearly identify that benchmark and the proposed Assessment Method.

Where applicable, the current approved BAL assessment and BMP should be appended to the PBDB and FER. DFES expects these documents to, as a minimum, include:

- the design-bushfire and fire-front characteristics relied upon, including flame height, flame temperature, rate of spread, duration and radiant heat exposure, derived from appropriate site-specific vegetation, fuel, topography and design weather inputs; and

- a site plan with the location of the building relative to classified vegetation, managed or cleared areas, other buildings and relevant site hazards, as these may influence radiant heat exposure, flame contact and ember attack.

8. Guidance on Design Inputs and Assumptions

The appendices to this guideline provide technical guidance on design inputs, assumptions, acceptance criteria, scenarios, occupant characteristics, compartmentation, ventilation and fire service intervention. These criteria and values are advisory and are not automatically applicable to every proposal. Alternative inputs may be adopted where they are appropriately sourced, clearly justified and suitable for the proposed assessment.

Unless otherwise stated, the numerical criteria and default inputs are drawn from, or informed by, some of the following as applicable: the applicable edition of the NCC and relevant Australian Standards; recognised fire-engineering guidance and literature, including AFEG, the *International Fire Engineering Guidelines* (IFEG), the *SFPE Handbook of Fire Protection Engineering*, the *Fire Engineering Design Guide*, *Enclosure Fire Dynamics*, the *Fire Brigade Intervention Model* (FBIM) and PD 7974; relevant international standards and guidance; scientific publications; software technical documentation; AFAC doctrine and DFES operational policy and experience. A criterion or value is not an NCC or Australian Standard requirement unless expressly identified as such.

Inputs and assumptions are critical to the validity of a Performance Solution and should therefore be identified early and clearly documented in both the PBDB and FER. The documentation should identify the source, edition or software version, applicability and justification for each material input or assumption relied upon.

9. Post-Construction

Performance Solutions often rely on specific assumptions about building use (e.g. fire load, occupant characteristics or behaviour, neighbouring buildings) and on defined construction materials or arrangements (e.g. compartment dimensions, openings, linings, attenuation screens). To ensure these assumptions and required fire safety systems to support the proposed Performance Solutions are understood and maintained after construction, DFES recommends that each FER include a ready-to-use list for end users.

This list should clearly identify all design requirements that are critical to the Performance Solutions, for example:

- identification of any manufacturer requirements with appropriate references or links so end users can easily access the full specifications;
- the adopted evacuation strategy (where applicable); and
- all maintenance obligations (whether in accordance with AS 1851 or customised beyond it).

Further DFES guidance on the design requirements list is provided in Appendix G.

Where a Performance Solution depends on specific fire-safety measures, commissioning, integration, or ongoing controls, the completed building should be verified against the design intent before use. Appendix F provides further DFES guidance on verification and ongoing validity.

10. Lodgements to DFES

For lodgement requirements, submission pathways, and supporting documentation expectations, refer to BEB Guideline GL-07.

Where modelling or specialist analysis forms part of the submission, the supporting input and output files and information should be provided in a form that allows the basis of the assessment to be understood and reviewed.

11. References

- NCC, Volume One, Australian Building Codes Board (ABCB)
- NCC 2025 Australian Fire Engineering Guidelines
- Guidance on Fire Safety Performance Solutions, Building and Energy
- Fire Safety Verification Method, Australian Building Codes Board (ABCB)
- AFAC Doctrine, Australian and New Zealand Council for fire and emergency services (AFAC)

DFES / Built Environment Branch Publications:

- DFES Operational Requirements Guidelines (ORG 1 to ORG 10)
- BEB Guideline GL-07: Submission and Response Guidelines for Documents Lodged with DFES
- Built Environment Guidelines
- Built Environment Guidance Notes
- Built Environment Technical Notes
- Built Environment Info Notes
- DFES Hazardous Materials (Hazmat) Guidance Notes
- DFES DBA Page
- Built Environment Branch Fire Engineering Meeting Request Form
- Built Environment Electronic Lodgement Form

International / Technical References:

- PD 7974 Series – *Application of Fire Safety Engineering Principles to the Design of Buildings* BSI PD 7974-6:2019
- NDIS Specialist Disability Accommodation Design Standard

Legislation

- Building Act 2011
- Building Regulations 2012 (WA)
- Fire Brigades Act 1942
- Fire and Emergency Services Act 1998
- State Planning Policy 37 - Bushfire

APPENDIX A – Acceptance Criteria and Factors of Safety

This appendix provides DFES advisory guidance on acceptance criteria and factors of safety applicable to the assessment of Performance Solutions.

DFES provides comment on these matters as the adoption of appropriate acceptance criteria and conservative assumptions relating to tenability, thermal and toxic exposure, visibility, and safety margins directly influences occupant survivability, the conditions for firefighters' intervention, and the overall reliability of the fire safety strategy where events do not proceed as anticipated.

In the absence of suitably referenced, project-specific inputs that are appropriately justified and demonstrate an equivalent or greater level of conservatism, the following values should be adopted for the purposes of fire engineering analysis, particularly where variability and uncertainty in fire development and human behaviour are present.

Fire engineering assessments inherently involve uncertainty. The adopted criteria and safety margins should therefore be robust and sufficient to account for uncertainties in fire development, system reliability, modelling approaches, and human behaviour.

The adopted acceptance criteria and factors of safety should be applied consistently across all design fire scenarios and sensitivity analyses. The use of differing criteria between scenarios should be clearly justified.

The acceptance criteria in this appendix should be considered in conjunction with the fire scenarios and design fire parameters set out in Appendix B.

A1. Occupant Tenability Criteria

For occupant tenability, DFES generally expects visibility, smoke layer height, convective air temperature, and radiant heat criteria to be selected conservatively and interpreted within the context of wayfinding, occupant characteristics (e.g. familiarity, mobility, impairment), and the anticipated duration of exposure. More conservative criteria may be required where occupants are vulnerable, unfamiliar with the building, or where evacuation may be delayed.

These criteria represent baseline expectations and should not be interpreted as target values where less conservative assumptions are sought to be justified.

In the absence of suitably justified, project-specific alternatives, the following criteria should be adopted:

Table A1 Tenability criteria for occupants

Tenability Criteria	Value	Comment
Smoke Layer Height	≥ 2.0 m	Minimum clear layer height expected by DFES.
Visibility	10 m	Generally adopted for tenable egress conditions.
	5 m (conditional)	May be considered only in small enclosures (≤ 100 m²) with short, direct, and clearly identifiable egress paths, where robust justification is provided.
Hot Layer Temperature	200 °C	Consistent with limiting radiant exposure below the smoke layer.
Radiant Heat	2.5 kW/m²	Maximum acceptable level for occupant tenability, measured at 2.0 m above floor level.
Convective Heat	60 °C	Maximum acceptable for environments with elevated humidity or water vapour (typical fire conditions). A convective air temperature of 100 °C is not considered appropriate where moisture content is likely to be elevated (e.g. typical fire scenarios),

		due to increased thermal stress and reduced tenability.
Toxicity	Where relevant, the assessment of occupant tenability should also consider exposure to toxic gases. Where explicit toxicity analysis is not undertaken, the relationship between visibility and toxicity should be justified.	

A2. Firefighters Exposure Criteria

Firefighters' exposure criteria should reflect the nature of the operational task, the likely duration of exposure, the limitations of personal protective equipment and clothing (PPE/C), hose handling requirements, and the need to sustain intervention without imposing unreasonable risk.

The values below represent conservative DFES recommendations for typical operational conditions, including routine intervention positions and fire attack positions. Alternative criteria may be considered where they are supported by an operationally realistic assessment and do not rely on conditions that would be impractical to achieve during fire brigade operations.

These criteria are intended to support effective and sustained firefighting operations, rather than representing absolute physiological limits.

Table A2 Tenability criteria for firefighters

Parameter	Value	Comment
Routine Operational Positions (e.g. external hardstand areas, staging areas)		
Air Temperature	100 °C at 1.5 m above ground level	Maximum acceptable value under routine conditions.
Radiant Heat Flux	1 kW/m²	Maximum acceptable value for sustained operations.
Exposure Duration	25 minutes	Represents sustained operational period.
Radiant Heat Flux at Booster, External Hydrants	2.5 kW/m²	Maximum acceptable value for booster and hydrant connection operations.
Fire Attack Positions (hazardous exposure areas, internal or external)		
Air Temperature	120 °C at 1.5 m above floor level	Short-duration exposure in fire attack conditions.
Radiant Heat Flux	3.0 kW/m²	Elevated exposure consistent with active fire attack.
Exposure Duration	10 minutes	Maximum recommended duration under hazardous conditions.

Conditions exceeding those above should not be relied upon as part of a performance solution, except for brief emergency actions (e.g. withdrawal or rescue), and should not form part of the design basis.

A3. Interpretation of Tenability Loss

Fire modelling outputs should be interpreted using a clear, transparent, and repeatable basis for identifying the onset of untenable conditions (Available Safe Egress Time (ASET)). Transient exceedances that do not affect tenable egress conditions should not be relied upon to demonstrate compliance.

For visibility-based assessments, DFES generally expects loss of tenability to be identified where untenable conditions affect exit access and a critical area of the occupied space, rather than being treated as a brief or highly localised transient condition. As a guide, in large compartments, where approximately 100 m² of the occupied layer at the relevant height falls below the adopted visibility criterion around exit points or places where occupants are still evacuating, DFES would generally regard this as indicating the onset of untenable conditions, unless a different, clearly justified project-specific basis is adopted.

Where temperature or radiant heat criteria govern tenability before visibility does, the adopted criterion should be applied in an equally transparent and consistent manner. The FER should clearly identify the height, area, and location used for the tenability assessment and demonstrate that the results are not dependent on isolated local effects or favourable fire locations.

A4. RSET Factor of Safety

Where the proposed solution depends on factors such as management intervention, staged evacuation, delayed warning, complex wayfinding, or other uncertain or variable conditions, DFES generally expects the adopted margin to be towards the more conservative end of the range.

The use of a fixed time-based safety margin (e.g. a constant allowance of several minutes) is not considered appropriate in all cases. A constant time addition affects assessed scenarios differently; for example, adding 2 minutes to a Required Safe Egress Time (RSET) of 15 minutes does not provide an equivalent level of safety to adding the same margin to an RSET of 4 minutes.

To achieve a more consistent and robust level of safety across a range of evacuation scenarios, DFES generally recommends the application of a factor of safety approach. As a guide, a safety factor of at least 1.5 x RSET is considered appropriate for base case scenarios, consistent with common industry practice.

Uncertainty in both ASET and RSET should be considered when selecting an appropriate safety factor.

Table A3 ASET versus RSET Factors of Safety

Scenario	Recommended Safety Factor
Base Case	1.5 - 2.0 x RSET
Sensitivity Case	≥ 1.0 x RSET

A5. DTS Comparator

Where a comparative assessment is undertaken, the FER should demonstrate that the proposed design achieves a level of performance that is at least equivalent to, or better than, an appropriate Deemed-to-Satisfy (DTS) solution.

DFES expects the DTS comparator to be clearly defined in the PBDB and FER, including the applicable building classification, relevant NCC provisions, and the key fire safety features forming the basis of comparison. The comparison should be undertaken on a like-for-like basis and should address the relevant performance objectives, rather than relying on selective or favourable comparisons.

In comparative assessments, consideration of queuing or flow-controlled evacuation time may only be appropriate where the comparison is based on equivalent occupant loading and exit capacity. Where a Performance Solution demonstrates improved RSET primarily due to reduced queuing (e.g. lower occupant density or increased egress width), this may not adequately address non-compliances associated with extended exit travel distances. In such cases, the assessment should consider travel time as the governing factor, and improvements in other RSET components may be required to demonstrate an appropriate level of performance.

A6. Radiant Heat Flux Criteria

DFES recommends a radiant heat flux of 12.6 kW/m² as a conservative criterion for piloted and non-piloted ignition. This value reflects the application of a factor of safety to an underlying ignition threshold of approximately 20 kW/m².

If robust and conservative inputs have been demonstrated throughout the calculations or modelling, an acceptance criterion of 20 kW/m² may be considered. Further guidance on radiation assessment methodology and modelling inputs is provided in Appendix B.3.

The suitability of the adopted acceptance criteria should be confirmed in the PBDB and FER. In some cases, lower acceptance criteria may be required where materials with lower ignition thresholds are present or where the potential for ignition (piloted or non-piloted) is elevated.

Use of NCC Provision C1V1 is acceptable where it is applied consistently in both directions (i.e. radiation emitted from and received by the subject building).

APPENDIX B – Fire Scenarios and Parameters for Design Fires

This appendix provides DFES advisory guidance on design fire selection, fire scenarios, modelling inputs, and related assumptions. DFES provides comment on these matters because understated fire scenarios or optimistic modelling inputs may fail to test conditions that affect occupant evacuation, firefighters' search and rescue, fire spread within the building, fire spread to adjacent property, and the water supply and operational resources likely to be required during an incident.

The guidance in this appendix is intended to support appropriately conservative analysis and should not be interpreted as a substitute for project-specific engineering judgement.

The design fire assumptions adopted in this appendix should be applied consistently with the acceptance criteria and factors of safety set out in Appendix A.

B1. Detector and Sprinkler Activation Assumptions

Sprinkler Activation Temperature

The assumed sprinkler activation temperature should reflect the actual sprinkler specification and ambient conditions. Selection of a lower activation temperature for modelling purposes should not be assumed without supporting evidence that it reflects the installed system.

Sprinkler Layouts

The sprinkler layout should reflect the actual geometry and sprinkler arrangement of the subject compartment / building.

Response Time Index

The following Response Time Index (RTI) values may be adopted as indicative default assumptions where project-specific information is not available. These values are provided as guidance only, and the selected RTI and corresponding activation temperature should be appropriate to the actual device type, expected thermal environment, and installation arrangement. Any departure from these values should be justified in the FER.

Table B1 Response Time Index (RTI) Values

RTI	Value	Comment
Standard Response Sprinkler	150 $(m.s)^{½}$	Indicative default value
Fast Response Sprinkler	50 $(m.s)^{½}$	Indicative default value
Thermal Detector	10 $(m.s)^{½}$	Indicative default value
Smoke Detector	1 $(m.s)^{½}$	Indicative value based on 5°C temperature rise

B2. Design Fire Growth and Peak Fire Size

Fire sizes derived from NCC Table S21C2 are intended for determining smoke exhaust capacity under Deemed-to-Satisfy provisions and are not representative of actual fire development for the purposes of performance-based analysis. Accordingly, such values should not be used directly to define design fire sizes or peak heat release rates in fire engineering assessments.

Design fire sizes should instead be based on a realistic representation of fire development, including consideration of the expected fuel load and fire load density for the occupancy, or, where sprinkler systems are provided, the predicted heat release rate at the time of sprinkler activation. The adoption of prescribed fire sizes without appropriate justification may not adequately capture credible fire conditions and may lead to unconservative outcomes.

DFES expects design fires to follow t^2 fire growth characteristics, unless an alternative approach is clearly justified.

Buildings without sprinkler protection

Where no sprinkler protection is provided, the design fire should generally be assumed to continue to grow until limited by available fuel, ventilation conditions, or compartment geometry, and should not be artificially capped at a lower value without robust justification.

Buildings with sprinkler protection

Where sprinkler control is relied upon to limit fire size, DFES generally expects the analysis to include a conservative scenario that does not depend on the earliest or most favourable sprinkler activation.

Where the Heat Release Rate (HRR) is used to establish a peak fire size with sprinkler control assumed, DFES generally prefers the inclusion of an activation scenario based on the operation of the second row of sprinkler heads, as recommended in the IFEG. This approach provides additional robustness, recognising that the first row of sprinklers may be shielded, obstructed, or otherwise delayed in activation under realistic fire conditions.

Where activation of the first row of sprinkler heads is adopted, the distance between the fire source and the activating sprinkler should reflect the maximum radial distance between two sprinkler heads, and a more rapid (e.g. fast or ultra-fast) t^2 fire growth rate should be considered to maintain conservatism.

The use of hybrid fire growth curves is generally not supported unless clearly justified with appropriate literature or testing evidence.

The selected fire growth rate should reflect the expected fuel, building use, and potential flame spread behaviour. The use of slower growth rates should be justified and agreed with DFES.

Table B2 Fire Growth Rates

Fire Growth Rates	Typical Applications
Slow	Not recommended
Medium	Residential, office, healthcare, education and similar uses
Fast	Retail, car parks, moderate storage or industrial uses
Ultrafast	High rack storage, high fuel loads, or rapid flame spread conditions

B3. Radiation and Fire Spread Assessment

Radiation-based fire spread assessments should adopt conservative assumptions for emissivity, flame temperature, opening geometry, and exposure conditions.

All assumptions, limitations, and dependencies associated with radiation and fire spread assessments should be clearly documented in the FER and, where relevant, reflected in ongoing building conditions or approval documentation (e.g. Occupancy Permit).

Openings

Where multiple openings are located within the same compartment that is not protected by sprinklers, the potential for simultaneous radiation from those openings should be considered where relevant to determine the maximum exposure towards a boundary or adjacent structure.

Unless a tested and appropriately installed system is provided to restrict flame projection (e.g. flame-inhibiting screens, shutters, or internal/external sprinkler protection), external flame extension should be included in the assessment (e.g. opening height + 25%).

Where external walls are of Type C construction, noting that the Fire Resistance Level (FRL) is typically tested from the outside only in accordance with NCC Specification S5C24(1)(b), the assessment of openings should not be limited to the opening alone. In such cases, the opening together with the associated portion of the external wall should be considered as the effective radiating surface.

Shielding

Where shielding elements (e.g. boundary walls, screens, or fences) are relied upon to reduce radiation exposure or the effective size of an emitting opening, the assessment should demonstrate that:

- the element will remain in place and effective for the duration of exposure;
- it has an appropriate fire resistance level (FRL), where applicable;
- it will not fail, deform, or contribute to secondary fire spread; and
- their performance will be consistent with tested configurations and installation requirements.

Non-combustible metal fences may be considered as partial shielding elements where their thermal and radiative properties are appropriately accounted for in the assessment. However, such elements may absorb and re-radiate heat, and this behaviour should be included in the calculation. Where combustible materials or materials likely to fail are used, they should not be relied upon as effective shielding elements.

Where there is potential for shielding elements to be removed or replaced such as fencing, the material type, height, width and separation distances should be documented on the building occupancy permit and the FER to ensure future shielding elements meet the building's fire safety requirements.

Adjacent Allotments

For radiation received from adjacent buildings or sites, the assessment should adopt a reasonable and credible fire source.

- Where the adjoining land is undeveloped or subject to change, either the allotment boundary or an appropriate future fire source (i.e. a representative hypothetical building) should be assumed. Where a hypothetical building is considered, the adopted inputs should reflect a likely building classification and configuration (e.g. representative opening sizes, separation distances, and flame extension effects). Separation distances should be based on a credible worst-case scenario, informed by the applicable code (i.e. NCC or R-Codes);
- Where the surrounding development is modern or redevelopment is unlikely, existing building openings and configurations may be used to inform the assessment, provided this approach is justified;
- Where land is expected to remain undeveloped (e.g. public land or accessways), reliance on this condition should be supported by appropriate evidence (e.g. confirmation from the relevant authority appended to the FER) and clearly identified as a limitation of the assessment.

Calculation inputs

The table below lists the recommended emissivity values and emitting temperatures.

Table B3 Radiant heat flux inputs

Radiant Heat Flux	Value	Comment
Emissivity	1	Conservative assumption; lower values (e.g. 0.9) require justification and should be accompanied by the adoption of more conservative flame temperature to maintain an appropriate level of conservatism.
Flame Temperature	680 °C	Related to 47 kW/m² radiant heat flux, fires open to atmosphere (no radiative heat feedback).
	830 °C	Related to 84 kW/m² radiant heat flux, typical of residential, office, or assembly occupancies.

Radiant Heat Flux	Value	Comment
	1038 °C	Related to 168 kW/m² radiant heat flux, typical of retail, storage, or industrial occupancies.
	200 °C	This reduced temperature may be adopted when a compliant AS 2118.1 sprinkler system is provided throughout the subject compartment / building.
	600 °C	Related to external flames scenarios (e.g. flame projection from opening), or scenarios when flashover is demonstrated unlikely to occur.

Refer to Sections D.2 and D.6 where radiation assessments are used to support compartmentation-related Performance Solutions.

B4. Fire Modelling Expectations

The modelling approach should be appropriate to the complexity of the non-compliances being assessed, and the level of detail should be proportionate to the significance of the conclusions.

Where sprinkler activation, local cooling, complex smoke movement, or detailed tenability conditions are critical to the assessment, DFES expects the use of a computational fluid dynamics (CFD) modelling package, such as Fire Dynamics Simulator (FDS).

Zone models (e.g. BRANZFIRE or CFAST), which assume a homogeneous upper layer, are generally not considered sufficiently robust. However, their use may be appropriate for relatively simple geometries and limited scenarios, such as minor extensions to exit travel distance, where the analysis does not depend on complex smoke behaviour or localised effects.

The adopted fuel properties, soot yield, heat of combustion, and toxicity inputs should be clearly identified and justified in the PBDB and FER, with conservative values used where there are uncertainties in the building content and design.

Table B4 FDS input parameters

Fire Modelling	Value	Comment
Soot Yield	0.1 g/g	Minimum indicative value; higher values may be required. Where lower values (e.g. 0.07 g/g) are adopted, they should be supported by robust justification in the PBDB and FER. Reduced soot yields are generally not supported for Class 7 and 8 occupancies, where the fuel load is expected to produce significant smoke.
Visibility factor	3	Consistent with FDS default; supports conservative visibility estimates.
Heat of Combustion	20,000 kJ/kg	Conservative input consistent with realistic fuel behaviour. Higher values are not recommended as they may reduce the level of conservatism, potentially resulting in more optimistic predictions of tenability (e.g. improved visibility conditions). Where higher values are adopted, they should be appropriately justified.
Radiative Fraction	0.35	Acceptable; sensitivity testing with lower values may be appropriate.
Toxicity	-	Should be based on recognised guidance and justified where used.

For sprinkler modelling, a C_FACTOR = 0 $m^{1/2}/s^{1/2}$ is commonly adopted; however, reliance solely on this assumption may underestimate delayed activation. Sensitivity analysis or degraded sprinkler performance scenarios should be considered where relevant.

The fuel specification should represent a credible worst-case fuel package for the occupancy. Selection of soot yield, CO yield, and other combustion parameters should ensure a conservative prediction of tenability conditions.

The adopted grid resolution should be justified in both the PBDB and FER with reference to recognised modelling guidance.

B5. Design Fire Locations and Scenario Set

DFES expects at least two representative fire locations to be assessed, as a single location would not reasonably demonstrate the range of potential conditions.

The design scenario set should include multiple credible fire locations where building geometry, roof form, ventilation, or exit arrangement may materially affect the outcome.

The design scenarios should clearly specify relevant inputs and assumptions, including:

- occupant density and distribution (based on NCC or justified alternative assumptions);
- smoke exhaust system capacity;
- natural ventilation openings and dimensions;
- make-up air provisions; and
- any other system or feature influencing fire development or smoke movement.

Design scenarios should include both base cases and sensitivity cases:

- Base case scenarios should represent expected operation of fire safety systems and normal egress conditions, with some level of conservatism;
- Sensitivity case scenarios should consider reduced performance, impairment, or failure of key systems (e.g. reduced sprinkler performance, reduced make-up air) and potential impacts on egress (e.g. blocked or unavailable exits).

  Multiple sensitivity scenarios should be considered where there are several credible points of system dependency or uncertainty and/or where multiple compliance variations are addressed collectively within the same assessment.

Design fire scenarios should not assume any occupant or fire brigade intervention, e.g. no suppression from fire extinguishers, fire hose reels or fire hydrants should be accounted for in the development of heat release rate curves.

B6. Geometry and Obstructions

The geometry used in the design-fire analysis must realistically represent the building or compartment being assessed. The model should account for major internal obstructions, such as internal walls or rooms, racked storage, large equipment, vehicles, or similar features, that reduce the effective volume of the space and can increase the rate of smoke layer development and smoke spread.

B7. Ventilation and Make-Up Air Considerations

Reduced or restricted make-up air conditions are likely to materially affect system performance. Therefore, the availability and effectiveness of make-up air pathways should be assessed under all relevant operating conditions, including periods where openings may be closed (e.g. outside trading hours).

Passive or low-level make-up air pathways are generally preferred where practicable, as they are less dependent on operational factors and less likely to be compromised during an incident.

Reliance on opened doors, roller shutters, or other operationally dependent openings as primary make-up air paths should be justified, as these may not be available or effective under all fire scenarios. This includes openings associated with loading docks or service areas, where access may be obstructed (e.g. by vehicles, goods, or equipment). Where such openings are proposed as part of the make-up air strategy, they must be automatically operated and supported by standby power. DFES does not support arrangements that require staff or occupants to manually operate these openings during a fire.

APPENDIX C – Parameters for Design Occupant Groups and Evacuation Strategies

This appendix provides DFES advisory guidance on occupant characteristics, evacuation strategies, and egress assumptions relevant to Performance Solutions.

DFES provides comment on these matters because where evacuation is delayed, incomplete, or does not proceed as expected, firefighters may be required to enter the building to conduct search and rescue under degraded conditions. Assumptions relating to movement speeds, pre-movement time, effective width, warning arrangements, and management procedures can therefore materially affect occupant outcomes, firefighters' risk, and the operational resources required at an incident.

Evacuation assumptions adopted in this appendix should be consistent with the tenability criteria (ASET) and safety margins (ASET/RSET) set out in Appendix A.

C1. Occupant Characteristics

The values in this section are indicative DFES guidance only and should be selected to reflect the actual occupant profile, management conditions, and likely behaviour in an emergency.

Lower movement speeds, greater variability, or additional assistance factors may be required where occupants are sleeping, unfamiliar with the building, under care, affected by age or disability, or otherwise less able to respond promptly and independently.

These parameters should be consistent with the evacuation modelling assumptions used to determine RSET.

Table C1 Travel speed

Conditions	Value	Comment
Level Travel	≤ 0.93 m/s	Fully mobile occupants
	≤ 0.80 m/s	Reduced mobility
Stair Travel	≤ 0.50 m/s	Fully mobile occupants
	≤ 0.24 m/s	Reduced mobility or assisted movement

Typical flow rates and their applicability should be justified. As a guide, a nominal flow rate of 1.0 person/s/m may be appropriate for average densities; however, higher or lower values may be required depending on occupant characteristics and crowding conditions.

Effective width should be based on the clear usable width after allowing for boundary layers, handrails, door hardware, and obstructions.

Table C2 Effective Width / Boundary Layer Allowances

Effective Width / Boundary Layer	Value	Comment
Stairway	150 mm	Each side
Handrails	90 mm	Each side
Corridor / Ramp Walls	200 mm	Each side
Obstacles	100 mm	Each side
Door	150 mm	Each side

Where evacuation modelling is used, the adopted movement speeds, effective widths, pre-movement times, flow rates, and behavioural assumptions should be clearly identified and justified in the PBDB and FER.

DFES recommends establishing the number of persons accommodated based on NCC clause D2D18. It should be noted that the entire floor area should be used for the purpose of determining the maximum number of people present in the building. Excluding floor area occupied by shelving and fixed displays within a shop floor area is generally not supported. Only ancillary spaces that are not intended for prolonged occupancy and are typically occupied for short periods (e.g. sanitary facilities) can be excluded from the calculation.

C2. Vulnerable Occupants in Specialist Disability Accommodation (SDA)

Specialist Disability Accommodation (SDA) buildings can present increased operational challenges for fire brigades due to the characteristics of occupants, many of whom may require assistance to evacuate safely. These characteristics increase the likelihood of requiring coordinated evacuation support and may necessitate search and rescue operations. While some SDA facilities include onsite carers, untenable conditions can develop rapidly during a fire, potentially preventing staff from completing evacuations.

Accordingly, the building design, installed fire safety systems, and the implementation of appropriate Personal Emergency Evacuation Plans (PEEPs) are critical to supporting what may be longer and more complex evacuations, as well as effective fire brigade intervention. Refer to Section C.6 for detailed guidance on PEEPs.

Essential Fire Safety Provisions for SDA Facilities

DFES considers the following fire safety provisions essential for SDA facilities:

- Installation of an automatic fire sprinkler system in accordance with AS 2118.1, AS 2118.4, or AS 2118.6;
- Provision of a hydrant system compliant with AS 2419.1 (when required by the NCC);
- Provision of a fire detection and alarm system compliant with AS 1670.1, or an interconnected smoke/heat alarm system to AS 3786 where the building accommodates up to two participants (consistent with NDIS SDA Design Standard);
- Where an AS 3786 system interfaces with an AS 2118 sprinkler system, the FER must specify the maintenance and testing arrangements, and electrical plans must clearly illustrate the interface between the smoke alarm system and the sprinkler flow switch;
- If a Direct Brigade Alarm (DBA) is provided, an Alarm Delay Facility (ADF) to AS 1670.1 is recommended, with a manual call point at the front door/final exit;
- Provision of a compliant stair pressurisation system, when required under the NCC;
- Robust construction (e.g. concrete or masonry walls) with smoke separation for each bedroom and other fire-risk areas (garages, laundries, storage rooms);
- Quantitative assessments or suitable protection to openings between buildings and/or fire compartments where required, to prevent fire spread. Refer to Appendices A and B for further details;
- Charging stations (wheelchairs, mobility devices, UPS, battery systems) must not be located along egress paths, particularly where no alternative egress route exists;
- Fire-rated door sets must not incorporate fire-activated retaining devices (e.g. fire bolts);
- Final exit doors that swing against the direction of egress should be carefully considered. To support safe evacuation, automatic opening mechanisms, push-button activation and battery backup for continued operation during power loss should be provided;
- Where lifts are provided, DFES recommends that emergency lifts be provided in accordance with NCC Clause E3D5 and DFES ORG 9: Emergency Lifts, including connection to a standby power supply;
- For occupants requiring physical assistance in daily activities and emergencies, the fire safety strategy must reflect the diverse needs of individuals and include:
  - A comprehensive evacuation strategy, including PEEPs applicable 24/7, finalised prior to occupancy, and maintained as live documents;

    - An evacuation approach that does not rely on shelter-in-place or fire brigade intervention. Evacuation must commence prior to the arrival of emergency services;
    - Ongoing preparedness, including regular drills and a structured review process to ensure the strategy remains current and effective.
- The Occupancy Permit should clearly specify:
    - The building's intended use;
    - The type of occupancy;
    - The characteristics of occupants (particularly support needs under NDIS Pricing Arrangements);
    - All relevant requirements from the FER to ensure ongoing suitability for the intended residents.

Assessing SDA Occupant Characteristics Against the Residential Care Building Definition

The appropriate building classification is determined in accordance with NCC Clause A6G1, having regard to the purpose for which the building is designed, constructed or adapted to be used. The classification decision is a matter for the building surveyor and, where applicable, the relevant permit authority. DFES does not determine building classification.

Schedule 1 of NCC 2025 defines a *residential care building* as a Class 3, 9a or 9c place of residence where 10 % or more of residents require physical assistance both in conducting their daily activities and in evacuating the building during an emergency. NCC Clause A6G4 includes a residential care building within Class 3. For projects assessed under a subsequent NCC edition, the corresponding provisions of that edition should be applied.

In some SDA developments, the nominated classification or design basis may not fully reflect the documented characteristics, support needs and evacuation capabilities of the intended occupants. The following factors should prompt closer review:

- residents requiring physical assistance with daily activities;
- residents unable to evacuate without physical assistance;
- overnight or continuous onsite assistance, or staffing arrangements intended to enable rapid intervention; and
- high behavioural support needs or other characteristics likely to delay or complicate evacuation.

The presence of any one factor does not necessarily establish that the NCC definition of a residential care building is met. In particular, staffing arrangements and behavioural support needs should be considered as part of the overall fire safety risk assessment but are not substitutes for applying the defined 10 % threshold.

Where the current or proposed occupant characteristics may meet the definition of a residential care building, DFES recommends that:

- the building surveyor review and confirm the building classification and applicable NCC provisions;
- the performance-based design and fire safety strategy be revised, where necessary, to reflect the documented occupant characteristics, support arrangements and evacuation dependencies; and
- any necessary approvals be obtained and required fire safety measures completed before the relevant use or occupation occurs.

Where the occupant profile does not currently meet the definition but may change during the life of the building, the approved design basis should clearly identify any limitations on occupancy or use. Where legally available and accepted by the relevant permit authority, those limitations should be supported by an enforceable occupancy or use control. The control should require the classification, fire safety strategy and applicable NCC provisions to be reviewed – and any necessary upgrades completed – before occupants outside the approved design basis are accommodated.

C3. Evacuation Strategy and Management Dependencies

Where a Performance Solution relies on management action, staff assistance, phased evacuation, alarm delay, or occupant-specific procedures, those dependencies should be explicitly identified in the PBDB and FER and reflected in the analyses.

Pre-movement times should be selected to reflect the characteristics of the occupants, the fire detection and alarm arrangements, and the expected behavioural response. Where uncertainty exists, conservative pre-movement times should be adopted.

Refer to Appendix F for guidance on documenting and maintaining management-dependent Performance Solutions.

DFES recommends the use of PD 7974-6 to determine appropriate pre-movement times. Table C3 below provides indicative applications. It should be noted that available evacuation-behaviour data are limited. The values in below table should therefore be applied with appropriate professional judgement and checked against the project-specific occupant characteristics, building configuration, alarm system and management arrangements.

Table C3 Pre-movement Times

Scenario category	Management, building and alarm modifiers	First occupants: Δt pre, 1st percentile [1]	Occupants: Δt pre, 99th percentile [2]
A - Awake and familiar	M1, B1–B2, A1–A2	0.5	1.5
	M2, B1–B2, A1–A2	1	3
	M3, B1–B2, A1–A3	*> 15*	*> 30*
B - Awake and unfamiliar	M1, B1, A1–A2	0.5	2.5
	M2, B1, A1–A2	1	4
	M3, B1, A1–A3	*> 15*	*> 30*
Ci - Sleeping and familiar, e.g. individual dwellings	M2, B1, A1	*5*	*10*
	M3, B1, A3	*10*	*> 40*
Cii - Managed sleeping accommodation, e.g. serviced apartments or halls of residence	M1, B2, A1–A2	*10*	*30*
	M2, B2, A1–A2	*15*	*40*
	M3, B2, A1–A3	*> 20*	*> 40*
Ciii - Sleeping and unfamiliar, e.g. hotels or boarding houses	M1, B2, A1–A2	*15*	*30*
	M2, B2, A1–A2	*20*	*40*
	M3, B2, A1–A3	*> 20*	*> 40*
D - Medical care: awake and unfamiliar, e.g. day centres, clinics, medical practices or dental practices	M1, B1, A1–A2	0.5	2.5
	M2, B1, A1–A2	1	4
	M3, B1, A1–A3	*> 15*	*> 30*
D - Medical care: sleeping and unfamiliar, e.g. hospital wards, nursing homes or residential aged-care facilities	M1, B2, A1–A2	*5* [3]	*150* [3]
	M2, B2, A1–A2	*10* [3]	*30* [3]
	M3, B2, A1–A3	*> 10* [3]	*> 30* [3]
E - Transport facilities, e.g. railway or bus stations, airports, trains or tunnels	M1, B3, A1–A2	1.5	5.5
	M2, B3, A1–A2	2	7
	M3, B3, A1–A3	*> 15*	*> 30*

Notes:

- Refer to PD 7974-6 for the complete descriptions and application of these categories.
- All times are in minutes.
- [1] Time from the alarm until the first percentile of occupants begins to travel.
- [2] Time from the alarm until the 99th percentile of occupants begins to travel. Italicised values have a higher degree of uncertainty.
- [3] These times depend on sufficient staff being available to assist occupants who require help to evacuate. Where fewer staff are available, for example, at night, the times may need to be increased.
- Additional application notes:
  - For category A with a B3 building-complexity modifier, add 0.5 minutes for wayfinding.
  - For categories B and D (awake), add 0.5 minutes for B2 and 1 minute for B3.
  - For category Ciii, add 1 minute for B3.
  - For category Ci, allow 1 hour for occupants of other units within the same building or block.
  - M1 would normally require a voice-alarm or public-address system where unfamiliar members of the public may be present.
  - M1 and M2 transport facilities would normally require a voice-alarm or public-address system.

Category	Alertness	Familiarity	Density	Enclosure or complexity	Examples
A	Awake	Familiar	Low or high	One or many	Offices, industrial premises, storage and warehousing
B1	Awake	Unfamiliar	High	One or few	Shops, restaurants and circulation spaces
B2	Awake	Unfamiliar	High	One enclosure with a focal point	Cinemas, theatres and classrooms
Ci	Sleeping: long-term individual occupancy	Familiar	Low	Few	Dwellings without 24-hour on-site management
Cii	Sleeping: managed occupancy	Familiar	Low	Few	Serviced apartments and halls of residence
Ciii	Sleeping	Unfamiliar	Low	Many	Hotels and hostels
D	Receiving medical care	Unfamiliar	Low	Many	Hospitals, nursing homes and other institutional residential facilities
E	Using transport facilities	Unfamiliar	High	Many	Railway stations, airports, trains and tunnels

Management Level	Descriptions
M1 - High-level fire safety management	Occupants, staff or residents receive comprehensive fire safety training. The premises have effective fire-prevention and maintenance practices, designated wardens, a well-developed emergency plan and regular evacuation exercises. Where unfamiliar visitors may be present, a high ratio of trained staff to visitors is maintained. Management procedures are independently certified and regularly audited. Evacuation exercises are monitored to confirm that performance is consistent with the design assumptions. Records from fire incidents and unwanted alarms are retained for audit. Escape routes should be obvious and easy to use, automatic detection and alarm provision should be comprehensive, and a voice-alarm system should be provided in buildings used by the public.

M2 - Intermediate fire safety management	M2 is broadly similar to M1, but staff numbers may be lower, wardens may not always be present and independent auditing may not be undertaken. Building complexity and alarm provision may also be less comprehensive. More conservative pre-movement times should therefore be used.
M3 - Basic fire safety management	M3 represents premises with only basic fire safety management and no independent audit. Escape-route complexity may be higher and alarm provision may be more limited. M3 is generally unsuitable as the sole management basis for a fire-engineered performance solution unless compensatory measures are provided, such as restrictions on combustible contents, enhanced passive fire protection or additional active fire safety systems.

Consistent with the intent of the NCC, the planned evacuation response is expected to commence prior to the arrival of emergency services. Evacuation strategies and associated Personal Emergency Evacuation Plans (PEEPs) should enable occupants to evacuate safely and effectively using the building's systems and documented management and staff arrangements, without relying on fire brigade intervention as a planned component of the strategy. While firefighters may undertake search and rescue as operational circumstances permit, this should not be treated as the primary or planned means of occupant evacuation.

C4. Exit Travel Distances

Extended travel distances increase the time occupants remain exposed to developing fire conditions and can increase the number of people requiring assistance or rescue if smoke spread, door failure, or delayed response occurs.

DFES expects quantitative analysis to address extended travel distances and be based on occupants' characteristics and installed fire safety systems (e.g. mitigation delays to AS 1670.1 should be accounted for when known / applicable).

DFES generally expects larger departures from Deemed-to-Satisfy travel distances to be supported by a conservative egress analysis using suitable evacuation modelling (e.g. Pathfinder, STEPS). Where modelling alone cannot adequately mitigate the increased risk, more fundamental design measures, such as enhanced fire safety systems or additional exits, should be implemented.

When assessing extended travel distances between alternative exits, the analysis should consider the cumulative movement time associated with travel to the first available exit and any subsequent travel between alternative exits, where relevant.

DFES will consider such proposals on a case-by-case basis.

C5. Egress Route Configuration and Usability

DFES generally prefers simple, direct, and intuitive egress arrangements, as confusion, hesitation, or operational complexity can delay evacuation and increase the likelihood of firefighters' search and rescue.

Where internal stair discharge arrangements, door operation, and exit widths form part of a Performance Solution, the design should ensure that egress routes remain clear, intuitive, and practical under emergency conditions, taking into account the occupant profile and their likely (un)familiarity with such routes.

Where rising and descending stair paths are not separated, or where fire-isolated exits discharge internally rather than directly to open air, the design should minimise smoke spread, confusion, re-entry risk, and travel past hazards. Final exit locations should be clearly identifiable, and discharge paths should remain clear and sterile (free of combustibles). Any reliance on dynamic signage or complex wayfinding should be carefully justified.

Where evacuation depends on doors being held open, operated against the direction of occupant flow, or operated by staff assisting others, the design should demonstrate that the arrangement remains practical and achievable during an emergency. Vision panels, automatic operation, and reduced manual demands may improve the reliability of assisted egress in some settings. DFES is unlikely to support arrangements that rely on unrealistic levels of staff coordination while also managing vulnerable occupants.

Reduced widths should not compromise the ability for simultaneous occupant evacuation and firefighters' access. DFES generally does not support reductions in required exit width where they are likely to increase evacuation delays or restrict firefighters' access. In some existing-building situations, reduced widths may be tolerable where the overall fire safety strategy remains robust; however, in new buildings, sufficient width is generally expected to support both occupant egress and fire brigade intervention. Where reduced widths are proposed, the assessment should consider:

- effective usable width;
- occupant movement behaviour (e.g. body sway and assisted movement);
- counterflow between occupants and firefighters (e.g. available alternative exit); and
- the limitations associated with firefighters wearing personal protective equipment (PPE/C). Noting that a minimum firefighter's shoulder width of 0.60 m should be assumed, consistent with the AFAC FBIM model anthropometric parameters.

C6. Personal Emergency Evacuation Plans (PEEPs)

Where occupants require assistance to evacuate, the fire safety strategy should incorporate PEEPs that reflect the needs and characteristics of those occupants.

The evacuation strategy and emergency planning arrangements should:

- include PEEPs that are applicable at all times (24/7);
- be developed and finalised prior to occupancy; and
- be maintained as live documents, reviewed and updated as occupant needs or building use changes.

PEEPs should be supported by appropriate management arrangements and resourcing to ensure that occupants can evacuate safely without reliance on fire brigade intervention. Consistent with the intent of the NCC, evacuation is expected to commence prior to the arrival of emergency services.

Where a Performance Solution relies on PEEPs or staff-assisted evacuation, the PBDB and FER should clearly identify these dependencies and demonstrate that they are realistic, reliable, and can be sustained under emergency conditions.

All evacuation and design requirements that must be incorporated into the PEEP, or considered during its development, should be clearly highlighted in the FER.

Regular training, drills, and review processes should be implemented to confirm the effectiveness of the evacuation strategy and ensure that responsibilities are understood and maintained over time.

Reference may be made to AS 3745 for broader emergency planning frameworks supporting the development and maintenance of evacuation procedures.

Refer to Appendix G for communicating ongoing evacuation-related requirements to building owners and facility managers.

APPENDIX D – Fire Compartmentation and Ventilation

This appendix provides DFES advisory guidance on fire compartmentation and ventilation matters relevant to Performance Solutions.

DFES provides comment on these matters as inadequate compartmentation or smoke management may permit the spread of fire and smoke within a building and to adjacent property, increasing the scale and duration of an incident, the water required for suppression, and the level of firefighting resources required. In addition, where smoke cannot be effectively relieved or cleared, firefighters' exposure may be prolonged, resulting in extended overhaul and smoke clearance operations, and delays in returning the building to the occupier, with associated impacts on business continuity and DFES operational availability.

DFES generally prefers the adoption of robust passive measures and conservative design assumptions, unless an alternative approach is clearly justified and demonstrated to provide an equivalent or greater level of reliability in supporting firefighters' intervention for the subject building.

General DFES guidance on the documentation of design assumptions, ongoing conditions, and triggers for reassessment is provided in Appendix F.

D1. Fire Compartmentation Size

The use of oversized fire compartments should be carefully considered, as this approach may:

- remove or reduce NCC provisions applicable to Large Isolated Buildings (including requirements that support fire brigade operations); or
- adversely affect safe evacuation, particularly in Class 9a (healthcare) buildings.

Such approaches should be appropriately justified and supported by robust analysis. Where uncertainty exists regarding future use or fire load, a conservative approach should be adopted.

Oversized fire compartment floor areas and volumes are generally not supported unless it can be demonstrated that:

- the increased area or volume does not materially increase the overall fire load of the building;
- the increased area does not result in a material increase in occupant load;
- the building does not include special hazards (refer to Section E.3);
- the extent of the increased area or volume and its associated use are clearly defined and restricted by enforceable conditions on the Occupancy Permit;
- the PBDB and FER clearly specify the building features, use, expected occupants, and design fire load, and identifies that any change to these assumptions would trigger reassessment of the fire safety strategy; and
- written acknowledgement from the building owner(s) or end user(s), confirming understanding of these conditions and limitations, should be appended to the FER.

Refer to Section A.5 for further information on comparative assessments.

Where increased fire compartment volume is justified on the basis of specific building features (e.g. gantry cranes or process equipment), DFES generally expects that:

- the additional volume and associated use are clearly defined and appropriately restricted;
- a credible worst-case fire load is identified and assessed;
- the PBDB and FER clearly document the dependency of the design on these building features, including the requirement for reassessment if they are altered; and
- the additional volume and associated use to be clearly defined and restricted by enforceable conditions on the Occupancy Permit.

For oversized fire compartment floor areas in Class 9a buildings, DFES generally expects a comprehensive justification having regard to:

- staff-to-patient ratios and the availability of assistance (24/7);
- occupant characteristics and dependency levels;
- the extent and distribution of uses (e.g. patient rooms, treatment areas, staff areas, and public areas);
- travel distances and the availability of alternative egress paths;
- the provision, performance, and reliability of fire safety systems; and
- the operational procedures and emergency response arrangements of the healthcare facility.

Refer to Appendix F where limitations on future use, fire loads, occupant characteristics, or management arrangements form part of the justification.

D2. Subdivision of Buildings and Fire Compartments

Performance Solutions proposing the subdivision of buildings or fire compartments to reduce or avoid fire safety system requirements should demonstrate that the resulting configuration reflects genuine separation in function, operation, and fire risk.

The subdivision of a building into two or more buildings for the purpose of avoiding fire protection requirements (e.g. hydrant systems) is generally not supported where the development operates as a single occupancy, business, or management entity. For example, facilities such as early childhood centres or similar occupancies cannot be reasonably treated as separate buildings where occupants and operations are interconnected, and evacuation into another "building" is not a suitable strategy.

Similarly, the subdivision of spaces such as car parks into multiple fire compartments to reduce system demands (e.g. hydrant flow rates or sprinkler provision) is generally not supported. Such approaches may not adequately address fire risk, particularly where increased hazards are present, including electric vehicles and associated charging infrastructure.

The use of fire shutters, roller doors, or similar movable elements to create compartmentation requires careful consideration and is not appropriate in all cases. In particular:

- where shutters fail to deploy or operate as intended, fire spread may occur, resulting in increased fire severity and greater demand on firefighting resources and water supply;
- shutters may be prevented from closing fully due to obstructions (e.g. stored goods, displays, vehicles, or operational activities), and therefore may not reliably achieve the intended fire separation; and
- reliance on such systems introduces dependencies on maintenance, operation, and management controls, which may not be consistent under fire conditions.

Fire shutters and roller doors typically do not achieve insulation criteria (e.g. FRL –/30/–), and this limitation should be explicitly addressed within the Performance Solution. Where such systems are proposed, appropriate mitigation measures should be demonstrated, which may include:

- sprinkler protection forming part of a tested and recognised system; and/or
- a quantitative fire engineering assessment demonstrating that radiant heat transfer will not result in fire spread, based on the expected fire load and fit-out configuration.

Fire doors or shutters are not supported as a means of avoiding other fire safety requirements, including sprinkler protection or limitations on compartment size.

For example, the use of shutters to subdivide car parks into smaller areas (e.g. fewer than 40 bays) to reduce applicable fire protection requirements is not supported, consistent with DFES Operational Requirements Guideline ORG 10.

DFES generally does not support the use of smoke or fire curtains as a primary fire separation measure. Such systems are more susceptible to failure due to reliance on deployment, sensitivity to air movement and pressure differentials (e.g. operation of smoke exhaust systems), mechanical damage or wear, and obstruction during operation. More robust passive or inherently reliable solutions are generally preferred, including permanently fire-resisting construction or systems with demonstrated performance under fire conditions.

D3. Smoke Hazard Management Systems

Where Performance Solutions propose to reduce exhaust rates for an automatic smoke exhaust system, or to replace such systems with smoke and heat vents or natural smoke venting (e.g. ridge vents), DFES expects the assessment to:

- include a quantitative fire engineering assessment, typically involving CFD modelling, demonstrating that tenability criteria in accordance with Appendix A are achieved;
- demonstrate that the proposed system is capable of achieving not less than one air change per hour, while maintaining all applicable tenability requirements;
- adopt design fire scenarios, system performance assumptions, and sensitivity analyses consistent with the guidance provided in Appendix B; and
- include confirmation from the project mechanical engineer that the proposed system can achieve the required air change rate under all relevant operating conditions.

DFES does not support the use of building leakage alone as a method of smoke hazard management. Refer to Appendix B.7 for further details.

Smoke management systems play a critical role not only during evacuation, but also in supporting firefighters' intervention and maintaining tenable conditions during fire suppression activities.

D4. Stair Pressurisation and Relief Paths

Where an automatic air pressurisation system is provided to a fire-isolated exit, DFES generally prefers passive relief paths (such as sub-ducts) over systems that rely on motorised dampers or dampers activated by fire detection.

Passive systems are considered more reliable, as they do not depend on power supply, control systems, signal transmission, or local temperature rise, and are therefore less prone to delayed operation or failure under fire conditions.

Where motorised dampers in lieu of sub-ducts are adopted, the associated reliability risks should be explicitly addressed, and an enhanced maintenance regime (beyond AS 1851) should be implemented to improve system reliability.

The interaction between pressurisation systems and other mechanical or natural ventilation systems should be considered, particularly where competing airflow paths may affect system performance.

Where a fire-isolated exit discharges internally, the design should demonstrate that an appropriate and reliable relief path will be maintained to satisfy the operational requirements of the pressurisation system. DFES generally expects confirmation from the project mechanical engineer that these requirements will be met.

Performance Solutions proposing a reduced number of open doors for the design, commissioning, or testing of stair pressurisation systems are generally not supported. Such approaches may not represent realistic fire conditions, where multiple doors may be open simultaneously, potentially affecting system performance and reliability. These proposals will be considered on a case-by-case basis, having regard to:

- occupant loads;
- expected simultaneous door openings; and
- the use and operational characteristics of the areas served by the fire-isolated exit.

D5. Penetrations and Service Openings

Where Performance Solutions propose reduced fire-resistance performance for service penetrations, including fire-service penetrations and associated pipework, DFES generally expects either:

- a quantitative fire-engineering assessment; or
- the use of a tested and compliant fire-stopping system achieving the required Fire Resistance Level (FRL).

A quantitative assessment may not be required where the affected areas are maintained as sterile zones, such as the space between a fire-isolated stairway and an adjoining corridor.

D6. Vertical Fire Spread and Compartmentation Interfaces

Performance Solutions that affect vertical fire separation, including lift shafts, façade systems, and compartmentation interfaces, should demonstrate that the potential for vertical fire and smoke spread has been appropriately controlled.

Vertical fire spread can occur through a range of pathways, including but not limited to:

- lift shafts, service shafts, and risers;
- façade openings and inadequate spandrel protection;
- balconies and external projections;
- interconnected voids or atria; and
- penetrations or discontinuities in compartmentation.

Performance Solutions proposing the omission of sprinklers within lift shafts are generally not supported. Sprinklers within lift shafts may assist in controlling or suppressing fires originating from lift machinery, the lift cabin, or the pit. Given the potential for fire associated with lift equipment and the presence of combustible components, DFES generally recommends the retention of sprinkler protection within lift shafts.

Where vertical fire spread relies on façade performance (e.g. spandrels, slab edges, or external wall construction), the design should demonstrate that flame spread and fire propagation between storeys is prevented under credible fire conditions, including scenarios involving glazing failure and external flame projection.

Refer to Appendices A and B for guidance on radiant heat analyses.

Reliance on roller shutter doors, curtains, or fire doors to achieve vertical separation may not be appropriate in all cases. Refer to Section D.2 for further discussion on the limitations of such systems.

Similarly, where service penetrations, shafts, bin chutes, or construction interfaces are present, the design should ensure that fire and smoke spread is adequately restricted for the required duration.

With respect to façade materials and external wall systems, DFES considers that compliance with NCC Clause C2D10 or Verification Method C1V3 generally provides an effective means of limiting vertical fire spread and protecting both occupants and firefighters.

With respect to façade materials and external wall systems, DFES considers that compliance with Deemed-to-Satisfy Clause C2D10 or demonstration of compliance through Verification Method C1V3 generally provides a more robust basis for managing external wall fire spread than a solution relying on combustible external wall materials that does not satisfy either pathway.

D7. Reduced Fire Resistance Levels

DFES generally does not support reductions in Fire Resistance Levels (FRLs) where this may adversely affect life safety, fire spread, or firefighters' intervention.

Reduction of FRLs should not be assumed to provide an equivalent level of performance without robust justification. Passive fire resistance provides inherent and reliable protection, and any reduction introduces increased reliance on assumptions, analysis methods, structural performance, or active systems.

Reductions in FRLs are generally not supported where:

- special hazards are present (refer to Section E.3), particularly where extended fire duration or increased fire severity may occur; or
- the building accommodates vulnerable occupants, where evacuation may be delayed or require assistance.

Where a reduced FRL is proposed, the Performance Solution should demonstrate that structural stability, compartmentation, and fire separation are maintained under credible fire scenarios, and that disproportionate or progressive collapse will not occur.

Reduced FRL solutions that rely on active systems (e.g. sprinklers) or management controls should demonstrate that appropriate reliability, redundancy, and system impairment scenarios have been considered.

Complete omission of a required FRL purely on the basis of sprinkler protection is not considered appropriate, as active systems are inherently less reliable than passive systems.

The long-term durability and robustness of any reduced FRL solution should also be addressed, including potential degradation of materials, protective systems, or construction over time. The Performance Solution should not rely on conditions that may not be maintained for the life of the building.

Where external structural elements or façade interfaces are affected, the assessment should consider exposure from both internal and external fire sources, including radiation from adjacent buildings and external flame impingement.

Consideration should be given not only to structural stability, but also to the consequences of structural failure on fire spread, occupant egress, and firefighters' intervention.

Fire Severity Time Equivalence

Fire Severity Time Equivalence (FSTE) represents the duration of exposure to the standard fire curve that would result in an equivalent thermal response to a complete burnout of the compartment under real fire conditions. It is an equivalent measure and does not represent actual time in a real fire.

FSTE methods have recognised limitations and should be applied with caution. DFES generally expects that such methods:

- are limited to buildings or compartments with clearly defined and well-characterised construction and FRLs (e.g. generally not suitable for Type C construction);
- are applied cautiously in large-volume or highly ventilated compartments; and
- are supported by sensitivity analyses addressing credible variations in fire development, including:
    - partial failure of glazing (e.g. 50 % breakage); and
    - sprinkler impairment or failure, where relevant.

Unless otherwise justified, FSTE methods should be based on a complete burnout scenario of the compartment, without reliance on early suppression or favourable system performance.

The calculated fire severity should be compared against the demonstrated fire resistance of the structural elements, such that the available fire resistance is equal to or greater than the calculated fire severity.

The use of FSTE methods may result in relatively low equivalent fire severity times, particularly in well-ventilated or low fire load compartments. Such outcomes should be carefully scrutinised to ensure they are consistent with credible fire scenarios and do not result in unconservative reductions in FRLs.

The selection of fire load density should be conservative and appropriate to the building use. As a guide, the following may be used:

- 95^{th} percentile fire load energy density values;
- isolated peak values;

- recognised approaches (e.g. Eurocode-based methods).

The same basis for fire load should be applied consistently across base case and sensitivity scenarios.

The selected analysis method should be applied consistently. Combining elements of different methodologies in a manner that reduces conservatism (i.e. “cherry picking”) is generally not supported unless clearly justified.

Care should be taken when applying reduction factors. The use of individual factors (e.g. a factor of 0.61 applied to mean fuel load) in isolation is unlikely to be consistent with the intent of established methodologies such as Eurocode 1, which require multiple factors to be considered collectively.

Steel Structural Performance

Performance Solutions involving reduced FRLs to steel structural elements should be supported by an appropriate structural assessment (e.g. in accordance with AS 4100 or equivalent methods).

Where limiting temperatures are adopted:

- these should be specific to the structural elements and loading conditions being assessed; and
- generic limiting temperatures should be avoided unless justified.

DFES generally expects explicit confirmation from the project structural engineer that:

- structural stability will be maintained under credible fire scenarios; and
- disproportionate or progressive collapse will not occur.

Where structural elements are exposed to fire (internally or externally), the assessment should consider:

- the potential for localised fire exposure (e.g. external column exposure to radiant heat); and
- credible fire scenarios based on building use and configuration.

Where reliance is placed on tested systems or proprietary products:

- the system must be supported by valid and relevant test reports;
- installation must be consistent with tested configurations, including dimensional and material limitations; and
- manufacturer requirements must be fully understood and followed.

Where tested systems are not applied, or where elements remain unprotected, a quantitative fire engineering assessment should be undertaken to:

- evaluate heat transfer and temperature development; and
- demonstrate that structural performance and fire separation objectives are maintained.

Quantitative assessments may include computational fluid dynamics modelling or equivalent methods to estimate heat flux and temperature development in structural members under realistic fire scenarios.

All penetrations, interfaces, and connections should be appropriately fire-stopped using durable and suitable materials, considering environmental and service conditions.

Provision should be made for inspection, maintenance, and reinstatement of fire protection systems where modifications or damage occur.

Timber Structural Performance

Performance Solutions involving reduced FRLs to timber structural elements should be based on a robust understanding of timber fire behaviour, including charring and residual section capacity.

Where existing timber elements are assessed, the adopted material properties (including moisture content and condition) should be confirmed by the project structural engineer.

Assessment methods may be based on recognised standards (e.g. AS 1720), and should consider:

- the actual timber properties, including species, density, and moisture content;
- charring rates and their variability; and
- connection performance and detailing.

DFES generally expects explicit confirmation from the project structural engineer that:

- the structural design will maintain stability for the required duration; and
- disproportionate or progressive collapse will not occur.

Where timber elements are relied upon for fire resistance, the assessment should demonstrate that:

- sufficient residual section remains after charring; and
- fire spread within or across elements is adequately controlled.

Where tested systems or encapsulation methods are used, they should:

- be supported by appropriate testing or evidence; and
- be applied in accordance with their tested parameters and limitations.

Where composite or hybrid structural systems are used, the assessment should consider the combined behaviour of all materials under fire conditions, including interaction between structural elements, connections, and any applied fire protection systems. The design should demonstrate that the failure of any single component or interface will not result in disproportionate loss of structural capacity or fire separation, and that the system maintains its intended performance through the combined behaviour of all elements.

APPENDIX E – Fire Services Intervention

This appendix sets out DFES guidance on fire services intervention matters and should be read in conjunction with the FES Commissioner's Operational Requirement Guidelines. As the fire brigade, DFES comments on these issues to identify what firefighters need for safe and effective intervention, what DFES recommends as good operational practice, and what may be required where stated in the FES Commissioner's Operational Requirement Guidelines or other applicable provisions.

The guidance in this appendix focuses on operational access, water supplies, hydrant performance, hose coverage, firefighters' set-up, and other matters that influence the speed, safety, and effectiveness of brigade operations.

E1. Attending Firefighters

Performance Solutions may involve assumptions regarding fire service intervention, including response capability, available resources, and operational procedures.

It is recognised that fire service response can vary depending on the nature of the attending brigade (e.g. career or volunteer), including differences in resourcing, equipment availability, and exposure to specific building types or incidents. These variations may influence the suitability or robustness of certain Performance Solutions.

Accordingly, assumptions regarding fire service intervention should be carefully considered and clearly stated within the PBDB and FER.

Early consultation with DFES BEB is recommended to confirm that proposed Performance Solutions appropriately reflect the expected fire service response for the subject building.

E2. Hydrant Testing and Supporting Evidence

Where a Performance Solution relies on fire hydrant performance, DFES generally expects recent flow and pressure test data that is representative of the available water supply conditions. As a guide, hydrant testing should be undertaken within 12 months of the date of submission.

Test reports should clearly identify the test location(s), methodology and equipment used; the current calibration status of the test equipment, supported by calibration certificates issued within the scope of accreditation of a NATA-accredited calibration laboratory or equivalent; and the incremental flow and pressure results relied upon in the assessment. For the purposes of DFES assessment, the calibration must have been completed within the 12 months preceding the hydrant testing.

Where sprinkler systems (including wall-wetting sprinkler systems or drencher systems) are provided, the assessment should demonstrate that simultaneous hydrant and sprinkler system demands can be achieved for the required duration.

Where on-site hydrant systems or booster assemblies form part of the Performance Solution, DFES generally expects confirmation at practical completion that the installed system achieves the required operational performance consistent with the assumptions adopted in the FER.

A backflow prevention device is required by Water Corporation for on-site fire hydrant installations. The associated pressure losses should be considered when designing hydrant systems and assessing any related Performance Solution to ensure that the required flow rates and residual pressures can be achieved under all design conditions.

E3. Special Hazards

Some buildings, structures, installations, and occupancies present special hazards to firefighters when involved in fire. In these cases, NCC Clauses E1D17 and E2D21 may be relevant.

To support firefighters' intervention, additional provisions may be necessary to address the unique challenges these hazards create for suppression activities, rescue operations, building access, water supply, prolonged incidents, and firefighters' safety.

Special hazards may arise from:

- hazardous processes or materials;
- high fuel loads or unusual fire behaviour;
- complex building layouts or automated systems;
- the presence of vulnerable occupants; or
- occupancies where evacuation is delayed, restricted, or dependent on staff assistance.

Examples of buildings, structures, installations, or occupancies that may present special hazards include (non-exhaustive):

- Battery Energy Storage Systems (BESS);
- car parks containing electric vehicle charging facilities;
- multi-tier vehicle stacking systems;
- multi-level self-storage facilities;
- tyre storage facilities;
- waste storage and recycling processes;
- automated storage and retrieval systems (ASRS);
- facilities subject to Dangerous Goods legislation;
- detention and custodial facilities;
- occupancies where occupants are unable to self-evacuate without assistance.

DFES recommends that caution be exercised when applying Performance Solutions to fire safety aspects of facilities subject to Dangerous Goods legislation, including bulk storage or processing of flammable liquids, industrial chemicals, explosive materials, or other hazardous substances. Such facilities may present risks that fall outside the scope of conventional building-code-based fire safety design.

Compliance with regulatory frameworks outside the NCC (e.g. Dangerous Goods legislation) may also be required and should be considered alongside building-code requirements.

Where applicable, reports prepared by appropriately qualified Dangerous Goods practitioners or other specialist consultants should be appended to the FER, and any assumptions, limitations, and recommendations that affect the fire safety strategy should be clearly identified.

E4. Outside the Scope of AS 2419.1:2021

Some buildings, structures, and installations fall outside the scope of AS 2419.1:2021 or exceed the limitations on which the Standard is based. In these circumstances, DFES expects a Performance Solution supported by an appropriate fire engineering assessment, demonstrating that the proposed firefighting water supply and hydrant arrangements adequately support firefighters' intervention.

Each proposal is assessed on a case-by-case basis.

Buildings Exceeding 135 m Effective Height

Buildings exceeding 135 m in effective height should be designed with a cascade fire hydrant system. DFES considers cascade systems necessary to maintain compatibility with firefighting equipment, align with established operational practices, and support work health and safety requirements.

Commissioning and acceptance testing should be discussed with DFES Built Environment Branch (BEB) at an early stage of the project. DFES BEB and local operational personnel may be requested to attend selected testing activities, with the extent of attendance based on the complexity and risk profile of the development.

Fire Compartments Exceeding 108,000 m³

Large-volume Class 7b and Class 8 buildings with fire compartment volumes exceeding 108,000 m³ present challenges beyond the scope of the Deemed-to-Satisfy provisions and the underlying assumptions of AS 2419.1:2021.

Where a Performance Solution is proposed, DFES generally expects:

- a quantitative fire engineering assessment establishing credible worst-case fire scenarios;
- determination of an appropriate design fire and peak heat release rate;
- demonstration that the proposed firefighting water supply is sufficient to support fire brigade intervention under the identified design scenarios;
- consideration of foreseeable future use and fuel load arrangements; and
- sensitivity analyses where future fit-out, storage configuration, or operational use remains uncertain.

Shell-building assessments are generally not supported where the building use, storage arrangements, or fuel hazards have not been adequately defined. Where uncertainty exists, DFES expects a conservative approach to be adopted.

DFES generally recommends a minimum hydrant design flow rate of 30 L/s for these types of applications.

Automated Storage and Retrieval Systems (ASRS)

Automated Storage and Retrieval Systems are becoming increasingly common and may present challenges beyond those contemplated by conventional warehouse firefighting strategies.

DFES generally expects Performance Solutions involving ASRS installations to address the unique challenges associated with firefighters' access, suppression, system shutdown, smoke management, and the potential for fire spread within densely stored commodities.

Design teams should, as a minimum:

- consider the recommendations contained within Appendix C of AS 2419.1:2021;
- clearly define the proposed firefighting strategy and the expected sequence of operation during fire conditions;
- document the shutdown arrangements for the ASRS, including isolation of power and automated movements;
- provide details of robot charging arrangements, including battery type, charging locations, fire protection measures, and overheating safeguards, and adequately address any associated fire hazards;
- identify the commodities intended to be stored within the ASRS, including the expected fuel load, storage configuration, packaging materials, and any hazardous or high-risk products;
- identify the location of internal and external hydrants and demonstrate suitable firefighters' access to all parts of the ASRS;
- demonstrate that firefighters can reasonably identify the location and extent of a fire within the ASRS and safely apply firefighting water or other suppression measures;
- provide details of the smoke hazard management strategy and demonstrate appropriate performance where a non-Deemed-to-Satisfy solution is proposed;
- demonstrate that the proposed fire safety strategy remains effective following shutdown, malfunction, or loss of power to the ASRS;
- demonstrate that any proposed fire suppression system is capable of controlling or extinguishing a credible fire within the ASRS. Where separation distances, compartmentation, or other passive fire protection measures are relied upon, the FER should demonstrate through a tested system, quantitative fire engineering assessment, or other appropriate evidence that fire spread will be prevented under credible fire scenarios and that firefighting water can effectively reach the seat of the fire;

- ensure that the proposed firefighting strategy does not rely on actions that are inconsistent with DFES operational procedures or may not be safely achievable during a developing fire; and
- clearly document any limitations relating to commodity type, storage height, storage density, battery charging arrangements, or operational use. Where these assumptions form part of the Performance Solution, they should be subject to appropriate management controls and ongoing compliance measures.

DFES generally does not support firefighting strategies that rely on the manual removal of access panels, particularly where such panels are located at height or require cutting tools, specialised equipment, or other complex intervention measures to gain access to the fire.

E5. Omission of On-Site Fire Hydrant Pumps and Tanks

DFES generally expects that the omission of on-site fire hydrant pumps and tanks is approached with caution, as reliance on town main supply and fire brigade boosting alone may increase system set-up time, reduce redundancy, and affect the effectiveness of initial fire brigade operations.

DFES will only consider Performance Solutions proposing the omission of both on-site fire hydrant pumps and tanks within the Perth metropolitan area (approximately Mandurah to Yanchep, noting that career-firefighter response area may change over time), where the primary structural fire response is provided solely by career firefighters. Applicability must be confirmed with the DFES Fire Engineering team before this approach is incorporated into the design.

Each proposal is assessed on a case-by-case basis. The following non-exhaustive criteria are generally considered by DFES when assessing the omission of on-site hydrant pumps and tanks:

- Where such an omission is proposed, the PBDB and FER should clearly justify the suitability of the approach, having regard to the building classification and use, occupant characteristics, rise in storeys and effective height, fire compartment sizes, fire safety systems, expected town main performance, and the potential consequences of degradation in supply conditions over time;
- DFES will only consider such Performance Solutions for buildings located within the Perth metropolitan area;
- Where the occupancy presents a high life safety risk and immediate water supply is critical to support firefighters' life-saving operations (e.g. nightclubs, hospitals, assembly buildings, aged care facilities, Specialist Disability Accommodation, or major shopping centres), such a Performance Solution is generally not supported;
- Where the occupancy involves high fire loads or elevated fire hazard (e.g. factories, warehouses, or similar uses where rapid suppression is critical to limiting fire spread), such a Performance Solution is generally not supported;
- DFES generally only considers this pathway for buildings with a rise in storeys not exceeding 5;
- DFES generally only considers this pathway where the floor area of the largest fire compartment does not exceed 2,000 m²;
- A current and complete hydrant flow and pressure test should be included in the PBDB and revalidated for the FER. The documentation should identify the test date, location, method and demand conditions and demonstrate that the design flow rate and residual pressure specified by the Performance Solution can be achieved, with appropriate allowance for variations or degradation in town-main supply;
- The presence of other Performance Solutions within the building should be carefully considered, as cumulative reductions in fire safety provisions may not be acceptable;
- Where future installation of pumps and tanks may be required, suitable allowances should be identified and clearly indicated on the design drawings in the PBDB and FER;

- Access to the hydrant booster assembly should be maintained clear at all times, including consideration of potential obstructions (e.g. vehicles, storage, landscaping, or vegetation growth);
- Where the ongoing adequacy of the Performance Solution depends on minimum water-supply characteristics, the required flow rate and residual pressure, test location, testing frequency, responsible party and corrective actions should be clearly documented. These requirements should be incorporated into an enduring and legally enforceable mechanism such as the Occupancy Permit. Where performance falls below the specified threshold, the required corrective action may include installation of the pumps and tanks for which provision has been made;
- The building owner(s) should acknowledge responsibility for maintaining the hydrant system in accordance with the applicable requirements of AS 1851 and the additional inspection, testing and management requirements documented in the FER. Evidence of this acknowledgement should be appended to the FER.

E6. Omission of On-Site Fire Hydrant Pumps

DFES generally expects that the omission of on-site fire hydrant pumps is approached with caution, as reliance on fire brigade boosting alone will increase system set-up time, reduce redundancy, and affect the effectiveness of initial fire brigade operations.

DFES will only consider such Performance Solutions in regional areas, where response is provided by volunteer firefighters.

Each proposal is assessed on a case-by-case basis. The following non-exhaustive criteria are generally considered by DFES when assessing the omission of on-site hydrant pumps:

- DFES will only consider such Performance Solutions for buildings located outside the metropolitan area;
- Where an immediate and reliable water supply is critical to support firefighters' life safety operations, such Performance Solution is not supported;
- Where the occupancy involves high fire loads or elevated fire hazards (e.g. factories, warehouses, or similar uses where rapid suppression is critical), such Performance Solution is not supported;
- The presence of other Performance Solutions within the building should be carefully considered, as cumulative reductions in fire safety provisions may not be acceptable;
- Dedicated on-site water storage should be provided (e.g. split tank, or two or more interconnected tanks);
- Where multiple tanks are provided, they should be interconnected to allow continuity of supply. Isolation valves should be installed to enable maintenance while ensuring at least one tank remains available at all times;
- Water tanks should be dedicated to firefighting purposes, unless sufficient capacity is provided to accommodate both firefighting demand and site usage. Firefighting water supply should be available at all times;
- Appropriate arrangements should be provided to maintain water levels, including make-up water systems to address usage and evaporation, and to ensure adequate supply during maintenance activities;
- Tanks should be located such that fire appliances are not required to pass the building on fire in order to access the water supply. Where this arrangement cannot be achieved, an appropriate separation distance between the building and tank(s) should be provided and justified. The assessment should demonstrate that firefighters can safely access and operate from the water supply location, and that the fire appliance can remain more than 10 m from the building during firefighting operations;
- A suitable hardstand should be provided adjacent to the tank(s) to accommodate fire appliance operations;

- Hydrant coverage should be achievable using a maximum of approximately 90 m of hose from the fire appliance;
- Hard suction connections should be provided either directly off the tank(s) or in a suitable accessible position adjacent to the tank(s);
- Connections (e.g. Storz and Camlock fittings) should comply with AS 2419.1 and DFES requirements;
- The design cannot include booster assemblies or dry riser / ring main systems.

E7. Fire Hydrant Coverage and Additional Hose Length

Where hydrant coverage forms a critical component of a Performance Solution, DFES generally expects the provision of clear and comprehensive drawings demonstrating:

- external hydrant outlet locations;
- booster location (where provided);
- fire appliance hardstand locations, noting that appliances should be positioned more than 10 m from the building;
- hose coverage and water spray extents. For operational hose-coverage assessments, DFES uses the hose-lay and nozzle-reach methodology of AS 2419.1:2005. This limited use does not replace the edition of AS 2419.1 referenced by the applicable NCC for hydrant-system design, installation and commissioning;
- dead-end accessway lengths and turning facilities, including turning facilities where a dead-end accessway exceeds 45 m;
- perimeter vehicular access arrangements, where applicable;
- Coverage should reflect the intended final configuration, including fit-out, storage, obstructions and the practical path of charged-hose deployment, and should be verified against the as-built configuration. Idealised or open-plan layouts should not be used.

DFES is unlikely to support solutions relying on extended hose lengths where these depend on operationally impractical set-up positions or unsafe arrangements (e.g. road crossings). Where extended hose deployment is proposed, the PBDB and FER should demonstrate that the arrangement is workable, safe, and consistent with DFES Operational Requirements Guidelines (ORGs) and applicable standards.

It should be recognised that additional hose lengths increase operational complexity. Charged hose lines are difficult to manoeuvre, are not easily flexible when deployed (particularly around obstructions, level changes, or stairs), and may weigh in excess of 100 kg. These factors should be considered when assessing the practicality of extended hose deployment.

Each proposal is assessed on a case-by-case basis. The following non-exhaustive criteria are generally considered by DFES when assessing the use of additional hydrant hose lengths:

- A Performance Solution should not be pursued where compliant hydrant coverage can reasonably be achieved using Deemed-to-Satisfy provisions. Cost or convenience alone is not considered sufficient justification;
- The presence of other Performance Solutions within the building should be carefully considered, as cumulative reductions in fire safety provisions may not be acceptable. A combination of omission of on-site fire hydrant pumps and tanks and additional length of hose is generally not supported;
- Hydrant coverage should be demonstrated considering both feed and attack hydrant arrangements, where applicable;
- Where additional hose lengths are proposed, coverage should generally be achieved from external (street or on-site) hydrants;
- The use of a combination of street and on-site hydrants to achieve hydrant coverage requiring additional hose lengths is generally not supported;

- The arrangement of hose lengths should be operationally practical. As a general guide, the first hose length should be deployed externally, with no more than approximately 60 m of hose deployed internally unless otherwise justified;
- Building height and use are critical considerations. As a guide:
  - Class 7 (excluding self-storage facilities) and Class 8 buildings are generally limited to single-storey applications, except where a Class 5 tenancy forms part of the building, in which case up to three storeys may be considered for the Class 5 portions only;
  - Buildings accommodating vulnerable occupants are generally limited to two storeys where extended hose deployment is proposed;
  - For Class 9b early childhood centres, extended hose deployment is generally limited to buildings with a rise in storeys of not more than 2. Additional measures may include on-site hydrant provision, unless a compliant street hydrant is located directly adjacent to the building, and a building-wide fire detection and alarm system, preferably designed in accordance with AS 1670.1.

E8. Shared Wet Fire Infrastructure

Where wet fire infrastructure (including water supply, pumps, and associated systems) is proposed to be shared between multiple buildings or allotments, the arrangement should be presented to DFES BEB at an early stage of design. Early engagement will enable DFES to provide input regarding operational considerations and any minimum requirements necessary (e.g. multiple / additional booster assemblies) to support firefighters' intervention.

Each proposal is assessed on a case-by-case basis. The following non-exhaustive criteria are generally considered by DFES when assessing shared wet fire infrastructure:

- Shared infrastructure should, where practicable, be centrally located to optimise hydraulic performance and operational access;
- A ring main is to be provided to improve redundancy and reliability of supply;
- Each building should be provided with dedicated system components, including sprinkler control/alarm valves, Fire Indicator Panel / Fire Brigade Panel (FDCIE), and DFES Direct Brigade Alarm (DBA) monitoring. Systems should be capable of isolation without affecting water supply to adjacent buildings or allotments;
- The shared pump room should be protected with a compliant sprinkler system;
- Monitoring of the pump room and associated systems should be provided in accordance with AS 2118.1 and AS 2419.1 (system and component monitoring), including connection to the DFES DBA monitoring centre and, where applicable, on-site monitoring systems;
- A block plan should be provided at each relevant location, including wet fire system boosters, control/alarm valve sets, and FDCIE, to clearly indicate the extent of the shared system and the buildings served;
- Pumps, tanks, booster assemblies, and pipework should be designed to meet the most onerous demand across all connected buildings;
- System pressures and boosting arrangements should allow DFES fire appliances to operate effectively. Supporting hydraulic calculations should be provided as part of the FER and associated documentation;
- A formal legal agreement should be established between all relevant parties, ensuring ongoing access, maintenance, and testing of shared infrastructure in accordance with AS 1851, including appropriate easements where required;
- The Occupancy Permit should clearly document shared ownership arrangements, maintenance responsibilities, and system monitoring requirements to ensure ongoing compliance for the life of the buildings.

E9. Fire Hose Reels and Portable Extinguishers

DFES generally considers fire hose reels and portable fire extinguishers capable of providing comparable first-aid firefighting outcomes in many ordinary fire scenarios. However, for vehicle fires, plant fires, and other hazards where sustained water application is likely to be more effective, the retention of fire hose reels is generally recommended.

Where portable fire extinguishers are proposed in lieu of fire hose reels, the FER should clearly justify why the proposed arrangement remains appropriate for the expected fire hazards, fire growth characteristics, and likely occupant response. The proposed arrangement should also comply with the relevant provisions of AS 2444, including extinguisher type, rating, and maximum travel distances.

Where a Performance Solution results in different first-aid firefighting measures being relied upon in different parts of the building, the use of a mixed arrangement is generally not recommended unless the PBDB and FER demonstrates that the equipment selection and locations are readily understood and will not create uncertainty for occupants during an emergency.

Where a Performance Solution omits fire hose reels otherwise required by the applicable Deemed-to-Satisfy Provisions without providing an alternative occupant first-aid firefighting measure, DFES considers that the occupant initial-attack function required by NCC Performance Requirement E1P1 has not been maintained. Accordingly, compliance with E1P1 has not been demonstrated, and the Performance Solution is not supported.

E10. Smoke Clearance

Smoke clearance systems are intended for use after fire suppression and should achieve minimum one air change per hour, using either mechanical or natural ventilation.

Where the system is mechanical or automated, a clearly labelled control must be provided at the FDCIE for firefighter use.

Smoke clearance systems are intended for post-fire operations and should not be assumed to provide the same level of performance as a Deemed-to-Satisfy smoke hazard management system. Where smoke clearance systems are relied upon as an alternative to, or replacement for, a DTS smoke hazard management system, refer to Section D.3 for additional design considerations.

E11. Fire Brigade Response Time Assumptions

DFES generally does not support reliance on the nominal proximity of a fire station or an assumed short response-time benefit as the primary justification for reducing system performance, increasing hose deployment complexity, or otherwise weakening the reliability of fire brigade intervention. Response times can vary with traffic, resource availability, simultaneous incidents, and other operational factors, and Performance Solutions should therefore be based on robust building and system measures rather than optimistic attendance assumptions.

E12. Signage

Appropriate signage should be provided in accordance with BEB Guideline GL-03. Any additional signage required to support Performance Solutions should be clearly identified within the FER.

APPENDIX F – Reliability, Verification and Ongoing Building Conditions

This appendix provides DFES advisory guidance on the reliability, verification, and ongoing conditions associated with Performance Solutions. DFES comments on these matters because many Performance Solutions rely on specific systems, maintenance arrangements, management measures, and building-use assumptions that can change over time. If those assumptions are not verified at completion and maintained during occupation, the intended fire safety outcomes and the conditions for firefighters' intervention may no longer remain valid.

Unless a requirement is specifically stated in the FES Commissioner's Operational Requirement Guidelines or another applicable provision, the guidance in this appendix should be read as DFES advisory recommendations.

F1. Supporting Evidence for Performance Solutions

Where a Performance Solution relies on existing fire safety systems, documented evidence should be provided to demonstrate that those systems have been appropriately maintained and remain suitable for their intended purpose in supporting the Performance Solution.

This evidence should be appended to the FER and may include:

- certification or statements from suitably qualified practitioners;
- maintenance records in accordance with relevant standards (e.g. AS 1851);
- inspection, test, or commissioning reports; or
- a signed letter or declaration confirming the condition and operational readiness of the systems.

In the absence of adequate evidence, the systems should not be relied upon as part of the Performance Solution unless reassessed.

F2. Verification at Completion

DFES generally expects the project fire engineer to undertake, upon completion of construction or at another suitable project milestone, an on-site inspection of the building and witness relevant system testing. This is intended to verify that the fire safety measures described in the Fire Engineering Report have been installed, commissioned, and operate as intended, including their interaction with other fire safety systems.

Verification should provide confidence that the assumptions, conditions, and fire safety measures relied upon in the assessment have been implemented before the building is occupied or used for its intended purpose.

F3. Ongoing Maintenance and Management Dependencies

Where the validity of a Performance Solution depends on management action, inspection, testing, maintenance, staff assistance, water supply performance, or other ongoing conditions, those dependencies should be clearly identified in the FER and reflected in the ongoing management of the building. DFES generally expects that assumptions critical to firefighters' access, rescue conditions, suppression effectiveness, or post-fire operations will be maintained for the life of the building.

Where practical, critical assumptions should also be communicated to building owners, facility managers, and other responsible persons.

F4. Change of Use, Fuel Load or Occupancy Conditions

A Performance Solution may no longer remain valid if the building use, fire load, storage arrangement, occupant profile, tenancy configuration, level of management, or other critical assumptions change materially.

Where a solution depends on specific conditions remaining in place, DFES generally expects those dependencies to be clearly identified and reflected on the Occupancy Permit. As a minimum, the Occupancy Permit should reference the current Fire Engineering Report.

F5. Recording Assumptions and Conditions in the FER

DFES generally expects assumptions, limitations, dependencies, and conditions that are material to a Performance Solution to be clearly recorded in the FER in a way that can be understood and applied by future owners, designers, facility managers, and regulators. Refer to Appendix G for the DFES template intended to assist project fire engineers in communicating key assumptions, limitations, dependencies, and ongoing requirements to building owners, facility managers, and other responsible persons.

F6. Reassessment Triggers

Reassessment should generally be considered where there are material changes to the building, systems, management arrangements, or other assumptions on which the Performance Solution depends. Examples may include changes to building use, storage arrangements, occupancy characteristics, fire loads, firefighting systems, egress provisions, management procedures, or other parameters critical to the original Performance Solution.

F7. Access to Documentation

DFES generally expects that the current Fire Engineering Report and associated documentation supporting Performance Solutions are retained and readily available to building owners, facility managers, and other relevant stakeholders throughout the life of the building.

APPENDIX G – Template for Performance-Based Design Requirements for Building Use and Management

Purpose

Performance Solutions rely on specific design assumptions regarding building use, occupant behaviour, fire load, and construction features. These assumptions are critical to achieving compliance with the NCC Performance Requirements.

To ensure these assumptions remain valid over the life of the building, this appendix provides a clear, operational summary of requirements for building owners, managers, and end users.

The example below provides indicative requirements that may be included, as applicable to the Performance Solution.

Building Details

Building Name	
Address	
Relevant Approval / Permit Authority	

Overview of Performance Solutions

This building incorporates Performance Solutions. A summary of each Performance Solution is provided below:

Reference	Description	Affected Area(s)
Performance Solution 1	*Brief description*	*e.g. Ground floor retail*
PS 2	*Brief description*	*e.g. Atrium*
PS 3	*Brief description*	*e.g. Level X Unit X*
…	…	

Critical Fire Safety Measures

The following fire safety measures are essential to the Performance Solutions and must be maintained for the life of the building.

Related PS	Description	Location
Performance Solution X	*Fuel load prohibition…*	*Ground floor retail*
PS X	*Exhaust rate of x m3/s, Door X to open upon fire detection activation or power failure…*	*Atrium*
PS X	*Radiant heat attenuation screen to be installed as per manufacturer's requirements (refer to FER Appendix X)…*	*Windows WX-X Level X Unit X*
…	…	…

Maintenance Requirements

All systems and features forming part of the Performance Solutions shall be maintained in accordance with the requirements below:

Item	Requirement / Standard / Reference	Frequency
Fire systems	*Maintain in accordance with AS 1851*	*As specified*
Attenuation screen	*Inspect and maintain as Manufacturer's requirements (refer FER Appendix X)*	*As specified*
…	…	…

Management-in-Use Requirements

The following operational controls are critical to maintaining compliance:

Area / Element	Requirement	Reason / Related PS
Area X	*Area to be kept clear / sterile*	*Supports PSX*
Storage areas	*Fire load not to exceed design assumptions: height <2.5m,*	*PS X*
Doors	*Not to be wedged open*	*PS X*
…	…	…

Occupant and Evacuation Strategy

The building's evacuation strategy is based on the following assumptions:

Aspect	Requirements
PEEPs	*To be developed and maintained for each relevant occupant. To consider evacuation strategy specified in Performance Solution X…*
Staff	*Minimum trained staff required where applicable*
Egress routes	*Must remain unobstructed at all times*
…	…

Change Management

Any changes to the following may invalidate the Performance Solutions and require reassessment by a qualified fire engineer:

- Building layout or compartmentation;
- Fire loads or storage arrangements;
- Occupant numbers or characteristics;
- Fire safety systems or their operation;
- External exposures or neighbouring buildings.

No such changes should be implemented without formal review.

Reference Documentation

Further detail is provided in the Fire Engineering Report(s), including:

- Design assumptions;
- Fire modelling and analysis;
- Drawings and specifications;
- Manufacturer requirements.

Primary FER Reference(s):

- FER revision X dated DD/MM/YYYY (base build)
- FER revision Y dated DD/MM/YYYY (fitout Level X)
- FER revision Y dated DD/MM/YYYY (Tenancy X extension)

PLEASE NOTE

- *This is a controlled document. DFES guidelines are available on the DFES Website: www.dfes.wa.gov.au.*
- *Should the information provided in this guideline require further clarification, please contact DFES Built Environment Branch Fire Engineering Team via email fireengineers@dfes.wa.gov.au.*

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