

Building to purpose – purpose to build

FPAA – Fire Australia 2026

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Presenter Introductions



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Why rethinking the way we do things?

Time to grow up



Building to purpose

Everything serves a purpose

Building to purpose

- Function
- Use-case
- Needs profile

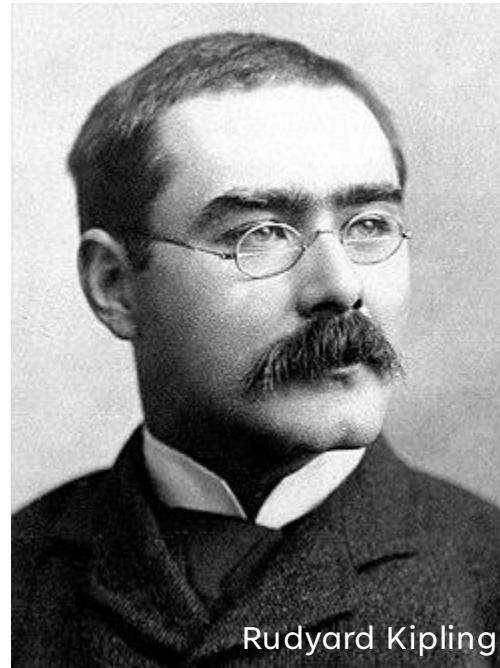


Purpose to build

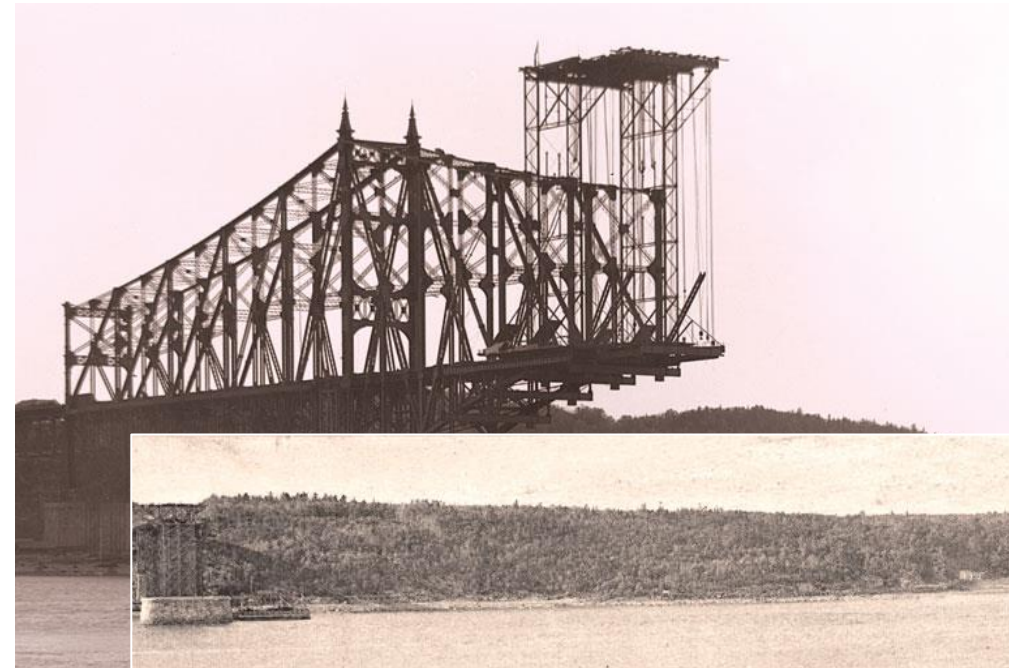
So why don't we do something about it?

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- <https://www.canadashistory.ca/explore/first-nations-inuit-metis/a-community-s-loss>



Rudyard Kipling



Canadian Engineer's Ring



Engineering – a high-stakes activity

Getting it right matters

Modern engineering failures

- 2013 Rana Plaza Collapse (1,134 † 2,500 i)
- 1981 Hyatt Regency Walkway collapse (114 † 216 i)
- 2005 New Orleans Levee failure (1,577 †)
- 1975 Banqiao Dam failure (>26,000 † >10M disp.)
- 1968 Ronan Point collapse (4 † 17 i)
- 1995 Sampoong Department Store collapse (502 † 937 i)
- 1978 Willow Island Cooling Tower collapse (51 †)

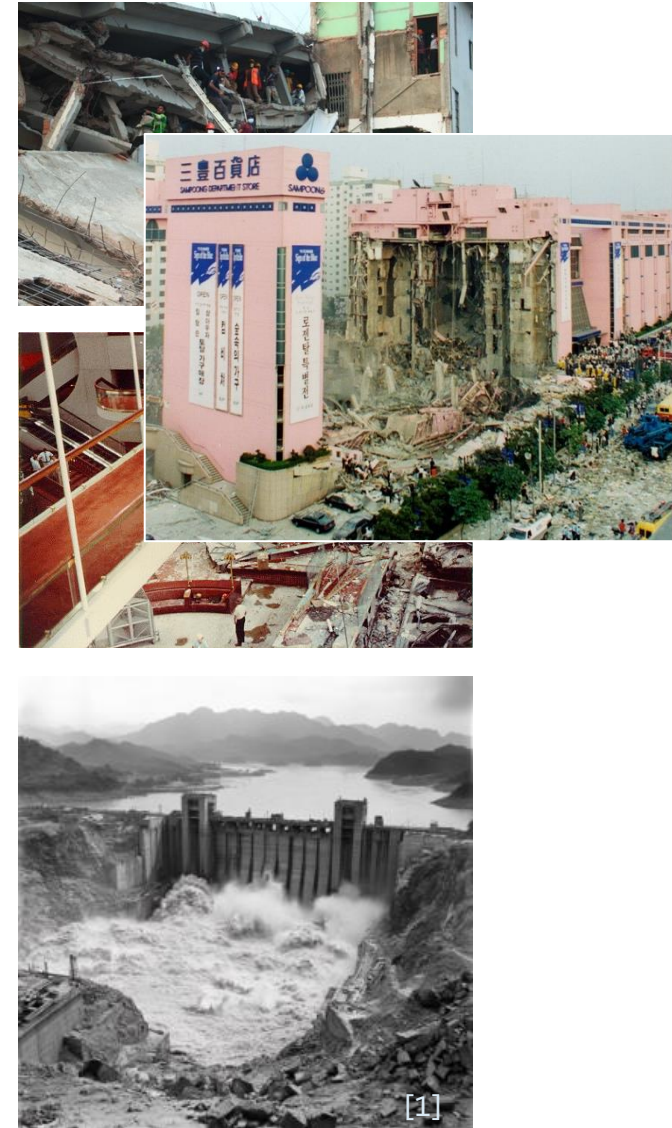


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Engineering – a high-stakes activity

Getting it right
matters

Modern devastating fires

- 1998 Gothenburg discotheque fire (63 †)
- 2022 Twin Parks fire (17 †)
- 2023 Hanoi Building fire (56 †)
- 2021 Kaohsiung Tower fire (46 †)
- 2017 Plasco Building fire collapse (21 †)
- 2013 Kiss Nightclub fire (242 † 630 i)
- 2017 Grenfell Tower fire (72 †)
- 2025 Wang Fuk Court fire (168 †)



[CNN]



[FOX News]



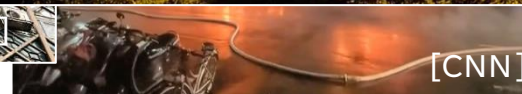
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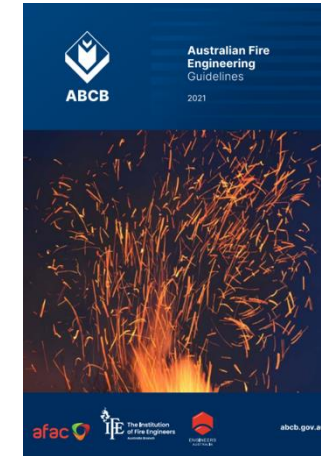


[Wikipedia]

Surely we have moved on and improved?

Photo credits:

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Surely we have moved on and improved?

Findings say
otherwise...

"The extent of non-compliant and potentially dangerous use of combustible cladding materials on buildings is a matter of significant concern, and indicates systemic regulatory failure."

• Victorian Cladding Taskforce, Interim Report (2017)

"Recent incidents highlight that a lack of understanding and inadequate application of the fire safety provisions continues to result in non-compliant and unsafe buildings."

• ABCB, 'Fire Safety in High Rise Buildings' Communiqué (2019)

"The identification of widespread life safety risks, particularly involving fire safety, points to a loss of confidence in the efficacy of building regulatory systems."

• Shergold-Weir "Building Confidence" Report (2018)

*"Serious defects in fire safety systems are the second most common defect identified... arising in around 46% of buildings"
"Serious fire-related defects found in 14% of strata buildings completed in the last 6 years"*

• Construct NSW, Improving Fire Safety Industry Report, NSW Government (2021)

"The failure to enforce fire safety certification undermined the entire system, putting residents at risk and leaving building owners with enormous rectification costs."

• NSW Parliamentary Inquiry: Regulation of Building Standards, Building Quality and Building Disputes, Final Report (2020)

"... nearly 90 percent of building permits audited in 2011 did not demonstrate basic compliance of safety standards."

• Stephen Kip OAM, citing the Victorian Auditor-General's Report, October 2020

So – what to do?

How do we solve this?



What is being asked for?

And where do we start?

Review definition of "higher-risk" buildings; impose particular duties on those involved with higher-risk buildings; statutory requirement for fire safety strategy report by registered fire engineer for higher-risk buildings

· Grenfell Tower Inquiry Report, Phase 2, Volume 7 (2024)

Residential buildings ≥ 10 storeys considered higher-risk residential buildings; implement rigorous and demanding dutyholders' roles and responsibilities including gateway points in design, construction, and refurbishment of HRRBs

· Building a Safer Future – Independent Review of Building Regulations and Fire Safety, Dame Judith Hackett Final Report (2018)

Registration of building practitioners; codes of conduct for building surveyors; adequate documentation and approval throughout the design and construction process; independent peer review; implementation of Building Manual

· Shergold-Weir "Building Confidence" Report (2018)

Provide Building Manual for use of owners, operators, and fire practitioners; effective regulation of fire practitioners; enhance trustworthiness of fire safety ESM documentation; more effective regulatory and compliance action

· Construct NSW, Improving Fire Safety Industry Report, NSW Government (2021)

Competency, accountability framework for dutyholders (fire safety, building approval, builder); final inspections by Competent Practitioners inc. fire engineer, fire authorities, services; risk-based building classifications and insp.

· IBQC, Principles for Good Practice Building Regulation (2020), Risk-Based Building Classification and Inspection Guidelines (2024)

Fire Safety Strategy Report demonstrating holistic compliance (DtS & PBD); design and as-built integration checking; provide Building Manual

· Engineers Australia Society of Fire Safety, Holistic fire safety engineering practice guide, public draft (2025)

Low-hanging fruit

Start with what we've got



All buildings and structures are assigned an Importance Level

- Table B1D3a
 - IL1 – IL4*
 - Relates *only* to structural provisions – *not* fire safety

NCC already has a mechanism for Complexity Level

- Table 2
 - Low, Medium, High, Very High
 - Has *no* provisions tied to it whatsoever

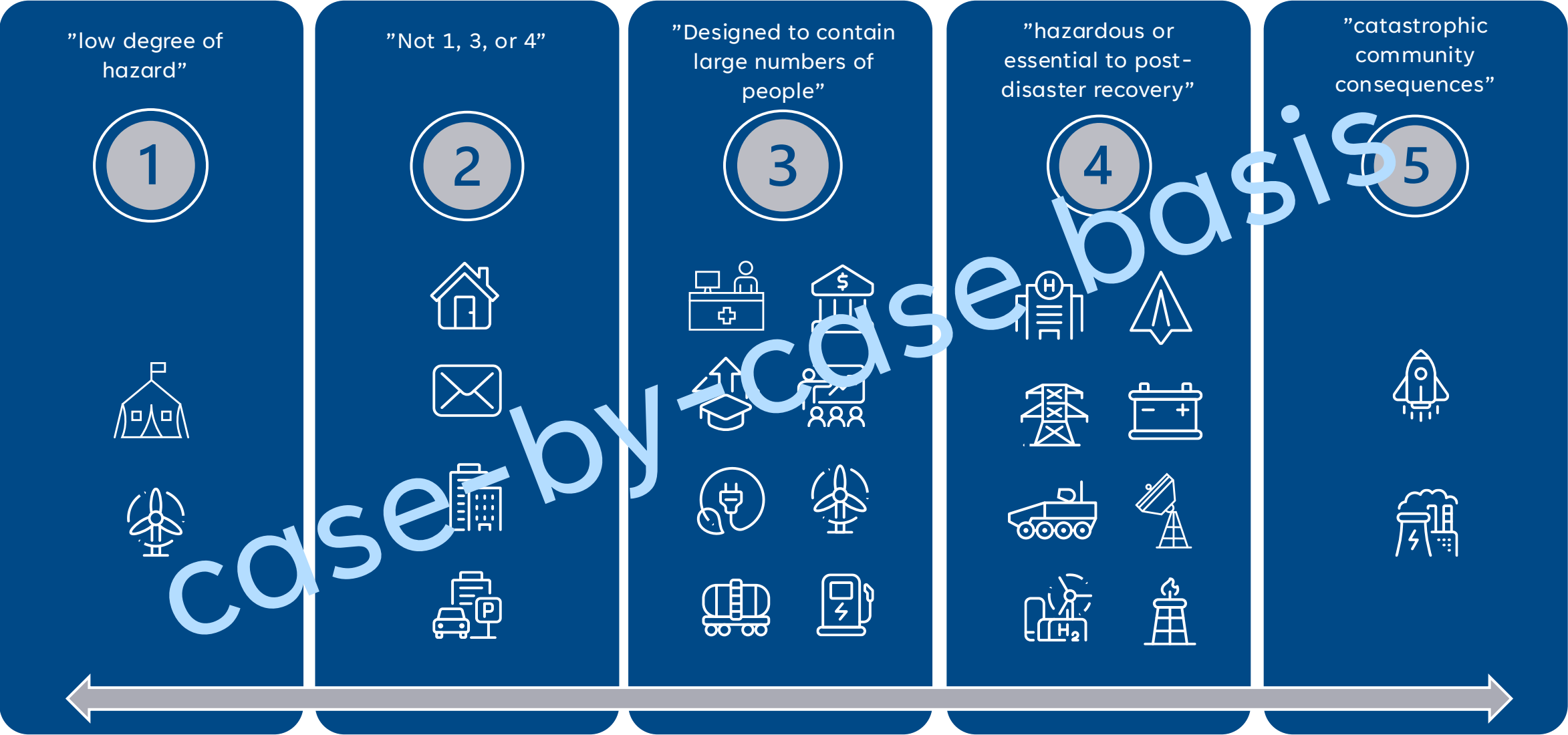
Importance Level – Table B1D3a



Importance Level – NCC Guide*

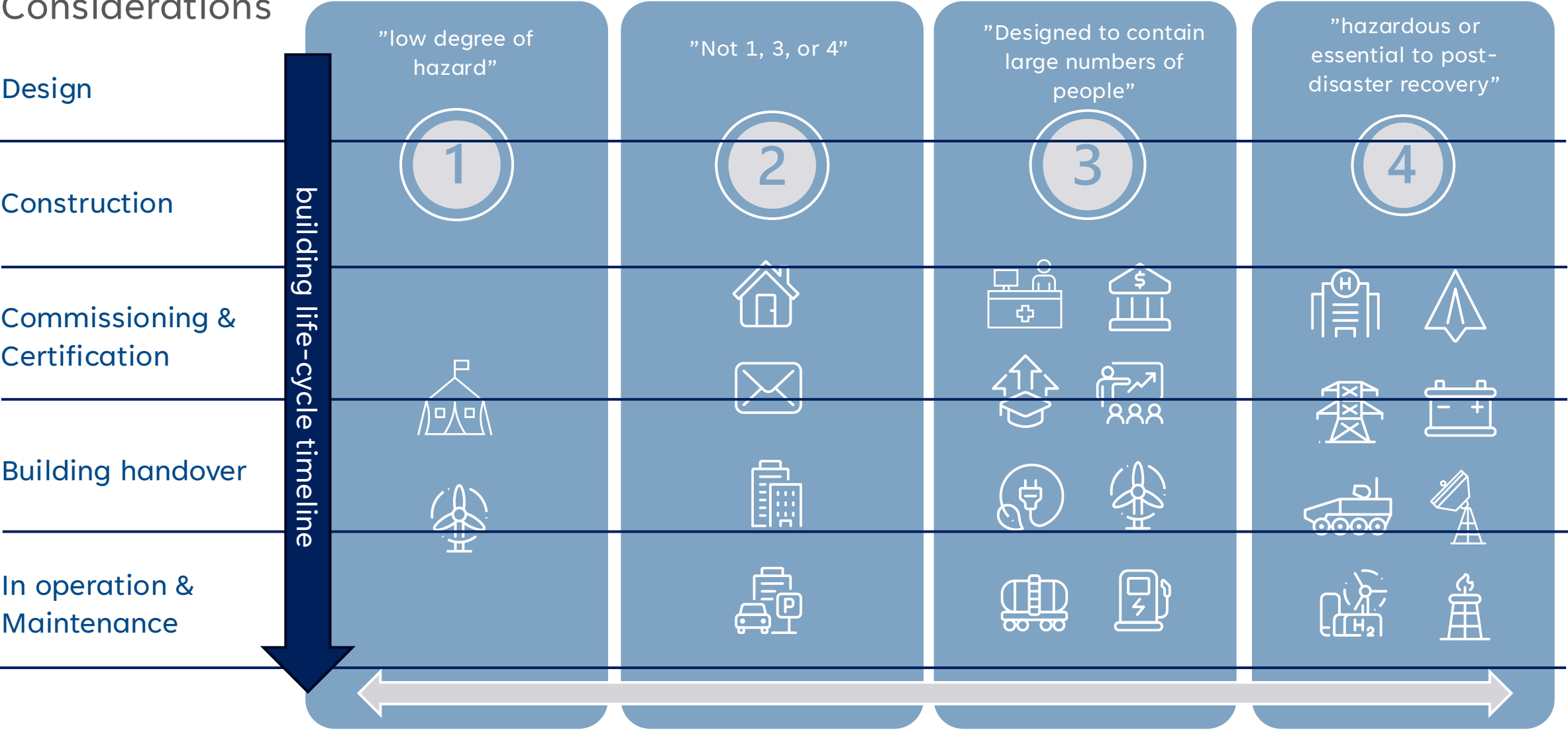


Importance Level



Importance Level

Considerations



VH	Very High Meets all 4 complexity criteria, <u>or</u> Importance Level 4 or 5
H	High Meets 3 complexity criteria
M	Medium Meets 2 complexity criteria
L	Low Meets only 1 complexity criterion

Complexity criteria				
(a)	(b)	(c)	(d)	(e)
Attributes · ≥ 25 m · Structural PBD · Fire Safety PBD · disaster-prone area	Class 2 · ≥ 3 storeys	Occupant numbers · Occupant load ≥ 100	Occupant characteristics · ≥ 10 people requiring assistance to evacuate	Importance · IL ≥ 4
				

Complexity Level

L

Low

1 criterion

VH

Medium

2 criteria

VH

High

3 criteria

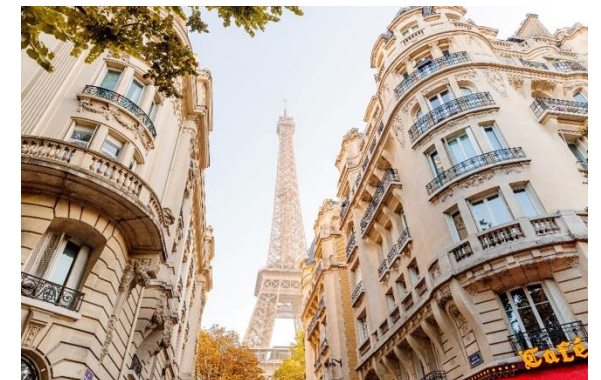
VH

Very High

All 4 criteria, or IL ≥ 4

Considerations

- Planning
- Design
- Construction
- Commissioning
- Certification
- Handover
- In operation
- Maintenance



Important and Complex Buildings - Overlay



So how do we do it?



Let it flow through...

- Planning
- Design
- Construction
- Commissioning
- Certification
- Handover
- In operation
- Maintenance

Fire safety as a design discipline



- Australia is rather unique in its ‘departure engineering’ process
- Private Certification embedded in the design and construction process
- Certifier (RBS, PCA) is *not* a designer (AIBS Code of Conduct)
- Fire Safety Engineer to develop (NCC C,D,E)
 - New Zealand
 - UK
 - Sweden

- “Fire Safety Engineering is an emerging field”
- BRE research in 1963
- Rasbash, Edinburgh University 1973; offered MSc 1974
- Margaret Law 1973 (Arup)
- First Fire Symposium in 1975
- Worcester Polytechnic Institute 1980
- Lund University 1986
- Canterbury University 1991
- BCA 1996

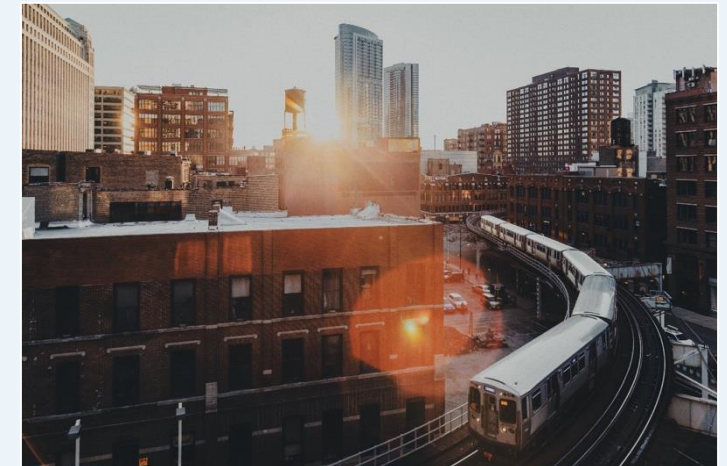
“Time to grow up from 28 y/o to mature, middle-aged parent”
 – Stephen Kip, OAM (2025)

Fire safety objectives

- **Compliance**
 - Applicable Building Act & Regulations
 - National Construction Code
 - Local / AHJ guidelines
 - Other applicable laws
 - WH&S (PCBU)
 - Rail (RSNL)
 - Dangerous goods
- **Owner / Operator standards & guidelines**
 - Rail / Transport Authority (SFAIRP)
 - Defence asset
 - Government asset
- **Industry guidelines**
 - Engineers Australia
 - NFPA, SFPE
- **Client objectives**
 - Aesthetics, openness, accessibility, operational continuity
- **Security & Safety**
 - Large assembly, threat profile
 - Societal needs-case
 - Media profile
- **Insurer's standards and guidelines**
 - Tolerable- / maximum loss
 - Premiums offset
- **Fire brigade considerations**
 - Local capacity, accessibility
 - Emerging risks & E1D17
- **End-user needs**
 - Ease of operability and maintenance
 - Reliability and longevity of fire-safety systems
- **Builder**
 - Buildability, clarity of IFC docs
 - Speed of construction

Famous quotes:

- “Client objective is an NCC compliant building”
- “[Design analysis] only addressing DtS departures as identified by [RBS / PCA]”
- “[Design analysis] does not account for arson”

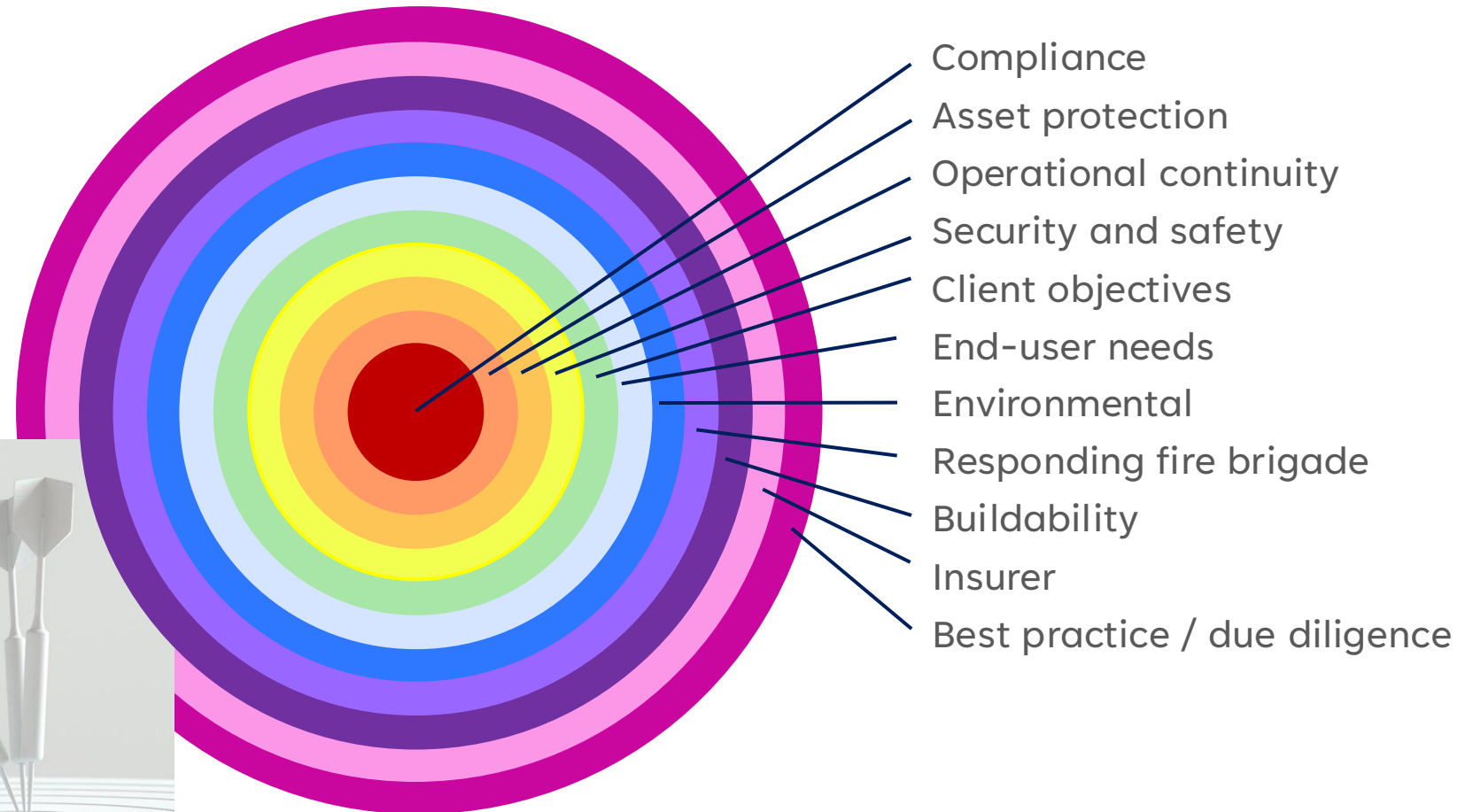


Building to purpose

Finding the 'target'



Fire safety objectives

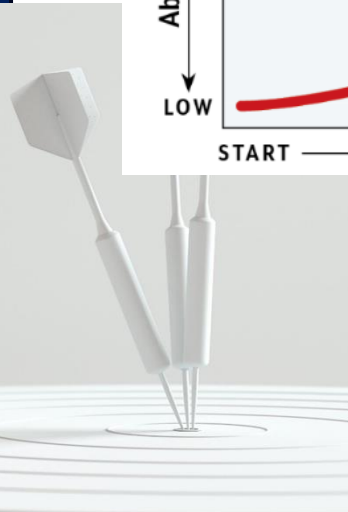


Building to purpose

Moment to act

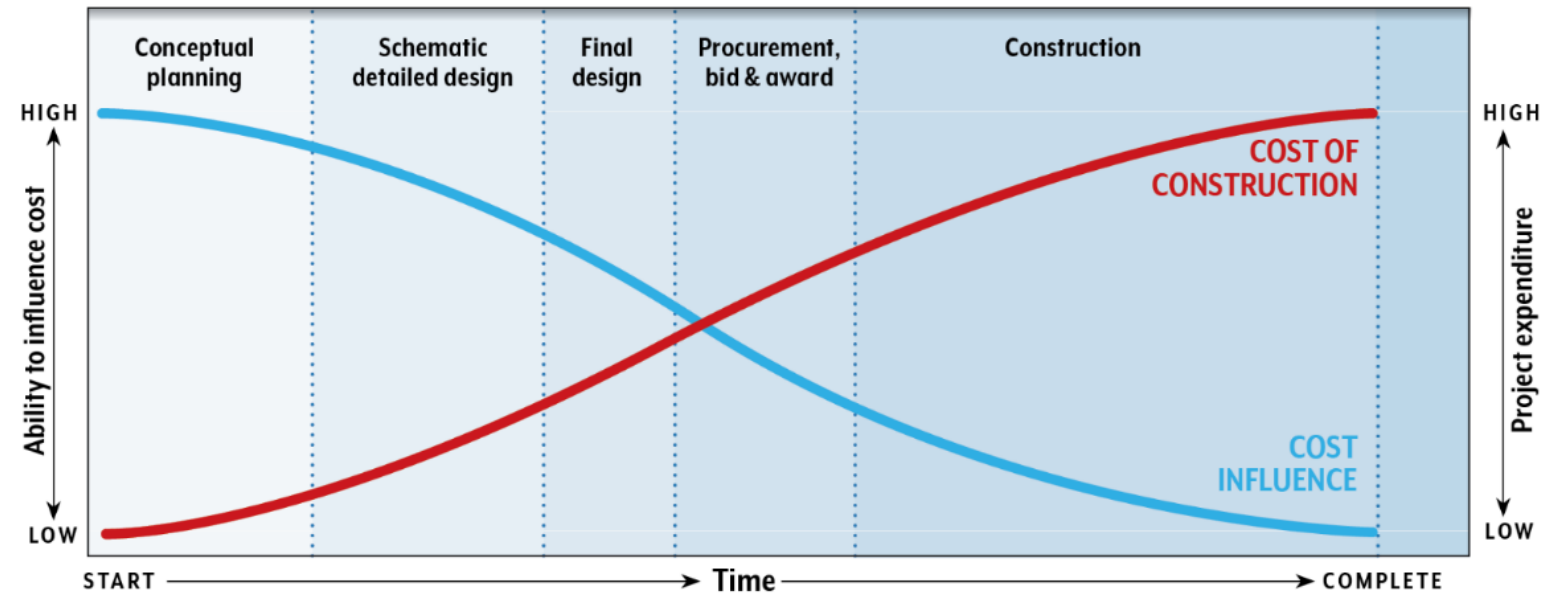


FireNZ2024 Lifetime Achievement Award



Opportunity for change

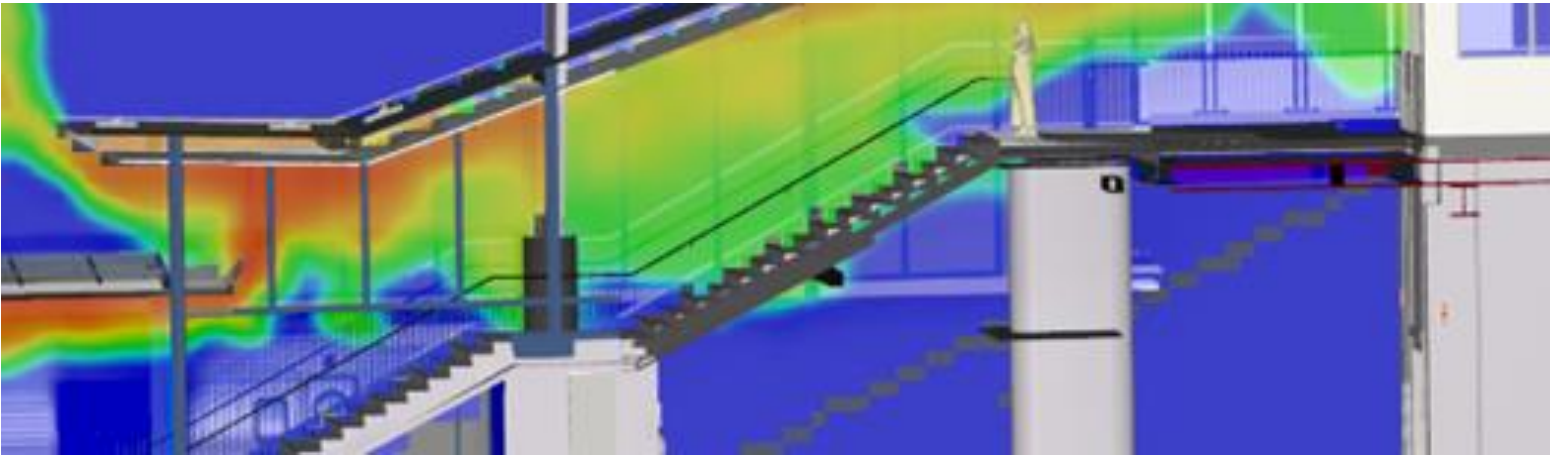
COST INFLUENCE CURVE



Martin Feeney (Dist. Fellow, Engineering NZ),

- *Feeney's Rules of Holistic Fire Design*

“#1: Engage an experienced fire engineer early in the design”



- “In the built environment, the fire safety strategy is the description of the ensemble of elements - and the narrative by which these elements work together - to ensure satisfactory performance in fire of the building”
 - Assoc. Professor D. Lange (2025)
- “Provides details on how the building design addresses the fire safety objectives of the building through the provision of fire safety measures, written in a manner that is accessible to relevant stakeholders”
 - Engineers Australia Society of Fire Safety Practice Guide: Holistic Fire Safety Engineering (2025)

4. Documentation Guidelines – Outline

This section outlines the content and preferred format for fire engineering **design documentation**.

- The **fire designer's** documentation is provided for at least two purposes:
- The design process – during the design process the documentation identifies what must be included in construction documentation (supplied for example by architects, engineers or the building owner) to meet the fire safety design requirements
 - **Building consent** approval – the documents provide the justification that the fire safety design complies with the **building code**.

ITEM	DESCRIPTION	DESIGN DOCUMENTATION
A	Building description and use	Intended use (5.1) Fire Engineering brief report Plans and specifications (5.2) Verification of Building code compliance (5.3)
B	Fire engineering design philosophy	
C	Means of escape	
D	Fire safety systems	
E	Control of internal spread of fire and smoke	
F	Control of external spread of fire	
G	Fire Service access and fire fighting facilities	
H	Construction inspection	Owner's inspections (5.4)
I	Compliance schedule	Ongoing inspections and maintenance requirements (5.5)
J	Miscellaneous information	Other information (5.6)

- IPENZ Practice Note 22 (2011)

Fire Safety Drawings

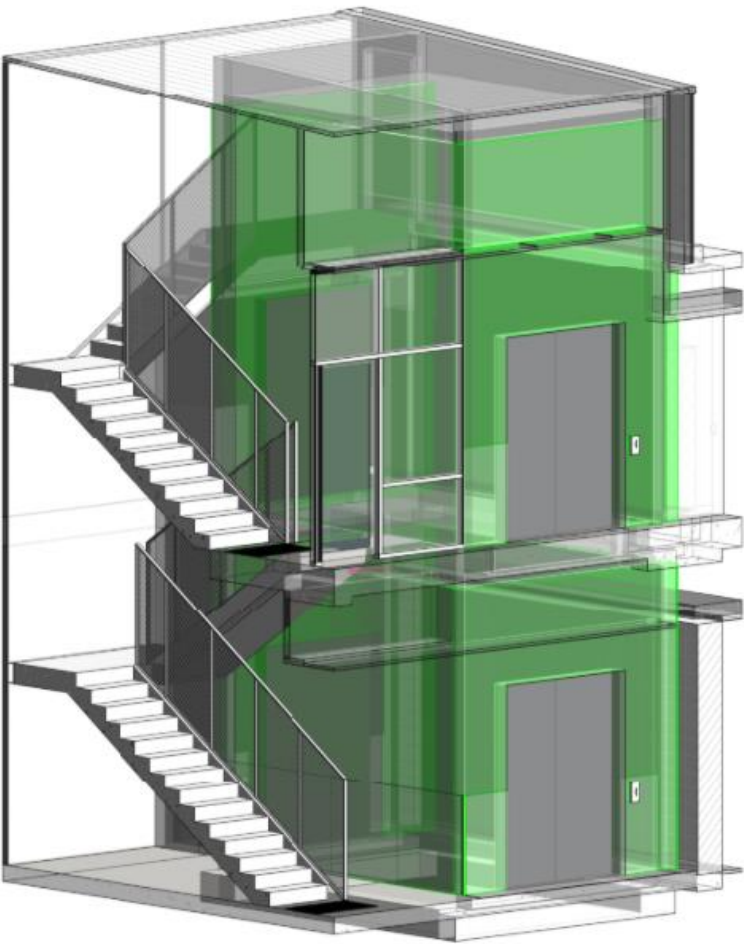
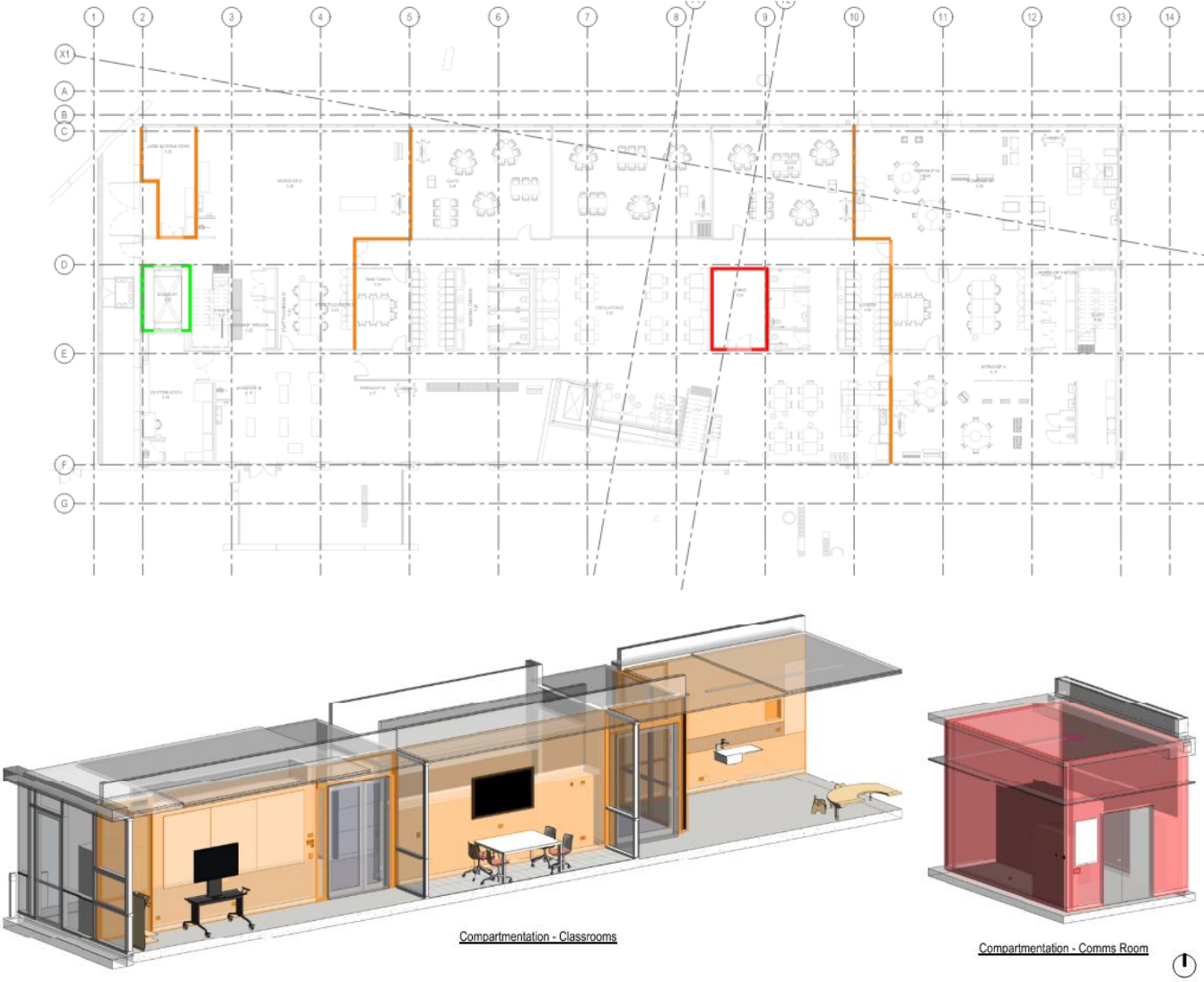


- Traditional Australian Fire Engineering deliverables
 - FEB / PBDB
 - FER / PBDR
- No other design discipline designs via reports
 - All other design disciplines work in drawings / model
 - Builder works off drawings / model
- Owner operator considerations
 - Maintenance / fire safety schedules

Fire safety design parameters

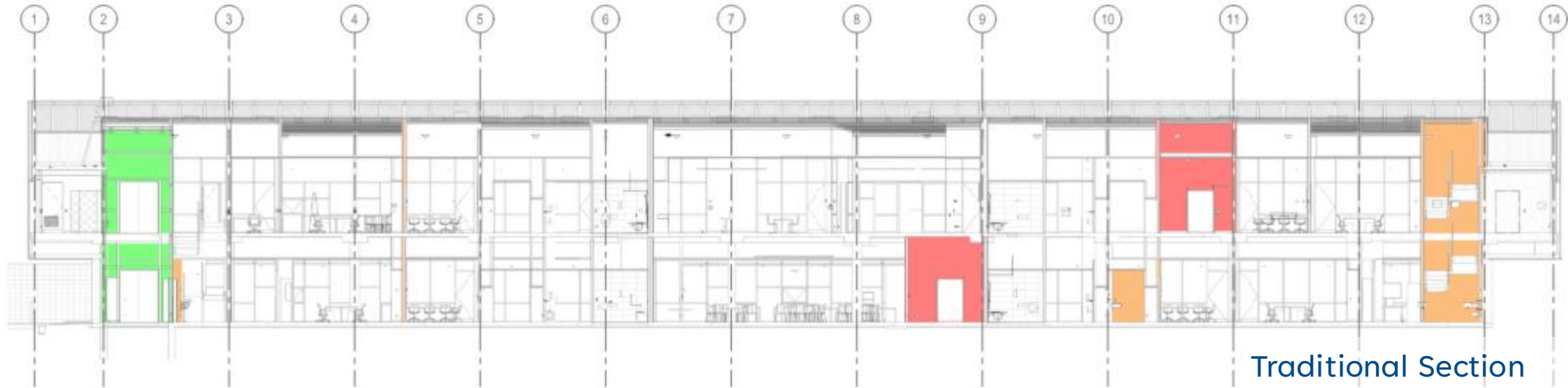
- Means of egress
 - *Architectural*
 - *Electrical*
- Compartmentation
 - *Architectural*
 - *Mechanical*
 - *Structural*
- Detection & suppression
 - *Fire protection*
- Firefighting provisions
 - *Architectural*
 - *Fire protection*
 - *Hydraulics*
- Smoke hazard management
 - *Mechanical*
 - *Architectural*

Fire Safety Drawings - Compartmentation

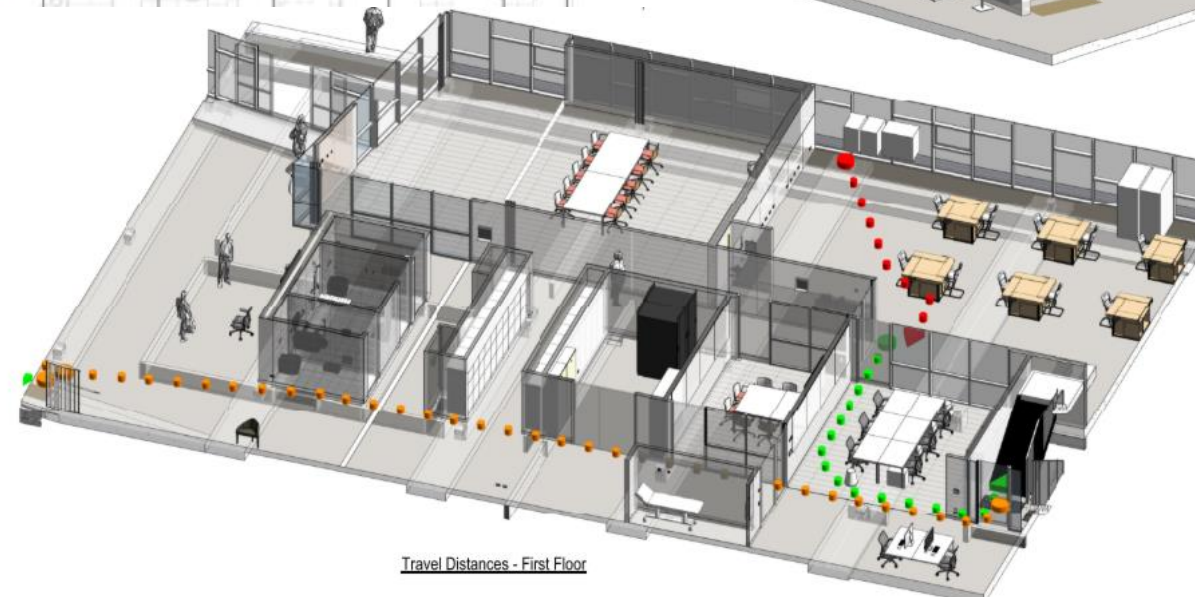
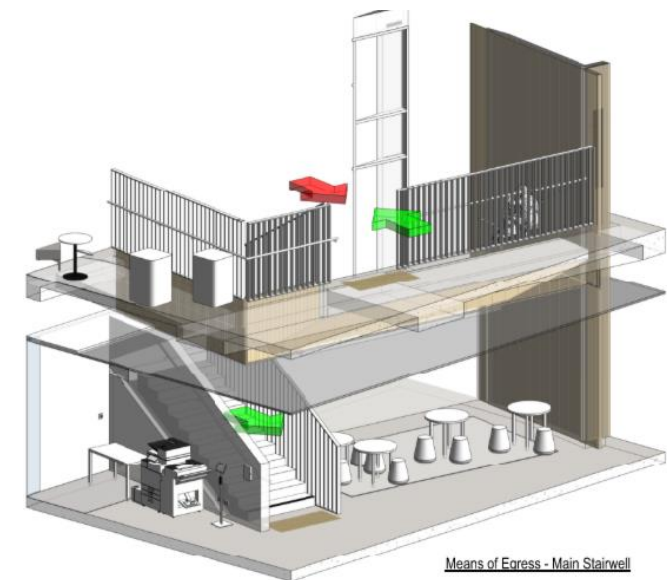


Compartmentation - Goods Lift

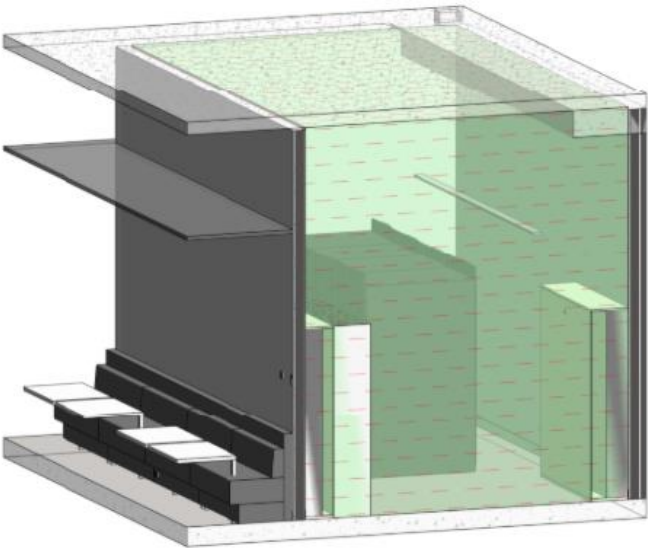
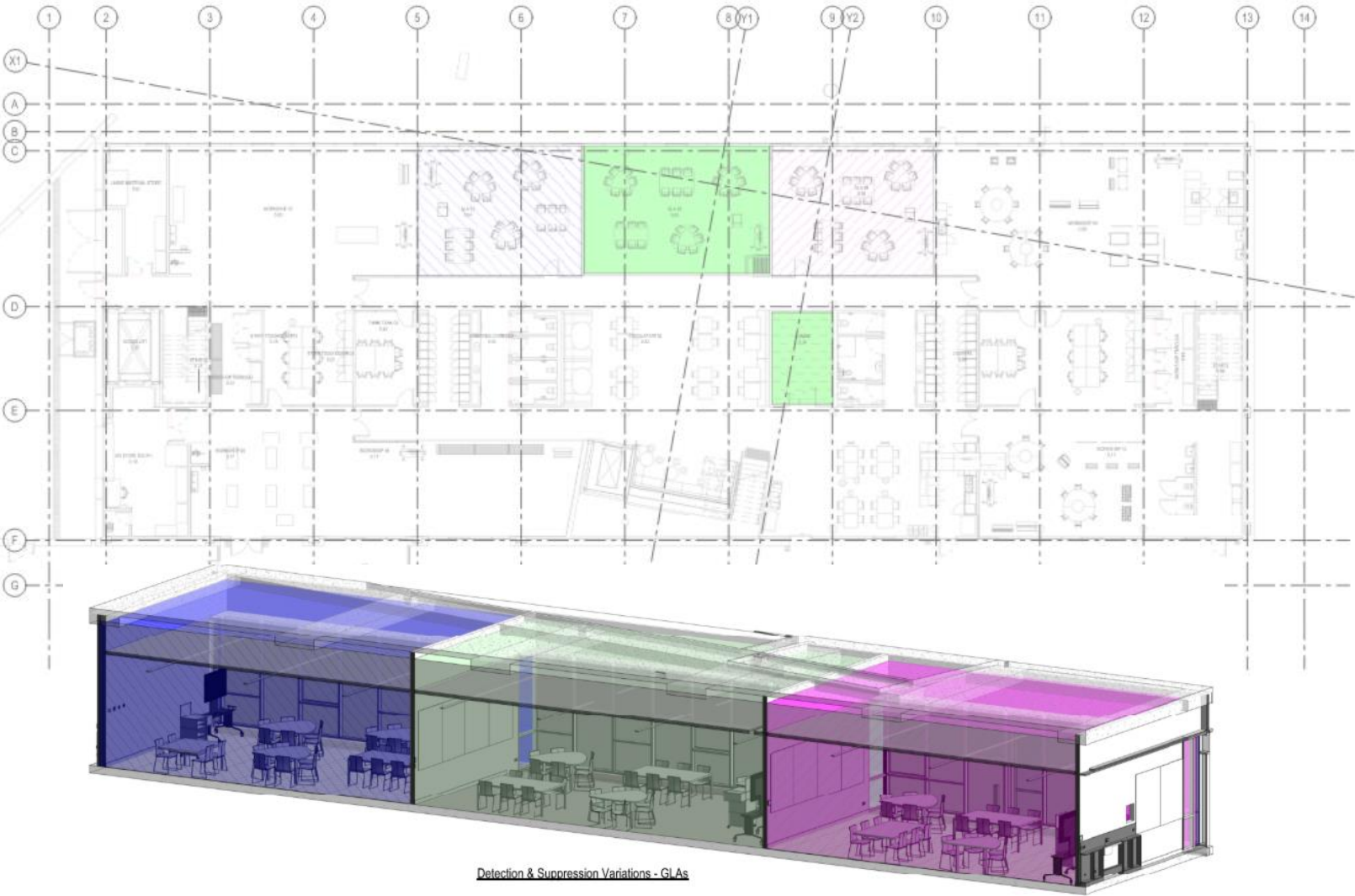
Fire Safety Drawings - Compartmentation



Fire Safety Drawings – Means of Egress

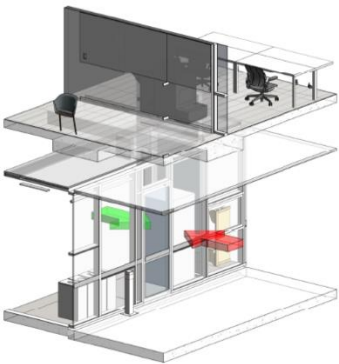


Fire Safety Drawings – Detection & Suppression



Detection & Suppression - Comms Room

Fire Safety Drawings – Firefighting provisions



Ingress / Egress - Open Store Exit



Fire Fighting Provisions - Stairwell

Third-party peer reviews

“Peer review is an important, regular and accepted process associated with many building design disciplines such as structural engineering or energy efficiency. However, nationally there is not a consistent culture of peer review for fire safety performance solutions. This is likely to contribute to the acceptance and implementation of poor design solutions overall.”

Fire Protection Association Australia.

- “Independent third-party review should be considered as part of any building approval process”

ABCB Discussion Paper, Independent Third-Party Review – A response to the Building Confidence Report (2020)

- Where to start?
 - Important and/or Complex buildings seem as reasonable a place as any.

Independent third-party peer reviews

- “Gateway points in design”
 - *Dame Hackett Report*
- “Genuine independent third party review for ... certain types of buildings”
 - *Recommendation #17, BCR*
- “Safety critical aspects ... be subject of mandatory independent peer review”
 - *Principle 6, IBQC “Good Practice”*
- “Impose particular duties on those involved with higher-risk buildings”
 - *Grenfell Tower Inquiry report*



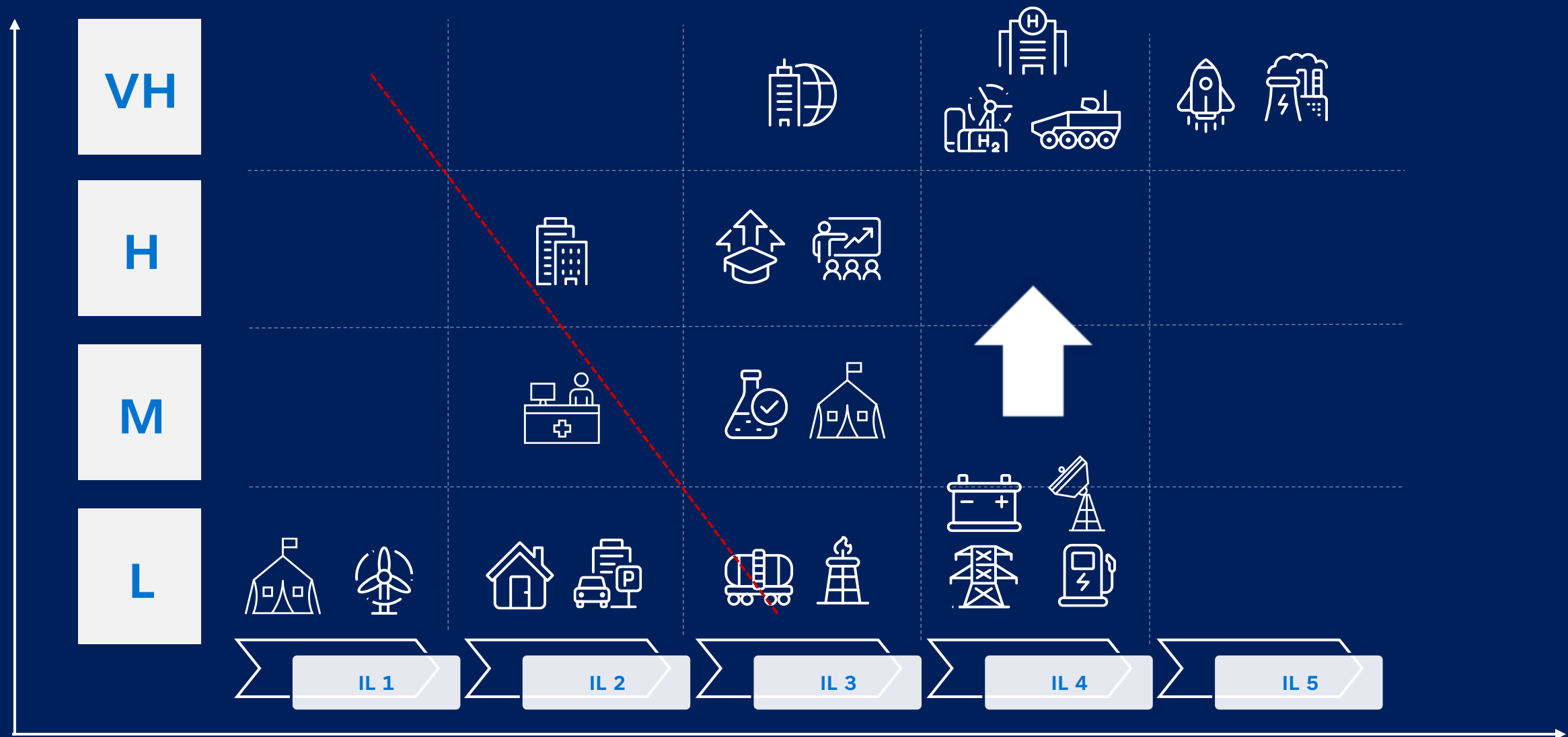
- “nearly 90% of building permits audited ... did not demonstrate basic compliance”
 - Stephen Kip, OAM
- “to ensure that adequate information is provided to the end-user to enable ongoing management and maintenance of the fire safety measures required by the fire safety strategy report”
 - Engineers Australia Society of Fire Safety Practice Guide
- “Statutory requirement for FSSR” (GTI); “Provide Building Manual for use of owners, operators, and fire practitioners (Construct NSW); “Implementation of Building Manual” (BCR)

Contents of *Building Manual**

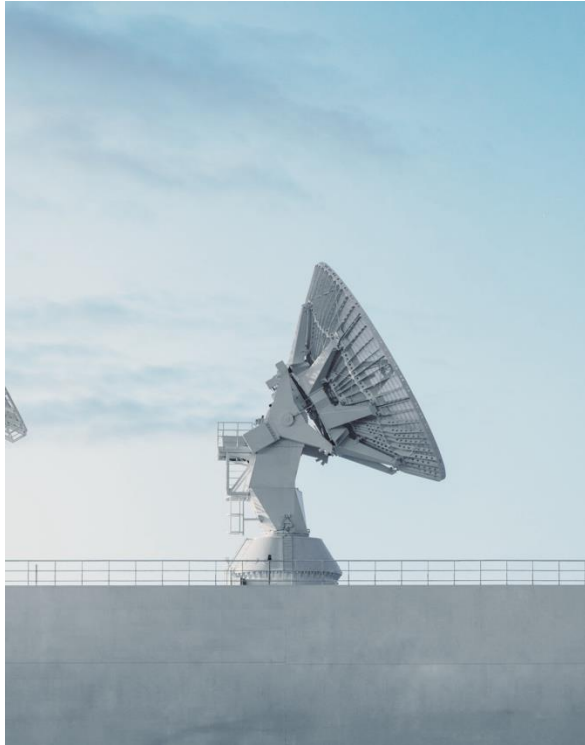
- Fire Safety Strategy Report
- Compartmentation dwgs
- Egress dwgs
- Detection & alarm dwgs
- Suppression dwgs & block plans
- Firefighting provisions dwgs
- Smoke control dwgs
- Mechanical dwgs
- Cause & Effect matrix
- Certificates
- Penetration register

* Industry definition of BM TBC

Important and Complex Buildings - Overlay



Important and Complex Buildings



Important Buildings & Facilities

Fire safety and engineering measures ~~must~~ (really, really should) be provided, commensurate to the building's or facility's function, risk, and regulatory requirement – proportionate to its Importance Level.

Baseline data and performance should not be negotiable.

- Fire Safety Strategy Report & Drawings
- Business continuity ~~must~~ should be considered
- Clear compliance documentation and Building Manual



Complex Buildings & Facilities

Complex buildings ~~must~~ (really, really should) consider adopting a holistic fire safety engineering design approach.

Building lifecycle, from inception to decommissioning, should be accompanied by peer and professional scrutiny – proportionate to its Complexity Level

- Fire Safety Strategy Report & Drawings
- Third-party peer reviews should be matter-of-course
- Clear design documentation and Building Manual



“#1: Engage an experienced fire engineer early in the design”



**Wrapping up *Purpose to
build and building to
purpose***

Thank you!