The Birmingham Gateway Project

Fire Safety in Operational Buildings While Upgrades Take Place

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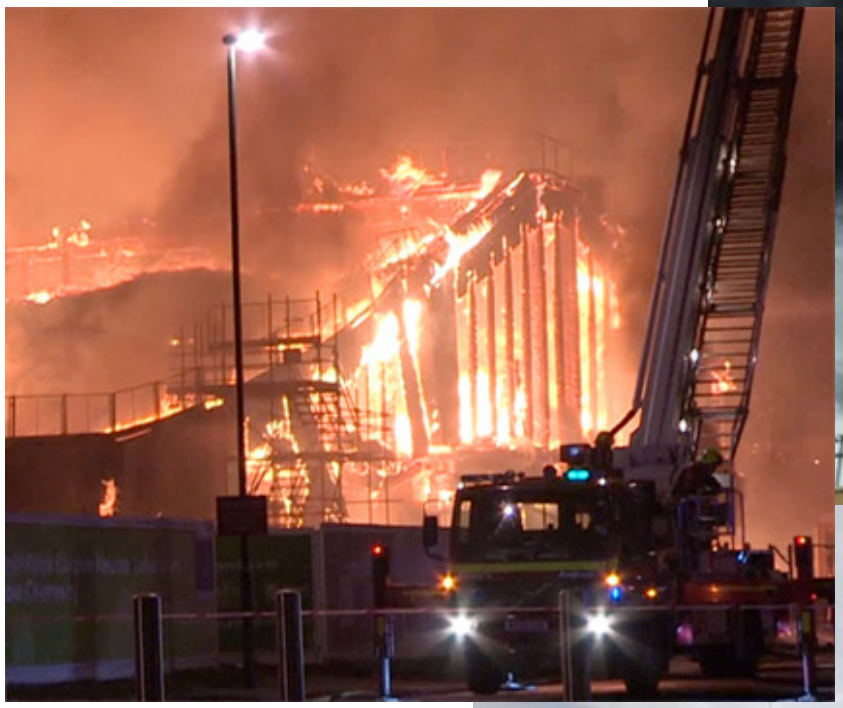
When it goes wrong



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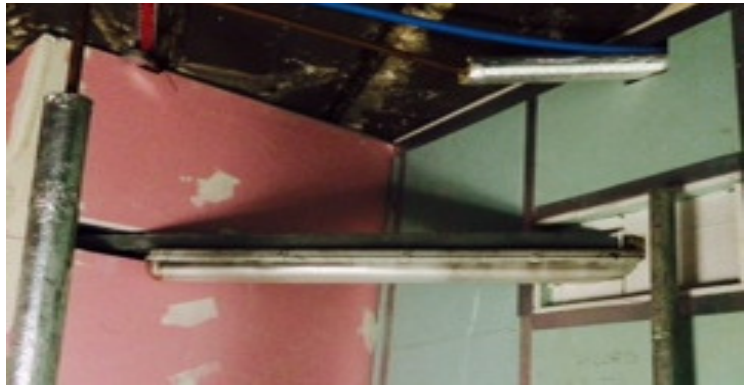
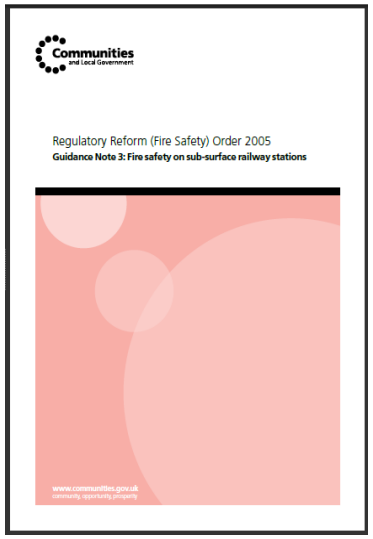
Why it goes wrong

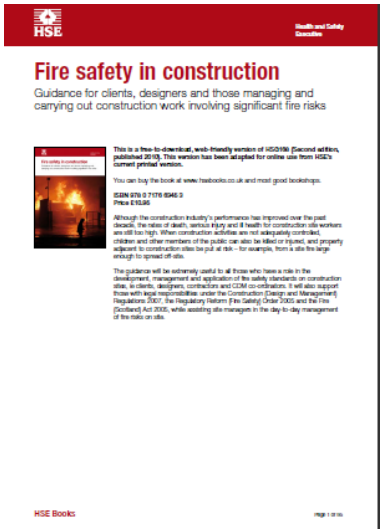
- Ill-managed hot work (Acetylene)
- Combustible management – No control
- Incorrect/un-certified compartmentation

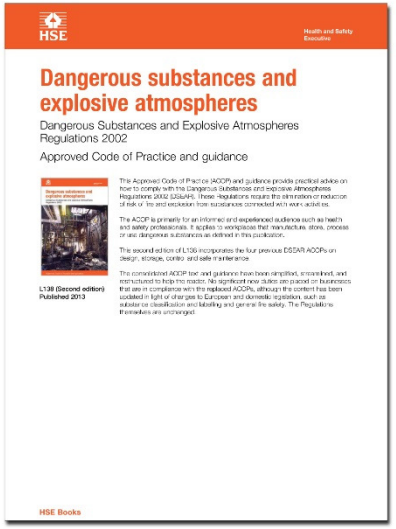


- Lack of equipment / systems
- Blocked escape routes/poor signage
- Incorrect commissioning of temporary systems
- Lack of co-ordination between stakeholders

UK legislation and guidance



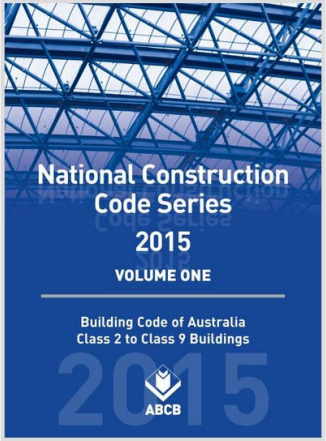


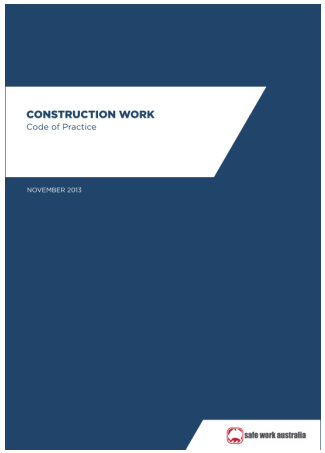


HSG 168 "It is essential that fire safety measures are considered throughout all stages of the procurement and design process and implemented effectively during the construction phase"

CDM Regs " Suitable and sufficient steps shall be taken to prevent, so far as is reasonably practicable, the risk of injury to ANY person during the carrying out of construction work against fire and explosion"

Australian legislation and guidance





No specific code of practise for managing fire safety in construction. We often use HSG 168 as a reference for best practise.

How best to manage construction site fire safety?

Construction Work COP "So far as is reasonably practicable, the duty holders involved must consult each other on the hazards and risks associated with the building and work together on appropriate design Solutions".

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Who's responsible for fire safety in construction?

- Principle Contractors / Sub-Contractors

Occupied buildings under construction?

- Building tenants (if remaining operational)
- Stakeholders
- Client
- Local authorities
- Health and Safety executive

How do all these duty holders co-ordinate and communicate the changes to fire safety measures in a partially occupied building?

Birmingham New Street

Birmingham New Street is one of the UK's largest rail stations

120,000+ passengers use the Station each day

Original design capacity was for 80,000 passengers

A train departs or arrives at the Station every 37 seconds

The Station/shopping centre can cater for 14,000 people at any one time

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Construction Phase - Aims and Objectives

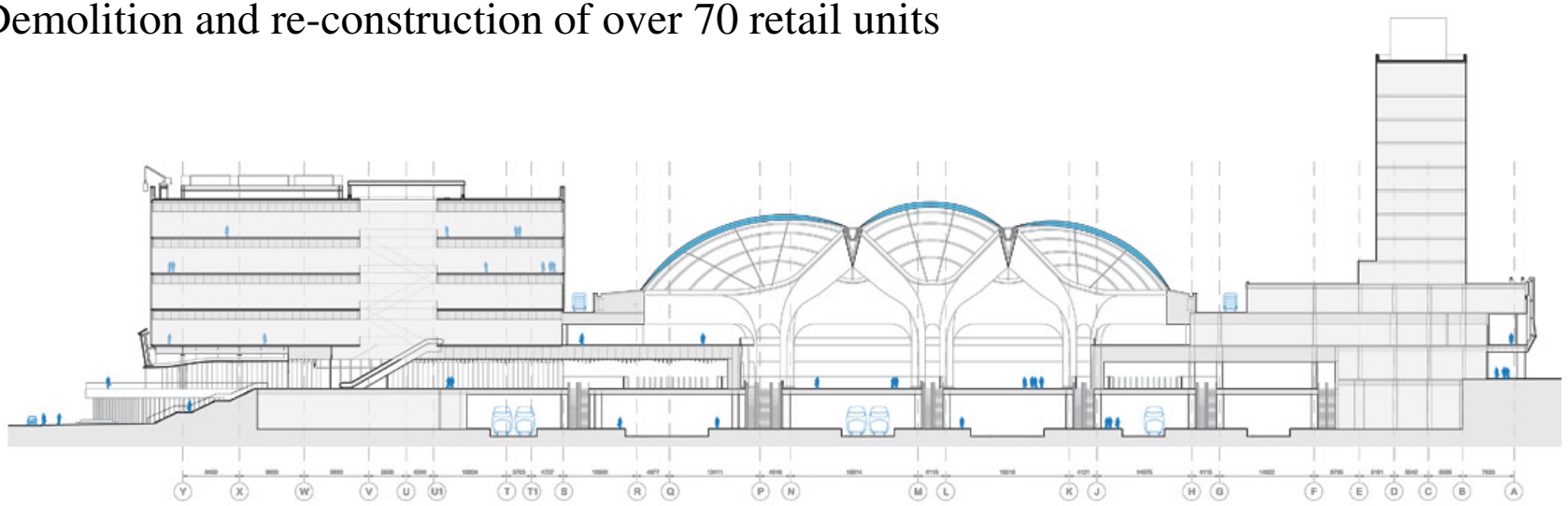
Continued operation of Station and shopping centre over the 5 year construction period

Construction of new atrium interconnecting the Station and shopping centre

Station Concourse area increased by 3 times it's original size

Refurbishment of all 12 sub-surface train platforms

Demolition and re-construction of over 70 retail units



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Original Station

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Station during construction

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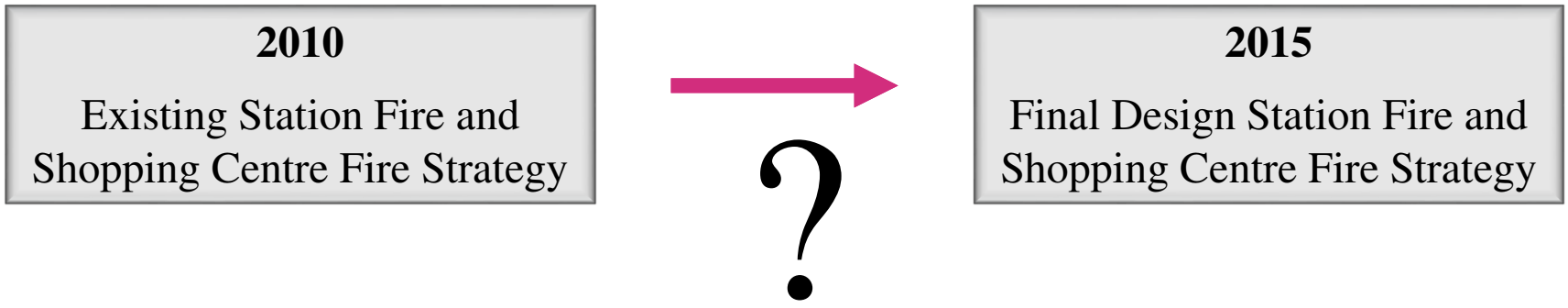
The role of the fire engineer?

HSG 168 "more complex and high-risk projects are beyond the scope of this guidance and you may need additional help with these from a competent specialist".

Arup's role

Arup were employed by the Principle Contractor to be there competent fire safety advisor throughout the 5 year construction phase of the project.

We produced fire design solutions for all construction changes and co-ordinated the new fire safety measures and management updates with all duty holders.



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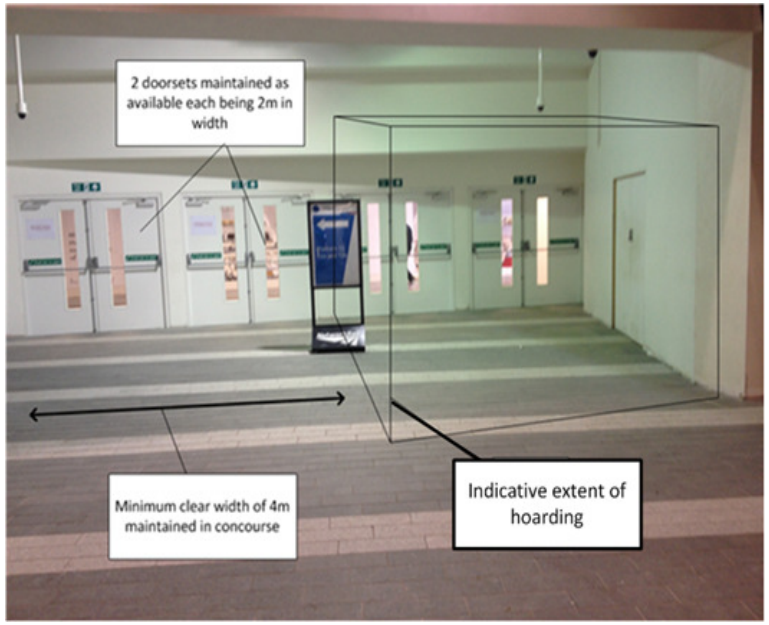
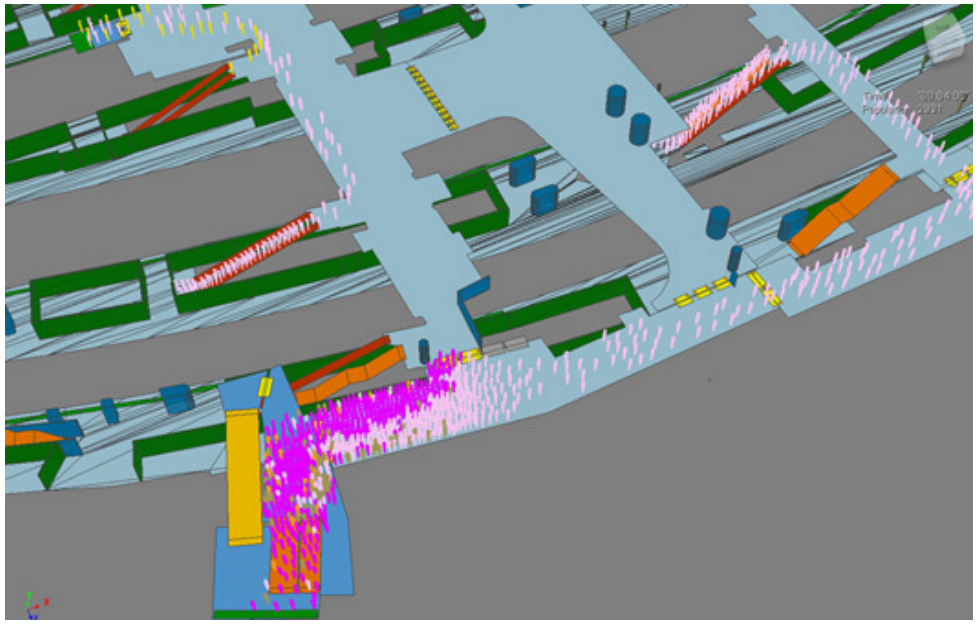
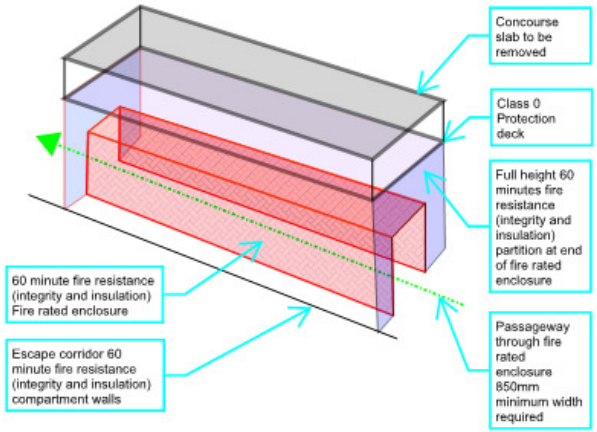
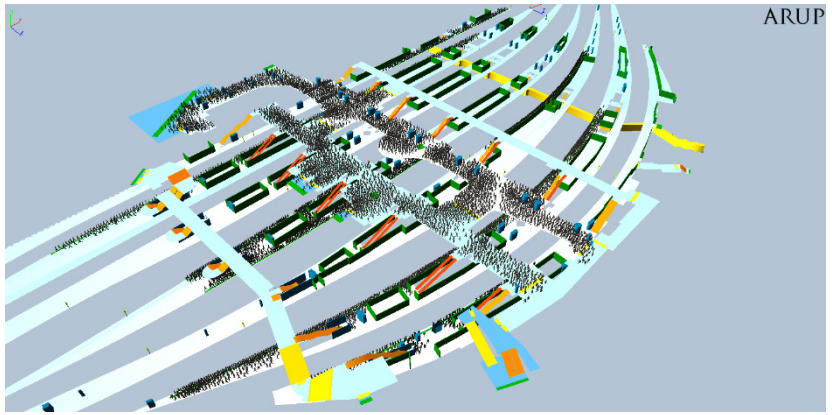
Risk Assessment example – small item work









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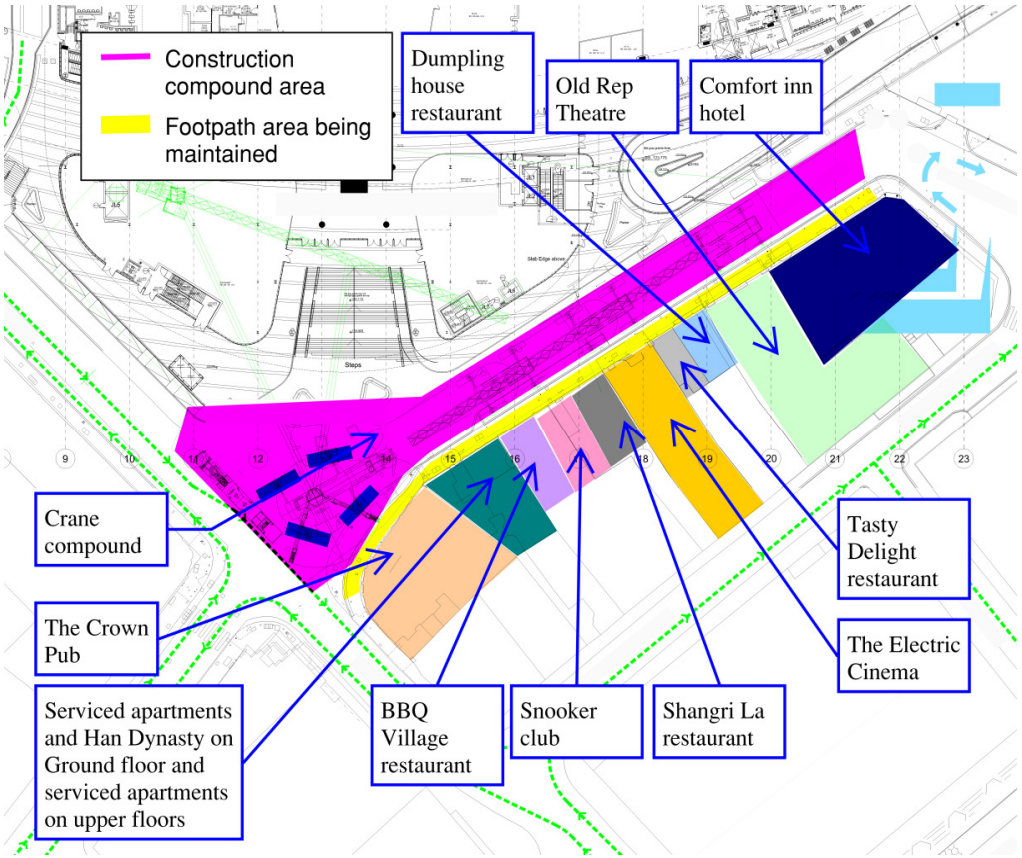
Impact on Fire Service access and facilities



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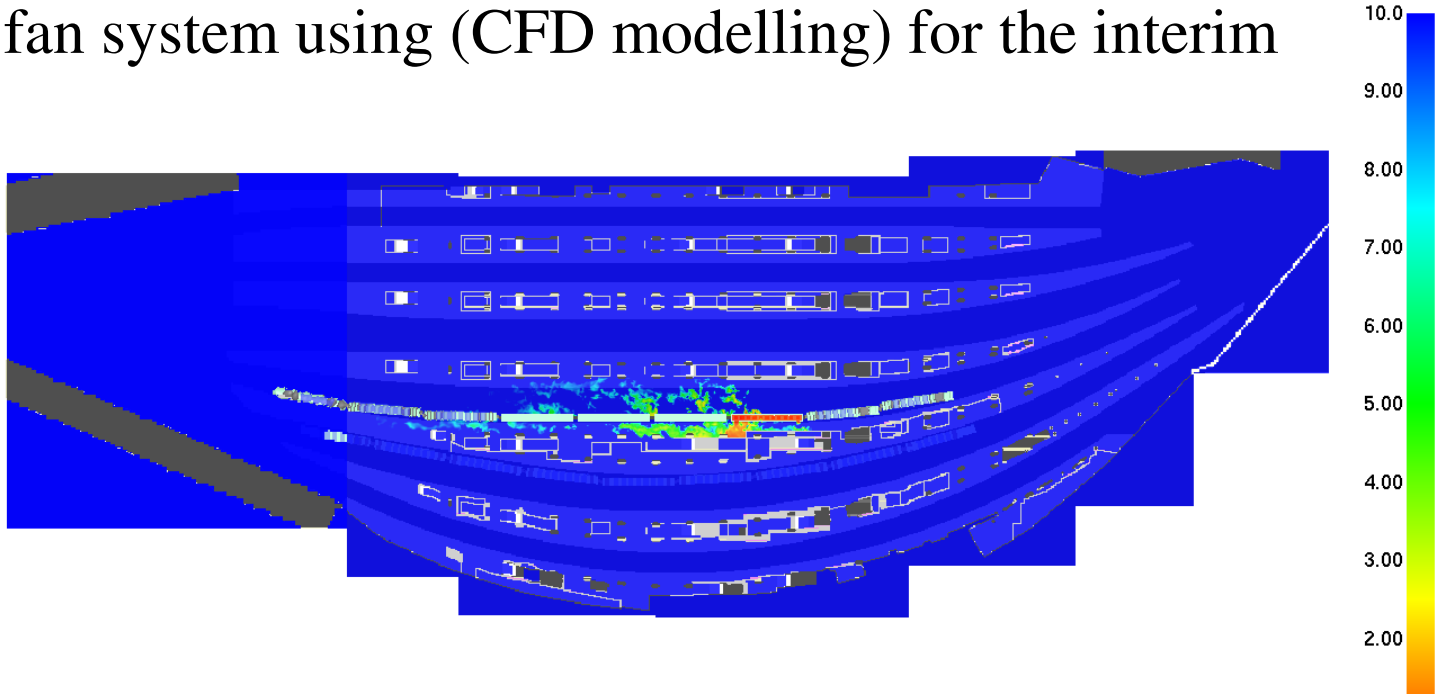
Technical Assessments – Smoke Control

- The existing smoke exhaust system was required to be removed at Platform level before the new smoke exhaust could be built.
- We assessed the performance of a temporary smoke control impulse fan system using (CFD modelling) for the interim period



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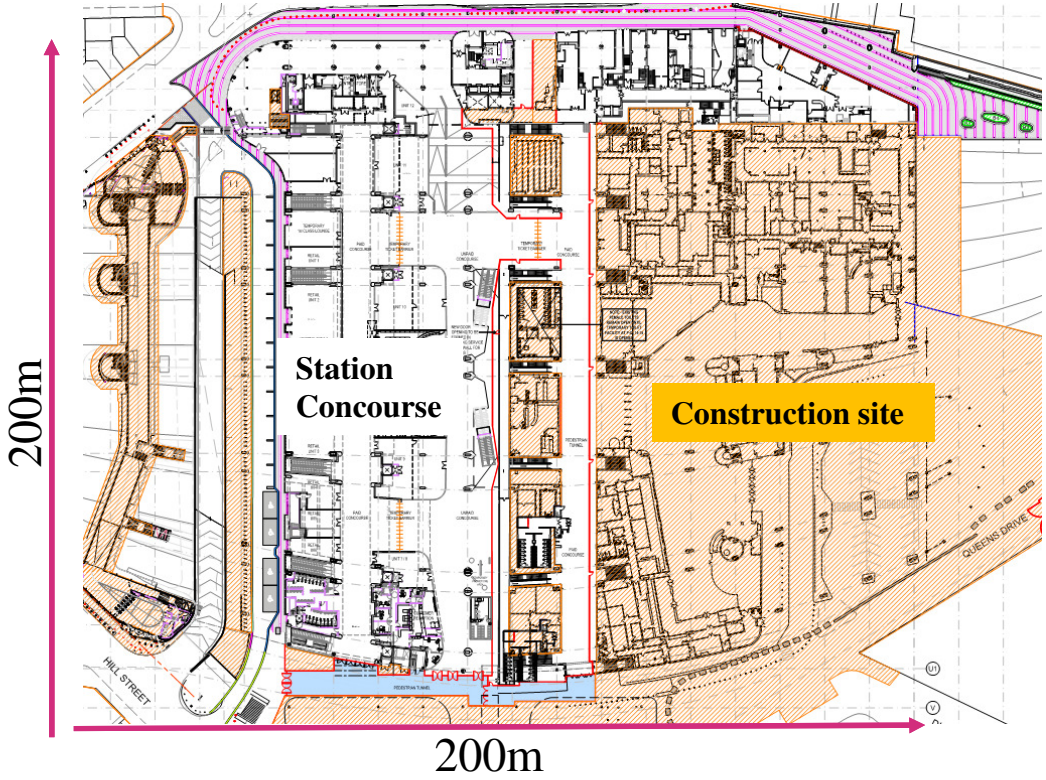
Extensive Area Risk Assessments



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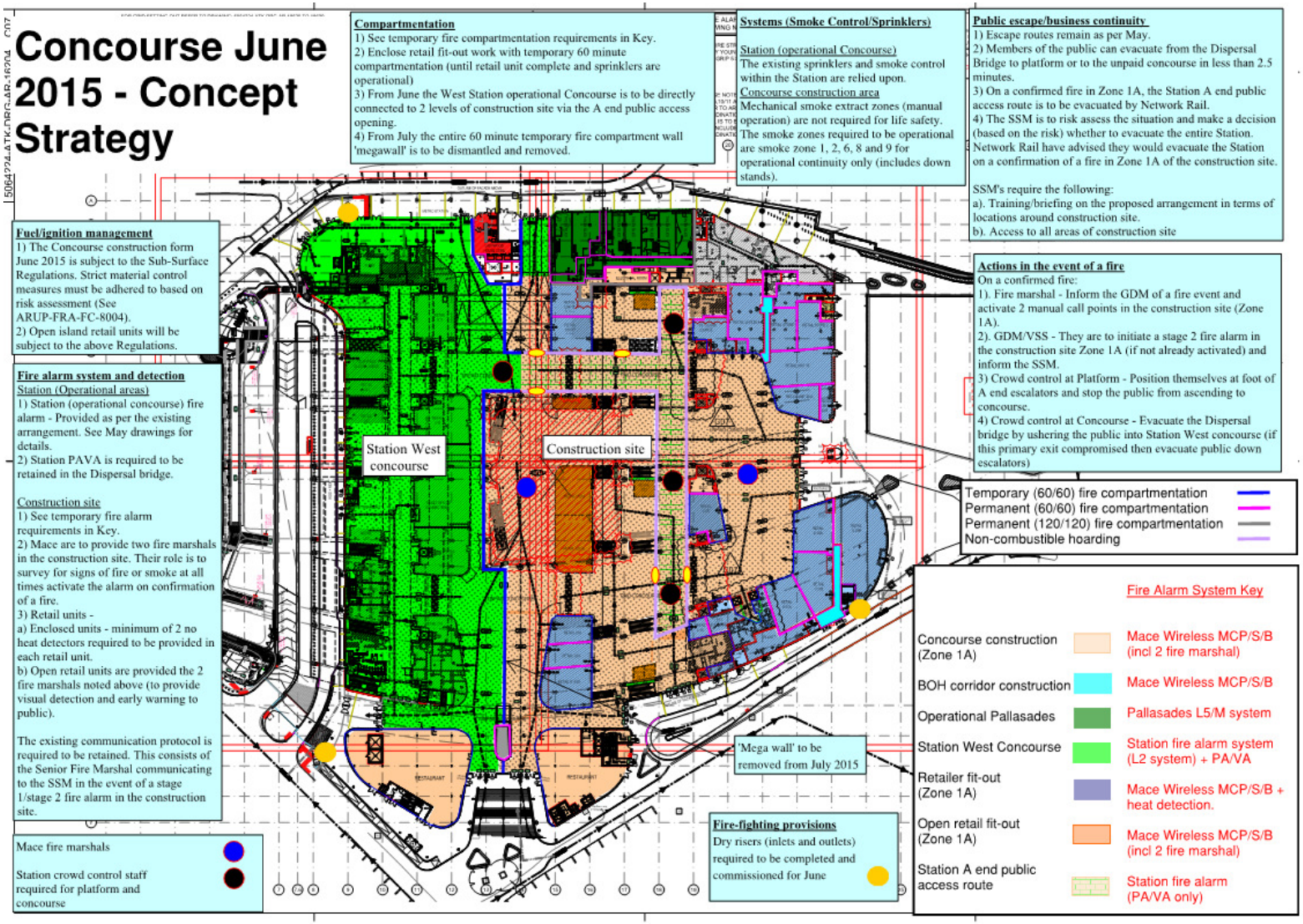
Detailed risk assessment solutions



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Project life cycle

Over the 5 year construction period Arup produced over **300 fire risk assessments**.

5 Arup fire engineers were permanently based on site for to assist the client in meeting their construction programme and maintaining a high level of fire safety.

Our role evolved from primarily technical analysis and assessments, to on site inspections and training, enforcement, Stakeholder engagement and 3rd party witnessing of fire system testing and commissioning.

Up to 3500 construction workers on site during the peak operations.

Lessons Learned

- Fire strategies and assessments are no use if not understood and implemented
- Temporary commissioning of fire safety systems is extremely difficult – impact on operational systems
- Communication and co-ordination between all parties is key
- Integration of technical justification with practical solutions and robust emergency response procedures is needed on high risk densely populated projects.
- Learn from near misses/incidents; hold event reviews
- Fire safety designers should provide greater input to identify potential issues through construction