

Sydney Theatre Company

**STC 50**

## SEARs - Fire Engineering Report

Fire Engineering Report

Issue 2 | 4 November 2016

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 250601

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# ARUP

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## Executive summary

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This report has been produced in response to the Secretary's Environmental Assessment Requirements Application Number SSD 7561 on behalf of The Sydney Theatre Company in support of the State Significant Development Application.

This report addresses issues required for a SSD and specifically responds to Key Point 7 of the Plans and Documents section of the Secretary's Environmental Assessment Requirements, which reads:

- The EIS shall include a Fire Engineering Report that details alternative fire engineering solutions as a result of the proposed removal of the existing fire tunnel

And dot point 10, which reads:

- Fire Engineering Report

This report is intended to outline the strategic fire safety philosophy for the project and fire safety measures proposed to be provided as part of the strategy. The fire engineering design that is proposed aims to satisfy both the architectural desires for the new space while maintaining an acceptable level of fire safety throughout the building.

## Conclusion

Based on our review of the project documentation, it is considered that performance based fire engineering can be used to demonstrate compliance with the Performance Requirements of the BCA without major changes to the current design. The Performance Solutions will be documented with detailed supporting assessments in the Fire Engineering Report for the project Certification in subsequent design stages, in line with normal design and approvals process.

It is anticipated that other non-compliances with the Deemed to Satisfy Provisions of the BCA may be identified by the Certifier as the design is developed further, it is however considered that there are unlikely to be significant issues that would impact the overall fire strategy concept approach.

# 1 Introduction

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## Project Overview

Since the repurposing of Wharf 4/5 (The Wharf) for STC more than 30 years ago, there has not been a significant refurbishment and consequently the existing STC facilities are at the end of their useful life. The lack of proper acoustic treatment in theatre and rehearsal spaces is inadequate for contemporary theatre operations and the outdated approach to accessibility and workplace conditions do not meet modern day community expectations for public buildings. In summary the original fit out has not kept pace with the Company's changing operations over the past 30 years and accordingly is in need of significant change.

The key aims and objectives of the proposed STC internal fit out and refurbishment works are to meet STC's current operational needs and strategic goals and to future proof the company by:

- Creating new, distinctive and flexible theatre spaces commensurate with the Company's position as one of the world's leading theatre companies
- Increasing public space, improve access and visitor amenities
- Increasing saleable seating inventory and revenue earning capacity for long term sustainability
- Reducing running costs
- Improving the staff and user experience
- Improving back of house and technical facilities by providing modern workspaces which are fit for purpose, safe and efficient
- Respecting and enhancing the heritage and architectural value, and
- Creating a world class set of facilities for Australia.

To achieve these objectives the subject works will be undertaken in conjunction with the STC external works which form part of the Walsh Bay Arts Precinct SSDA (SSD 7689).

The proposed internal upgrade of the Sydney Theatre Company's facilities at Wharf 4/5 Walsh Bay will comprise internal alterations and reconfiguration of spaces and uses as outlined below:

### Ground level

- New box office / ticketing area at southern end of wharf and administration / staff areas

### Mezzanine

- Additional offices at southern end of wharf

### Level 1 (Main Floor)

- The co-location of Wharf 1 and 2 Theatres to create two distinct performance spaces that are flexible in seating configuration and use. The new theatres will comprise:
  - A new multi-format flexible studio space (Wharf 1 Theatre) with seating for 350 – 450 and additional height over the seating and stage areas for the rigging of technical equipment.
  - A new studio theatre space (Wharf 2 Theatre auditorium) with retractable or removable seat with a capacity of 150-200 seats in various configurations.
  - New public display space and formal meeting area to south of Wharf 2 Theatre mid wharf with an atrium over
- Upgrade to existing restaurant and bar area at northern end of wharf and terrace balcony including back of house areas
- Improved rehearsal and dressing room spaces and introduction of more flexible spaces including:
  - Co-located rehearsal spaces with shared back of house area
  - Provision for two set up floors at the southern end of the wharf with back of house area to allow transportation of sets to the theatres
- Administration, costume and props areas within the shore sheds

### Level 2 (mezzanine)

- Administration area and meeting rooms
- Provision of a new multi-purpose function room with balcony with capacity for 120 persons at the northern end of the wharf overlooking the restaurant and the harbour

### Level 3 (under roof)

- Lighting bridge and technical area

### Other works

- The removal of the existing fire tunnel within the building and associated reconfiguration of the space into the new layout as above plus addition of new fire stairs
- Improvements to acoustics, amenities and back of house and plant areas / facilities,
- Relocation, reconfiguration and improvements to administration areas centrally within the wharf
- Upgrade of services and infrastructure; and
- New loading and access arrangements to improve movement arrangements between technical and production areas.

The proposal provides for an increase in theatre capacity from existing 550 persons to a maximum of 650 persons in the combined Wharf 1 and 2 theatres. It also provides for a new multi-purpose public/event space with combined capacity for 200 persons over and above the existing Theatre Bar capacity of 500 persons. Accommodation for administrative staff will also increase from existing to a maximum of 200.

Works are as illustrated in detail on the architectural plans prepared by HASSELL.

## 2 SEARs Issues Addressed

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This report addresses issues required for a SSD and specifically responds to Key Point 7 of the Plans and Documents section of the Secretary's Environmental Assessment Requirements, which reads:

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## 3 Fire Engineering Design Philosophy

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### 3.1 Aims and Objectives

The fire engineering design that is proposed aims to satisfy both the architectural desires for the new space while maintaining an acceptable level of fire safety throughout the building. The key change to the existing arrangement with regard to fire safety is the removal of the existing ‘fire tunnel’, which is too small to transport sets and uses valuable space that could be better utilised by the design. There is also a desire to maintain ‘The long walk’ along the Eastern side of the building, as an open and tall space, therefore the fire safety design has been centred around achieving the above needs.

In addition to the above, the existing site constraints associated with the development result in a number of non-compliances with the BCA 2016. As such the concept fire strategy approach at this stage aims to assist in addressing those non-compliances in a holistic way.

The proposed concept strategy is based on the following fire safety objectives;

- Early notification of fire via upgraded smoke detection;
- Reduced fire size and smoke quantities via enhanced fast response suppression to give earlier fire suppression, enable longer evacuation times and reduce the quantity of smoke exhaust in the performance spaces;
- Well-placed fire compartmentation to separate and protect evacuating occupants (particularly highly populated spaces) from fire and smoke while maintaining an open front of house space;
- Justification of structural fire ratings for new structure and existing structure without significant upgrade.
- Sufficient external vertical exits for occupants to move away from the fire’s location and evacuate in a safe external environment;
- Improved fire service facilities for safer and efficient fire brigade intervention

### 3.2 Concept Design Approach

In accordance with the aims and objectives, the fire safety approach proposed is based upon the following preliminary strategy:

#### 3.2.1 Compartmentation

1. The end walls of the shore sheds are proposed to provide appropriate fire separation between the adjacent buildings in order to resist fire spread between the premises immediately adjacent;

2. We understand, from the project structural engineers, that the existing building structure achieves 60 minutes fire resistance in most parts. Where the structure does not meet this standard, it is proposed to be upgraded, where required, to achieve 60 minutes fire resistance. This is considered to be a minimum requirement to protect occupants during an evacuation and enable fire brigade intervention. As the existing building structure comprises predominantly of large timber columns, achieving a greater fire resistance is impractical, due to the existing structural constraints;
3. The workshop structure is existing and an upgrade strategy of fire systems will be used to justify no changes to the existing structural fire ratings which has been agreed with the Certifier.
4. The floor plate of the second floor is proposed to provide fire and smoke separation between the first and second floors in order to separate the different compartments to facilitate both areas operating relatively independently in a fire event;
5. The West corridor (adjacent the theatre space) is proposed to be fire separated from the adjacent accommodation to provide a protected egress route from the theatre space without having to discharge through the entry foyer and hence achieving a protected egress path without the use of the existing 'fire tunnel';
6. The maximum fire compartment sizes are proposed to be maintained within a 2000m<sup>2</sup> floor area in order to limit the potential fire spread to a defined compartment. This is proposed to assist in protecting occupants during evacuation, limit the amount of structure exposed to fire and assist fire-fighting operations;
7. In order to limit the compartment sizes and separate risk areas, the following spaces are proposed to be fire separated from the rest of the wharf by 60 minutes FRL:
  - Dressing rooms (over 50m<sup>2</sup>);
  - Storage rooms;
  - Theatres;
  - Workshop.

### 3.2.2 Egress

1. At present, occupants are proposed to be provided egress routes onto the external perimeter balconies, subsequently evacuating vertically via external stairs onto the Ground floor wharf apron. Building wide egress calculations are to be undertaken in detail as the design progresses in order to understand the maximum populations who are required to use the external stairs, minimum width requirements and any queuing which may occur due to merging populations from Ground and Level 1 of the building;

2. There is to be two independent means of egress from the theatre spaces. One egress route is to be via the West corridor which is to be fire separated from the remainder of the building accommodation. The second route is proposed to be via the East corridor and Theatre bar. On this basis occupants are always provided a safe egress route in all fire scenarios;
3. Improved fire alarm warning and detection is proposed to be provided throughout the building in order to provide early warning to occupants of a fire event, initiate early evacuation and to allow early notification to the Fire Brigade subsequently reducing their response time and the size of fire on arrival;
4. There are to be extended travel distances within areas of the building which will be addressed by means of improved compartmentation, fire alarm warning and detection and upgraded sprinkler protection.

### 3.2.3 Suppression

1. Enhanced sprinkler provisions are proposed to be provided throughout the building with exceptions to specific areas where sprinkler installation cannot be achieved. Enhanced suppression is used to activate earlier and therefore is to assist in protecting the existing structure (with reduced fire resistance), improving conditions for occupants during evacuation and improving conditions for fire-fighters on arrival;

### 3.2.4 Smoke Hazard Management

1. The expanded theatre space (combining theatre 1 and 2) is proposed to be provided with dedicated smoke exhaust. The management of smoke in theatre spaces is a requirement of the BCA and assists in maintaining tenable conditions for the large occupancy numbers evacuating the theatre seating. Smoke exhaust and make up air rates are to be determined as the design develops.

### 3.2.5 Fire Brigade Intervention

1. Upgraded fire hydrants, fire hose reels and enhanced fire suppression are proposed to be provided to further assist Fire Brigade intervention and operations.

## 4 Conclusion

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Based on our review of the project documentation, it is considered that performance based fire engineering can be used to demonstrate compliance with the Performance Requirements of the BCA without major changes to the current design. The Performance Solutions will be documented with detailed supporting assessments in the Fire Engineering Report for the project Certification in subsequent design stages, in line with normal design and approvals process.

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