Infrastructure NSW

Walsh Bay Arts Precinct

Fire Engineering Report for SSDA

Rev A | 2 February 2017

Job number 248853-00

Arup
Arup Pty Ltd ABN 18 000 966 165

Level 10 201 Kent Street
PO Box 76 Millers Point
Sydney 2000
Australia
000000000000000000000000000000

ARUP

Document Verification

ARUP

Job title		Walsh Bay Arts Precinct			**Job number** 248853-00
Document title		Fire Engineering Report for SSDA			**File reference**
Document ref					
Revision	**Date**	**Filename**	002 Fire Engineering Report for SSD.docx		
Draft 1	10 Oct 2016	**Description**	First draft – For SSDA stage only.		
			Prepared by	Checked by	Approved by
		Name			
		Signature			
Issue	26 Oct 2016	**Filename**	003 Fire Engineering Report for SS-DA.docx		
		Description	Issued following clients comments		
			Prepared by	Checked by	Approved by
		Name	Neil McPhail	Alistair Morrison	Alistair Morrison
		Signature			
Rev A	2 Feb 2017	**Filename**	004 Fire Engineering Report for SS-DA rev A.docx		
		Description	Updated to address FRNSW SSDA recommendations		
			Prepared by	Checked by	Approved by
		Name	Neil McPhail	Alistair Morrison	Alistair Morrison
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
			Issue Document Verification with Document		✓

Contents

Appendices

Executive Summary

Arup has been engaged by Infrastructure NSW (INSW) to develop the fire safety engineering design for the Walsh Bay Arts Precinct. The precinct works covers two separate buildings; Wharf 4/5 (excluding the Sydney Theatre Company) and Pier 2/3.

This report has been produced in response to the Secretary's Environmental Assessment Requirements (SEARs) Application Number SSD 7689 (No18 Fire Engineering Report) on behalf of Infrastructure NSW and ArtsNSW in support of the State Significant Development (SSD) Application.

1 Introduction

This report describes the fire safety strategy for the proposed refurbishment of Pier 2/3 and Wharf 4/5 at Walsh Bay for Infrastructure NSW. The fire strategy has been developed using a combination of performance based fire engineering and Deemed-to-Satisfy (DtS) Provisions as set out in the Building Code of Australia (BCA) 2016.

This fire strategy does not address the internal Sydney Theatre Company (STC) spaces specifically but does acknowledge where these works may have an impact on or be impacted by this tenancy of Wharf 4/5. Arup are providing fire safety engineering services on the STC fire strategy design and the two strategies will be developed to avoid any adverse impact on each other.

The purpose of this report is to outline the strategic concept fire safety strategy for support of the Stage 1 State Significant Development (SSD) application. It is intended to demonstrate how the design is capable of satisfying the Performance Requirements of the BCA and the measures to be provided as part of the design strategy.

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 building form.

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 design approach.

2 Building characterisation

The Walsh Bay Arts Precinct involves the adaptive reuse of Pier 2/3 and partial refurbishment of Wharf 4/5. Pier 2/3 is the last remaining undeveloped wharf in Sydney. The precinct is to be activated for cultural, and creative purposes which will include event spaces and facilities for the Australian Chamber Orchestra (ACO), the Bell Shakespeare Company, The Australian Theatre for Young People (ATYP), Bangarra Dance Theatre, Sydney Dance Company and Philharmonia and Gondwana Choirs and The Song Company.

Pier 2/3 will consist of 4 floors (Ground, Mezzanine, Level 1 and Level 2).

Pier 2/3 is understood to be separated from Wharf 4/5 by a fire rated party wall located midway through the shore sheds.

The buildings are predominantly timber construction with exposed steel connections and steel beams. In some areas concrete topped floors are provided over the timber floors. The structural engineer (TTW) has investigated the inherent fire ratings and has concluded that the loadbearing elements (columns, beams and floors) will achieve an FRL of at least 1 hour.

The following key population numbers are understood to be included in the Pier 2/3 development:

- Ground floor function space – provisional number (based on 1350 function of 1300 + 50 staff)
- Level 1 function space 300 people
- Bell rehearsal spaces – 300 people (spread over both spaces)
- Australian Theatre for Young People (ATYP) Performance space – 200 people
- Australian Chamber Orchestra (ACO) Performance space – 300 people

Key areas are shown in the following figures:

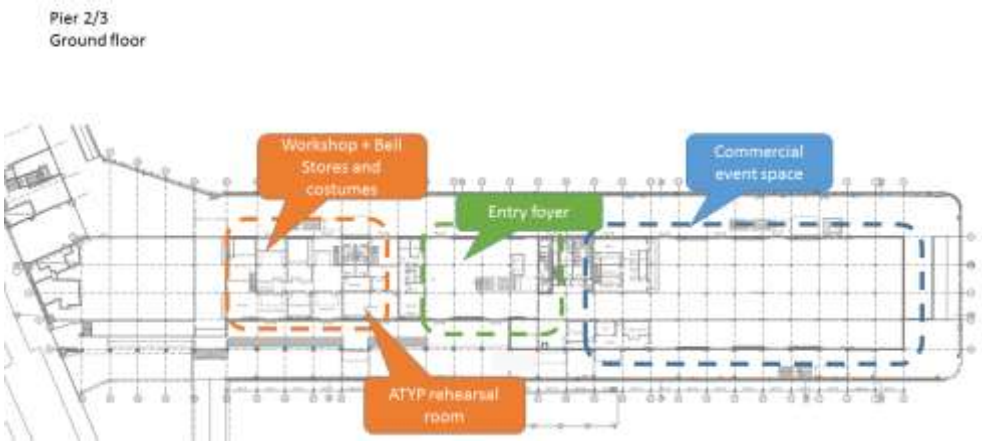


Figure 1: Pier 2/3 Ground floor

Pier 2/3
Mezzanine

Figure 2: Pier 2/3 Mezzanine

Pier 2/3
Level 1

Figure 3: Pier 2/3 Level 1

Pier 2/3
Level 2

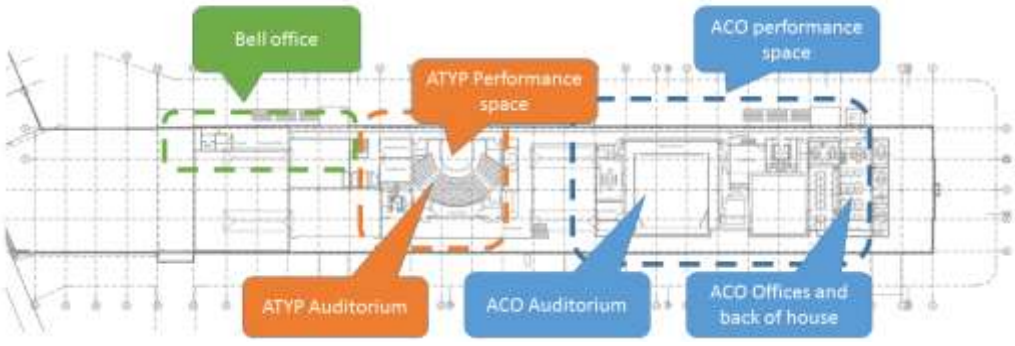


Figure 4: Pier 2/3 Level 2

Wharf 4/5

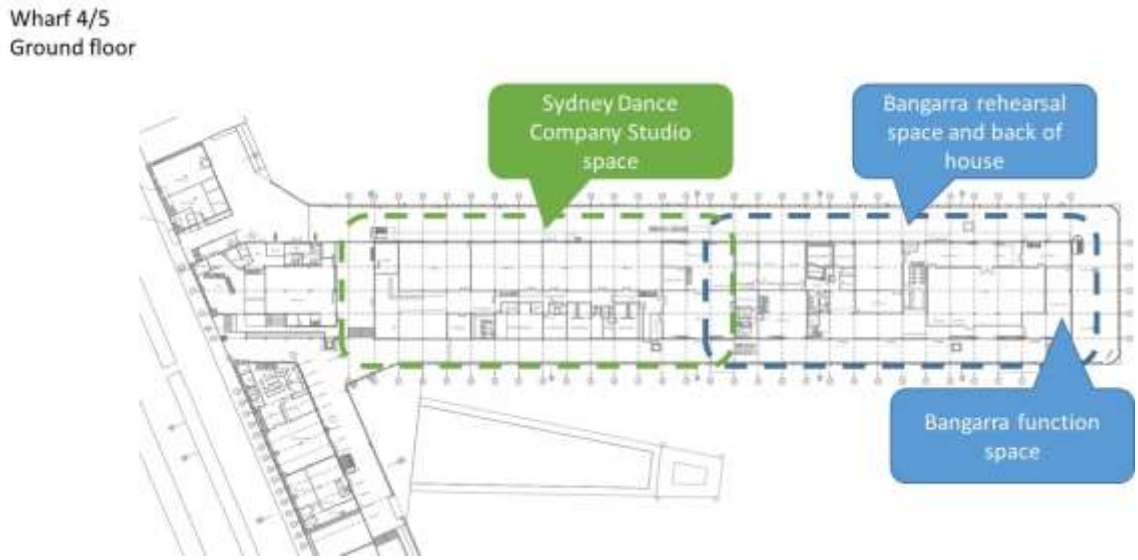


Figure 5: Wharf 4/5 - Ground floor

Figure 6: Wharf 4/5 Level 1

3 Proposed fire safety strategy

3.1 Design objectives

The fire safety strategy is to provide a design that gives a satisfactory level of occupant life safety and protection to other properties and can facilitate Fire and Rescue NSW (FRNSW) intervention, whilst meeting other project objectives, as described below. The building upgrade works are generally to be in accordance with the DtS Provisions of the BCA appropriate to the use of the building as a performance and cultural hub for Sydney, except as outlined in this report and in subsequent stages of the design.

There is an existing fire engineering report that relates to the shore shed and existing retail and commercial areas of Pier 2/3. The aim of this design is not to impact on this existing condition and maintain a level of appropriate fire separation so as not to impact on this existing strategy. Generally this requires a 60 minute fire rating.

The timber structure and proposed floor interconnections present a risk of fire and smoke spread through the building, thereby increasing the risk to occupants located both above the fire or remote from a fire. To address this, the general philosophy will be to minimise fire and smoke spread through the provision of sprinkler protection and compartmentation, in lieu of smoke exhaust due to the division of spaces which would make smoke exhaust impractical.

Compartmentation will be incorporated into the building while appreciating the historic nature of the building and architectural aspirations to leave much of the original structure as exposed as possible.

Detection and exits direct to the outside will help provide shorter evacuation times for the large occupant numbers in the buildings. Phased evacuation will be considered in conjunction with appropriate fire separation of levels and spaces to minimise required exit widths and crowding on the apron.

3.2 Structural fire resistance

Based on the DtS requirements of the BCA the building should have a Fire Resistance Level (FRL) of 120 mins. This is consistent across both Pier 2/3 and Wharf 4/5.

The building has an existing timber and steel structure that will be largely exposed. Therefore the DtS 120 min FRL is unachievable without significant upgrades to the building, which may be contrary to the architectural and heritage objectives, although essential for the new uses proposed for them. The structural engineer has confirmed that the loadbearing elements (columns, beams and floors) can achieve an FRL of at least 60 mins. Some steel members will require added protection in order to achieve this fire rating including steel “strong backs’ supporting floors.

The key requirement is to demonstrate that occupants have sufficient time to evacuate the building prior to structural failure, and that conditions are appropriate for safe brigade fire fighting operations.

3.3 Internal Compartmentation

3.3.1 General

The existing Pier 2/3 and Wharf 4/5 buildings are currently a single fire compartment. This causes a conflict with a number of aspects of the BCA DtS provisions particularly with regard to the maximum compartment size for a Class 9b assembly space.

The DtS provisions require a smoke exhaust system for a Class 9b compartment of over 2000m². The limitations of the existing building mean that this is difficult to achieve without detrimental impact on the historic fabric of the building. In addition, the division of spaces in the building mean that effective smoke exhaust would be difficult to achieve. Instead a compartmentation strategy is proposed that keeps the compartment sizes within the 2000m² limits, to minimise smoke and fire spread.

3.3.2 Pier 2/3

The proposed fire walls may have a number of penetrations, and this will generally be considered to be acceptable, with the aim of the strategy being to delay the spread of fire and smoke in the early stages of a fire allowing occupants more time to evacuate from the building.

The individual performance spaces will be fire isolated in order to contain a fire to the compartment of origin. This compartmentation will make use of the more onerous acoustic requirements of these spaces. The compartmentation of the performance spaces will aim to provide different compartments through which to egress, reducing the risk of a fire outside of the performance space preventing occupants from egressing out of the performance space.

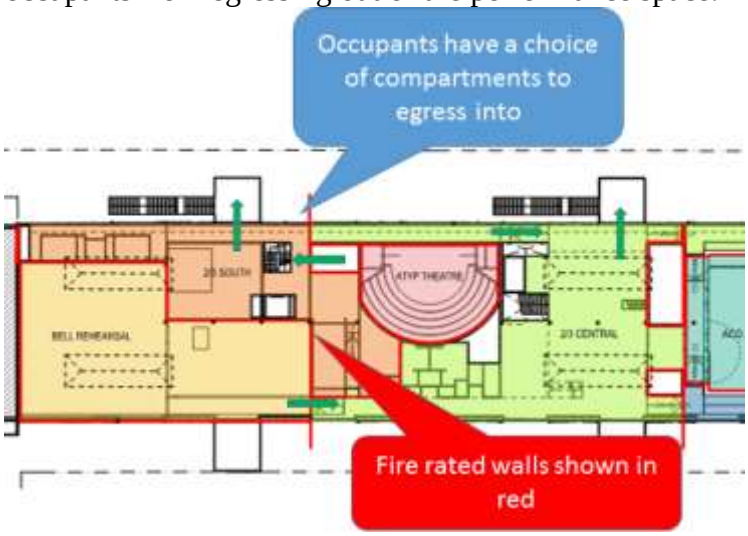


Figure 7: Egress options

The compartmentation required would only come into effect if the sprinklers were to fail which is considered unlikely. If they were to fail then the compartmentation would limit the fire to the area or compartment of fire origin.

The proposed compartmentation strategy is outlined below in the following figures:

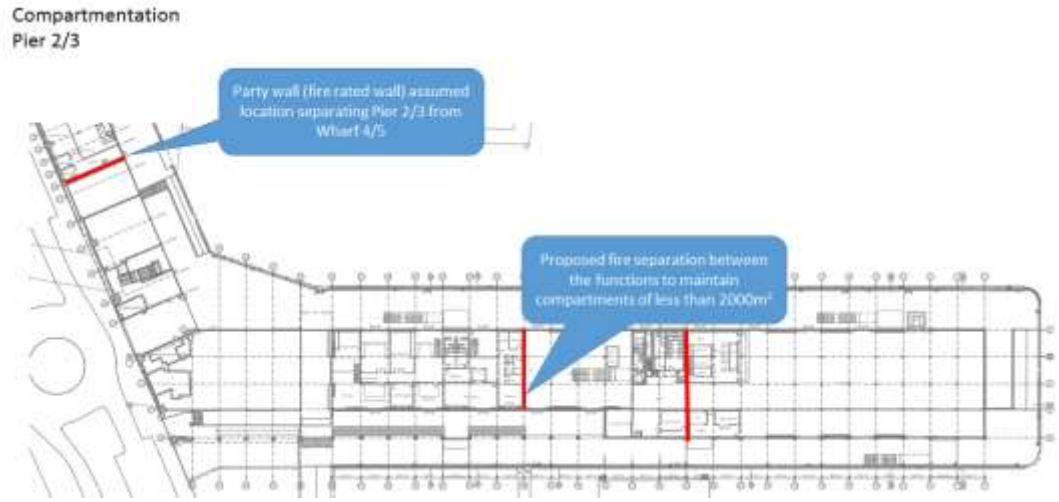


Figure 8: Ground Floor

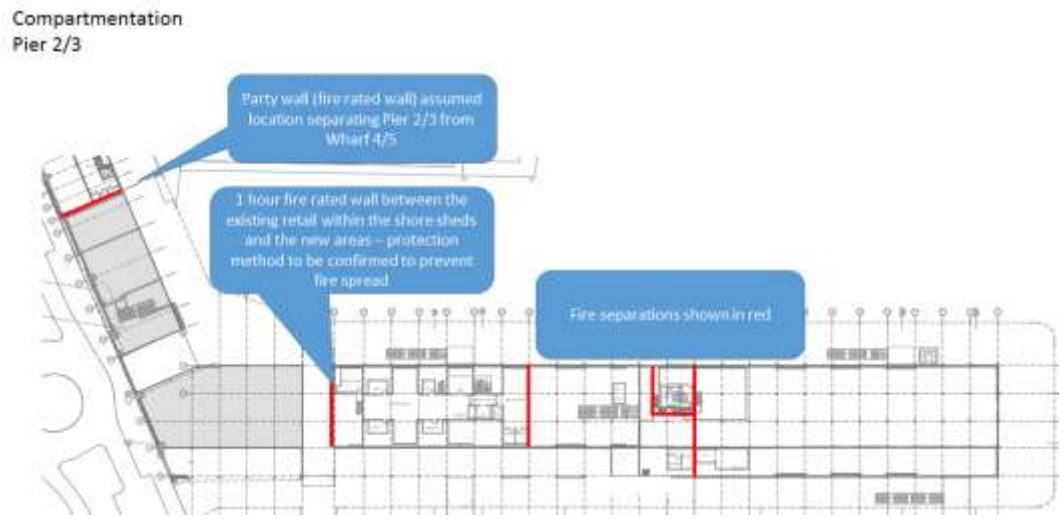


Figure 9: Mezzanine

The shaded areas are the existing shore sheds and part of an existing fire engineered solution for STC which will be maintained. The impact on the existing strategy will be assessed as part of the next stage.

Figure 10: Level 1

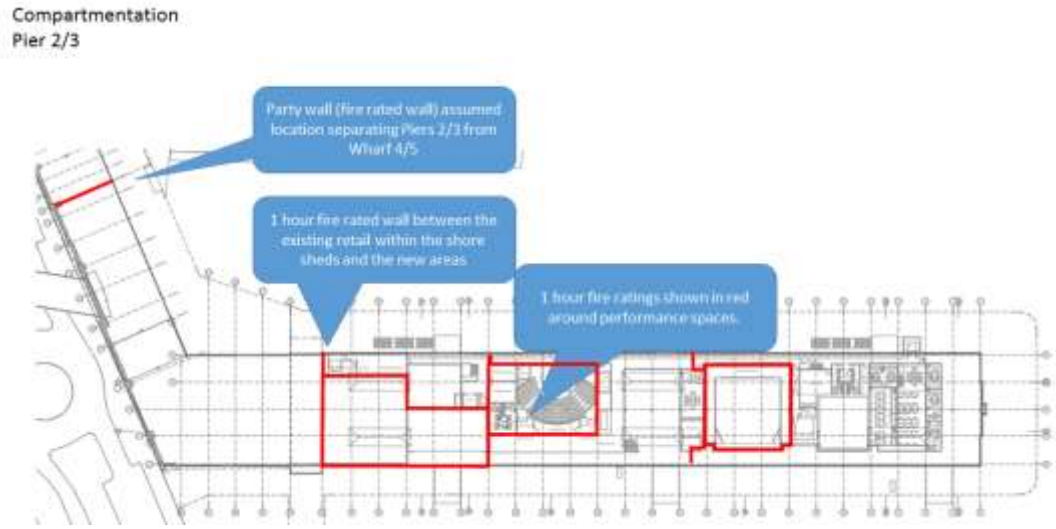


Figure 11: Level 2

There is a 4 storey connection created in the building (central entry foyer) which could be considered an atrium under the prescriptive DtS definitions. It is proposed to provide a Performance Solution whereby an enhanced level of fire compartmentation and horizontal egress routes are to be provided so to allow occupants to evacuate away from the atrium through fire and smoke walls to reach an adjacent compartment ('place of relative safety'). From here they can continue their evacuation remote from the 4 storey connection. As such, the potential risk to occupants associated with a 4 storey connection is reduced, with the aim of satisfying the Performance Requirements of the BCA whilst understanding the constraints of the existing construction.

Subsequently the need for specific atrium fire safety provisions is not considered necessary. This solution is to be further demonstrated within the FEBQ/FER documentation as the detailed design develops as part of the normal approvals process.

3.3.3 Wharf 4/5

The works on Pier 4/5 do not incorporate the whole Wharf and sheds. The Sydney Theatre Company is to remain and works referred to in this SSDA are only proposed on the ground and mezzanine floors.

The principle of Pier 2/3 will be applied to Wharf 4/5 to compartmentalise the building in to areas less than 2000m². The STC internal works will follow a similar approach, which will include the separating fire and smoke rated floor between Level 1 and STC above.

In SDC, the Workshop and Studio 5 will be a separate fire compartment to reduce the Class 9B portion of the compartment to 2,000 m². 'Commercial 5' is also a separate compartment.

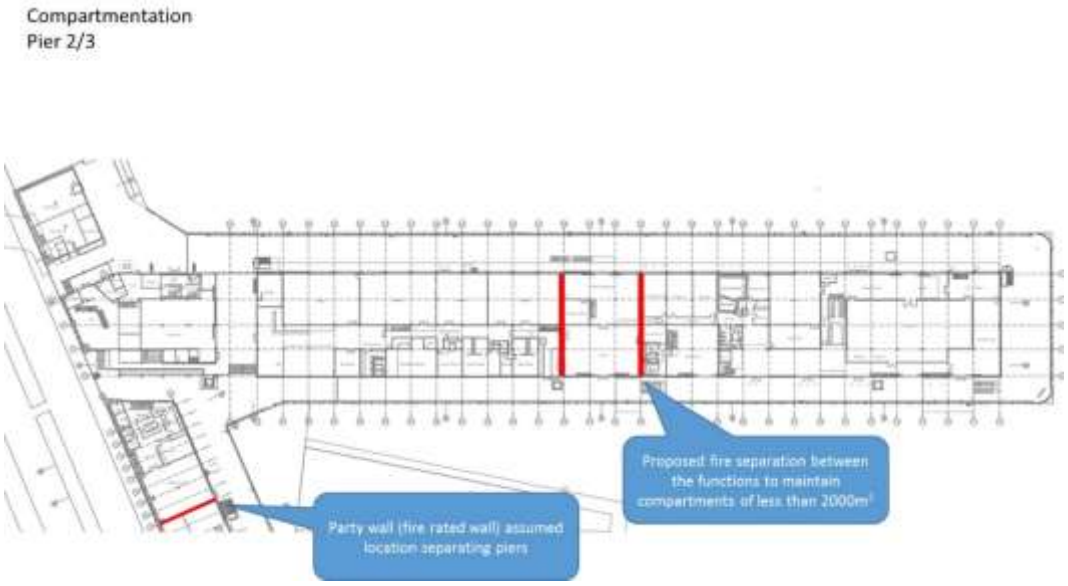


Figure 12: Wharf 4/5 Ground Floor

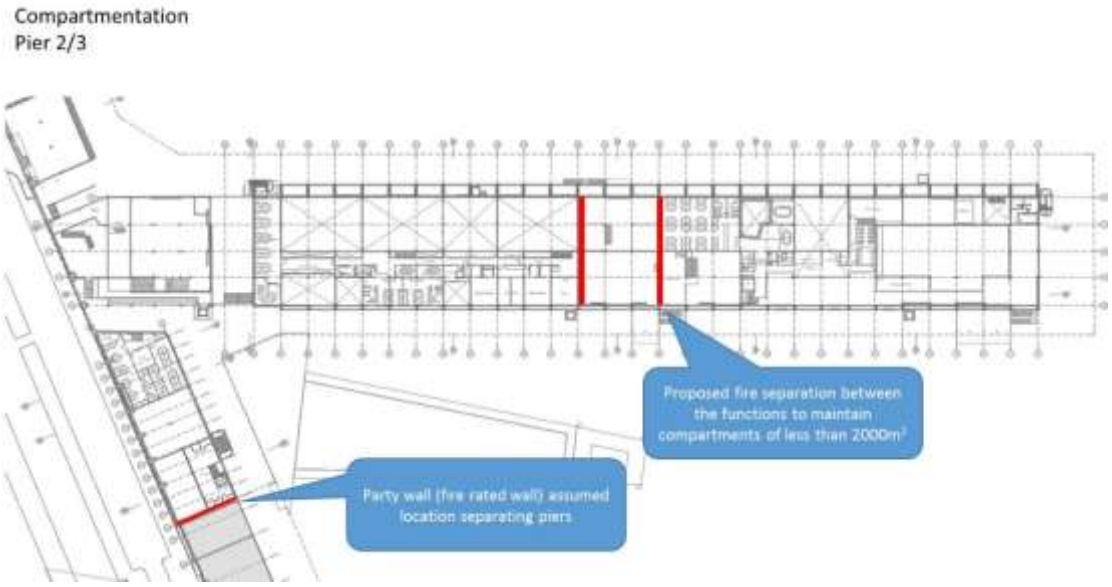


Figure 13: Wharf 4/5 Level 1

3.4 Egress

3.4.1 General

The buildings are to have a staged evacuation regime in order to support the reduced exit widths within the building, the delay between areas of the building will be defined as the design progresses but generally it would be between 4-6minutes between evacuation zones. This may also be beneficial t limit queuing, particularly due to the large populations from the function area in Pier 2/3 on Level 1. This will be worked through in more detail in subsequent stages of the project.

The building is provided with a number of external fire isolated stairs and direct access to the outside on ground floor.

For the purposes of performance design with regard to travel distances the egress is considered to be complete once on the apron. However, the overall egress to Hickson Road and the apron “holding capacity” for all evacuating occupants will also need to be assessed.

Protection of window openings and walls facing the external stairs within 6m will be assessed in detail in subsequent stages to determine the required protection to enable safe egress of occupants but the intent at this stage is to leave the stairs unprotected, equivalent to required non fire isolated stairs supplemented with horizontal evacuation and sprinkler protection. This may include a combination of fire rated walls and wall wetting sprinklers where calculations show excess received radiation.

Additionally it is noted that there will be areas on the apron susceptible to queuing and which may require design solutions to limit the risk of falling into the water. This is described in more detail in Appendix A1.

3.4.2 Pier 2/3

Based on the population number within the building, Pier 2/3 is to be provided with 12.5m of exit width on the advice of the building certifier. This is less than required by the DtS provisions of the BCA and will be addressed via a Performance Solution

The proposed design includes:

- Use of external stairs from the upper levels
- Use of open internal stairs through no more than 3 levels (noting the open stairs connect all levels, only 3 storeys are required to be used by the evacuating occupants due to the combination of horizontal evacuation, external stairs and fire protection to the mezzanine level).

This is based on the fire separation between the uses, the sprinkler protection, and the automatic smoke detection.

Travel distances are largely compliant with the DtS provision of the BCA although there are some areas where there are slight extended travel distances which will be addressed as a Performance Solution.

Final occupant numbers and aggregate exit width will be reviewed as the design progresses.

The following figures note the potential egress available to the occupants within Pier 2/3 and Wharf 4/5.

Figure 14: Pier 2/3 Ground Floor exits

Figure 15: Pier 2/3 Mezzanine level egress

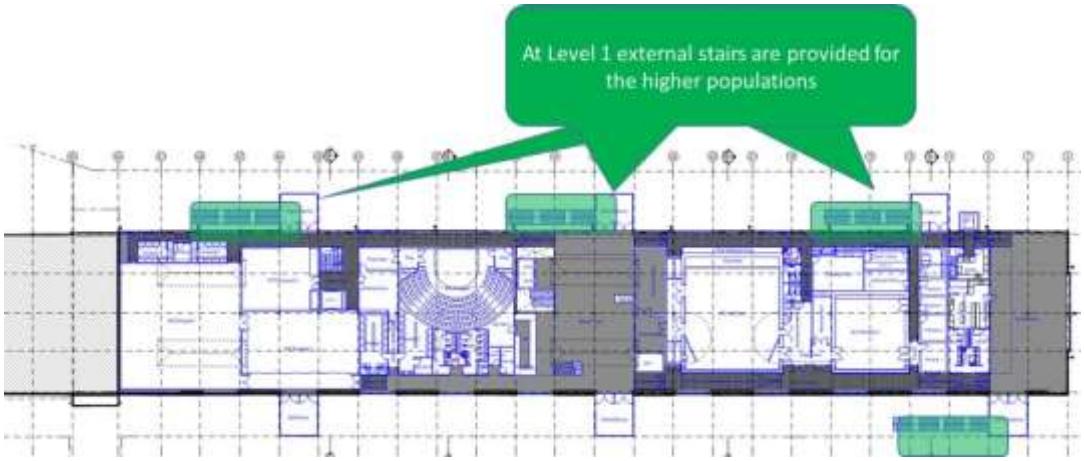


Figure 16: Pier 2/3 Level 1 egress

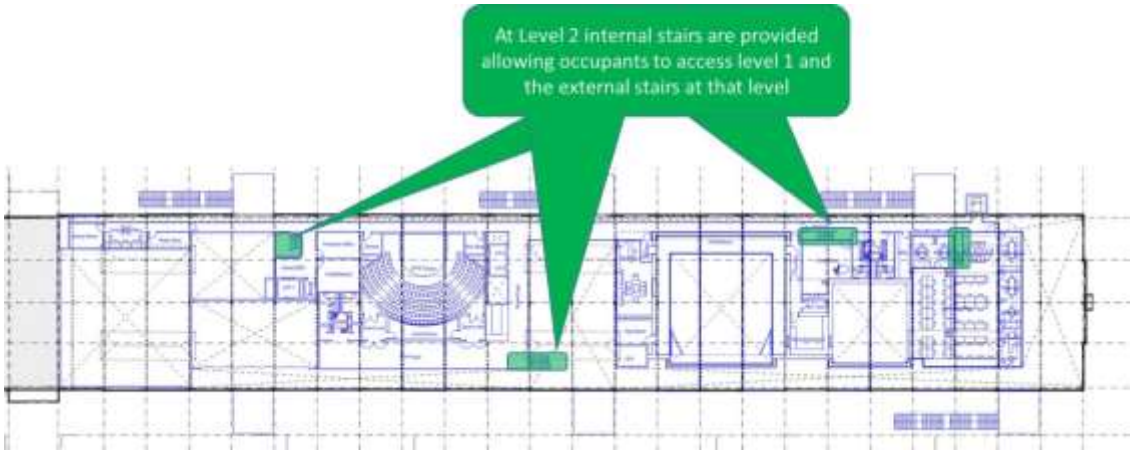


Figure 17: Pier 2/3 Level 2 egress

3.4.3 Wharf 4/5

Wharf 4/5 is largely existing and makes use of direct egress at ground level or internal open stairs at Level 1.

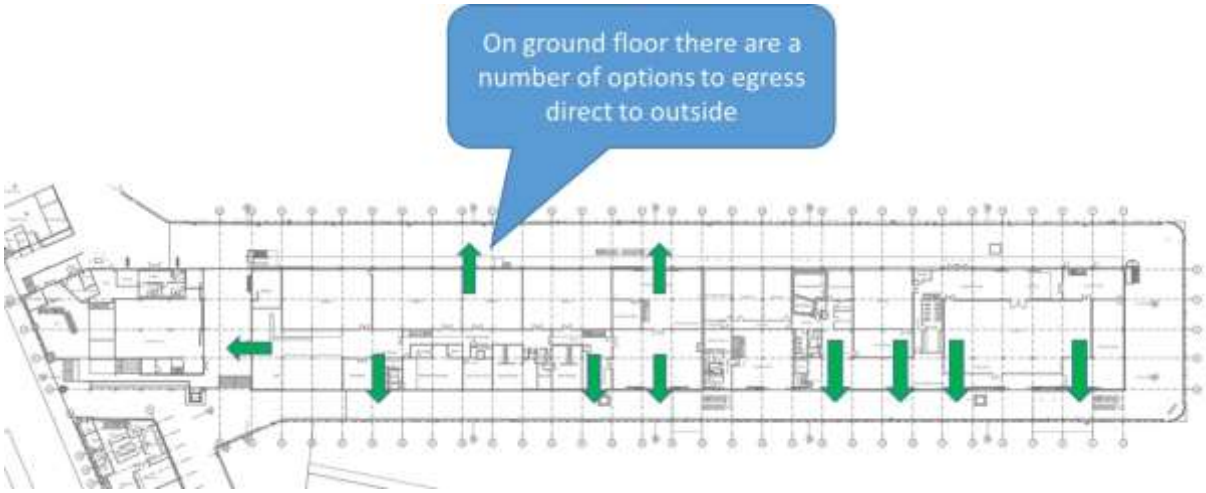


Figure 18: Wharf 4/5 Ground Floor egress

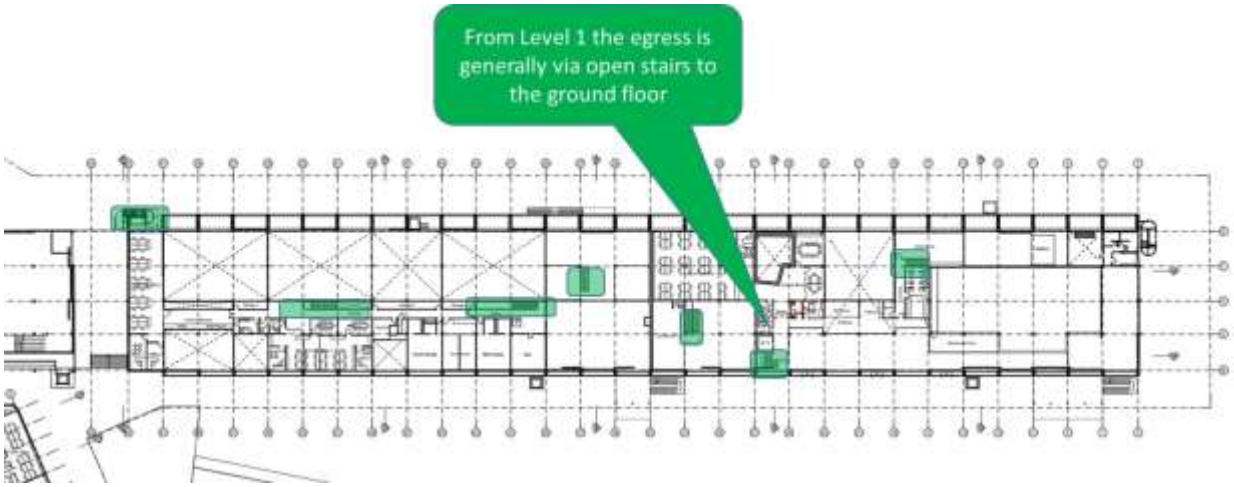


Figure 19: Wharf 4/5 Level 1 egress

3.4.4 Mobility impaired occupants

A management plan shall be provided by the building users which shall consider the specific needs for people with a mobility impairment, as the detailed design develops and Fire Engineering Report documented.

As with all public buildings of this nature we advise clients to consider the evacuation of mobility impaired occupants over the DtS provisions of the BCA and where possible provide a design that will minimise management intervention (within the constraints of the existing building) and facilitate a more equitable egress strategy.

The fire compartmentation strategy will facilitate horizontal evacuation where possible and compliment management evacuation using evacuation chairs etc. The

sprinklers will minimise smoke production and fire spread increasing time to evacuation. This will be developed in more detail as part of the evacuation strategy.

3.4.5 Non Fire Event

There could be a risk of needing to simultaneously evacuate the precinct for a non fire event (such as a terrorist threat or similar). Pedestrian evacuation modelling of the entire wharf precinct will be undertaken in order to assess this event case. This will be done in collaboration with the security and pedestrian planning team.

3.5 Fire detection and alarm

3.5.1 Detection – Pier 2/3 and Wharf 4/5

Early detection of fire is essential for these buildings. Therefore, smoke detection is to be provided in accordance with AS1670.1 – 2015 throughout on a 10 m grid.

Security measures restricting access to areas of the building will need to release on fire alarm if they are located on escape routes.

3.5.2 Alarm – Pier 2/3 and Wharf 4/5

A Sound System Intercommunication System for Emergency Purposes (SSISEP) is to be installed to AS1670.4 and detection of smoke, activation of sprinklers or activation of a manual call point must immediately alert the building occupants.

It is proposed that a double knock style of system is incorporated where two smoke detectors (or one smoke detector and one manual call point) would evacuate the building or the activation of a single sprinkler systems. This is to minimise false alarms or the unnecessary evacuation of the spaces. The potential delay caused by this system will be taken into account in the design if considered necessary.

The evacuation of the floors in each pier and shore sheds will be staged as noted in Section 3.4.1 above. The Piers will be split into evacuation zones that include multiple floors. The zones will be as per the diagrams below:

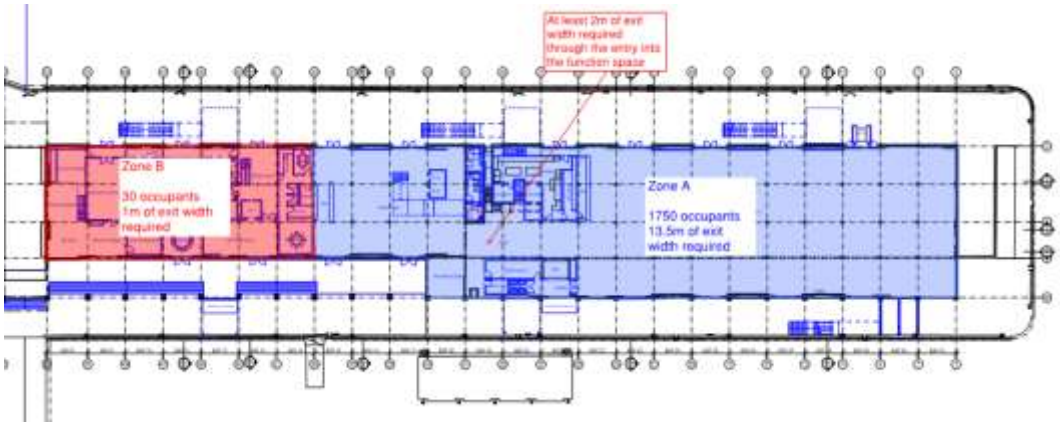


Figure 20: Pier 2/3 Level Ground Floor

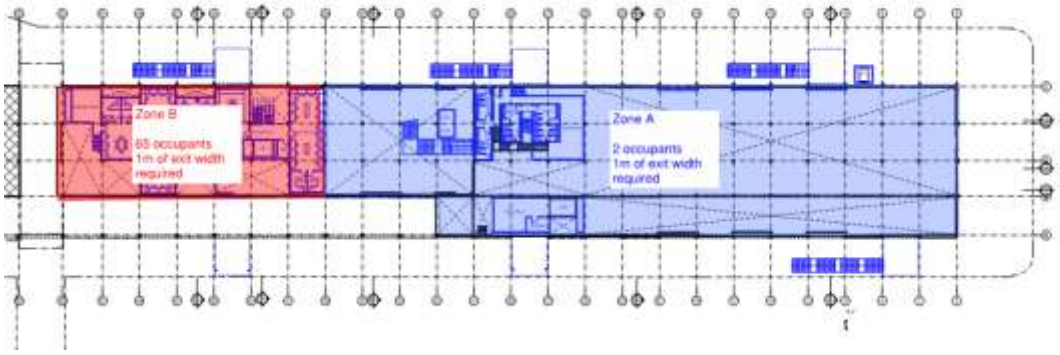


Figure 21: Pier 2/3 Level mezzanine

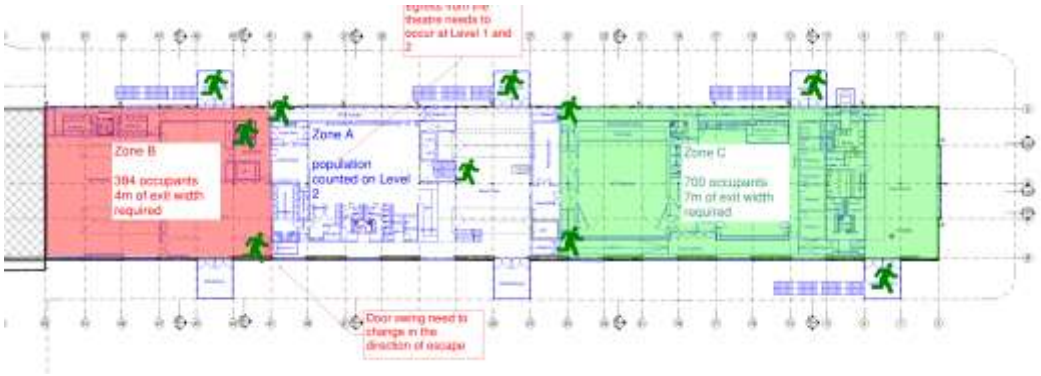


Figure 22: Pier 2/3 Level 1

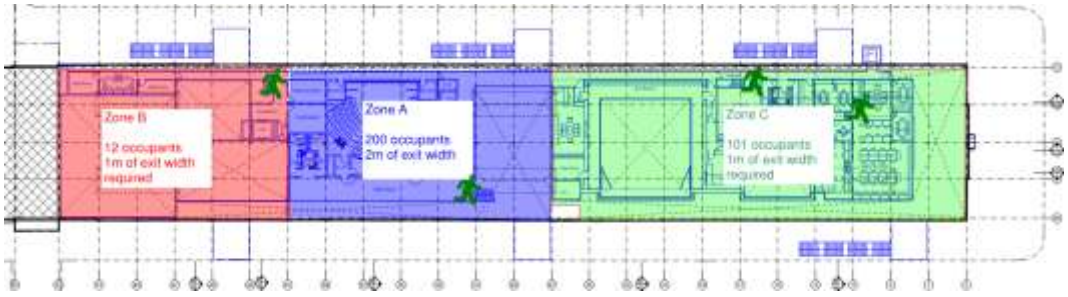


Figure 23: Pier 2/3 Level 2

Each coloured area will evacuate as one and also be able to move horizontally through the building to non-affected areas. The staging between areas will be only approximately 4-6minutes and will be clarified as the design progresses.

Each pier is considered a separate building and provided with independent FIP and alarm systems, hence the fire alarm does not need to cascade between the two buildings automatically.

3.6 Hose reels

Hose reels are required throughout the building. At this design stage, it is assumed compliant fire hose reels will be installed in the buildings.

3.7 Sprinkler Suppression

Automatic sprinklers will be provided in accordance with BCA Clause E1.5 and AS2118.1-1999. Wharf 4/5 is also to be upgraded throughout. At this time it is assumed full compliance will be achievable throughout the piers.

To help justify the reduced fire rating of the elements it is proposed to install fast response, exposed heads. These would also be expected to keep the fire size to less than in a DtS designed space with standard response heads.

Fast response heads would be required for both piers and shore sheds.

3.8 Smoke Exhaust

Smoke exhaust is provided within the theatres where there is a stage over 50m². This is likely to include the following performance spaces:

- ACO
- Bell rehearsal space (to be able to accommodate seating and public performance)
- Arup understand that the ATYP theatre stage is less than 50m² and would not require smoke exhaust.

The dance studio (known as Bangarra Dance studio) is proposed not to be provided smoke exhaust on the basis the studio is not considered a typical theatre space. Oversized escape routes and exits shall be provided to demonstrate acceptable egress provisions as part of a fire engineered performance solution.

The smoke exhaust system for ACO and Bell will be designed from first principles rather than following the prescriptive DtS tables to satisfy the Performance Requirements of the BCA. The systems will be designed to maintain tenable conditions during the evacuation of occupants and also acknowledge the requirements for fire brigade intervention.

The system will be mechanical exhaust with natural make up air requirements. The smoke exhaust system will be provided with a level of redundancy in that occupants can still evacuate even if one fan was to fail.

3.9 Fire Brigade Access

Arup assume that FRNSW would not drive a truck onto the piers or aprons. FRNSW would set up on Hickson road and manage the operations from there.

The FIP’s are to be located at the Hickson Road end of each pier.

3.10 Hydrants

The hydrant system for Pier 2/3 will be upgraded to meet current code. Currently external hydrants are provided and the necessity for the provision of internal hydrants will be investigated. At this stage it is assumed that internal hydrants would be required in Pier 2/3 to get compliant coverage.

The existing hydrant system on Wharf 4/5 is understood to also require full upgrade due to the amount of work to be undertaken in this development but there locations are considered adequate. The levels being refurbished are all covered by the external hydrants provided.

A Performance Solution will also be required to justify external hydrants within 10m of the building.

The upgrade will at least require double heads and Storz couplings provided to the current hydrant outlets.

The existing booster location is 90 degrees to the road and considered by the BCA Consultant and design team to be visible and readily accessible from the road and satisfy the Australian Standard 2419.1-2005. The booster serves other buildings not part of the project and relocation to face the road is not practical given the nature of the existing heritage building fabric nor required by the standard.

4 Conclusion

Based on Arup's 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 building form.

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.

5 Referenced Information

The proposed design is based on the architectural drawings by Tonkin Zulaikha Greer Architects (TZG), dated 07/10/2016.

This report is based on preliminary BCA advice and the BCA report undertaken by Blackett Maguire and Goldsmith dated October 2016 as well as ongoing advice from Jake Hofner and Brian Maguire.

The past fire engineering report relating to the Shore Sheds was titled “T.M Management Services Pty Ltd, Walsh Bay Shore Studios 2 and 3, Fire Safety Assessment Report August 2003.

Appendix A

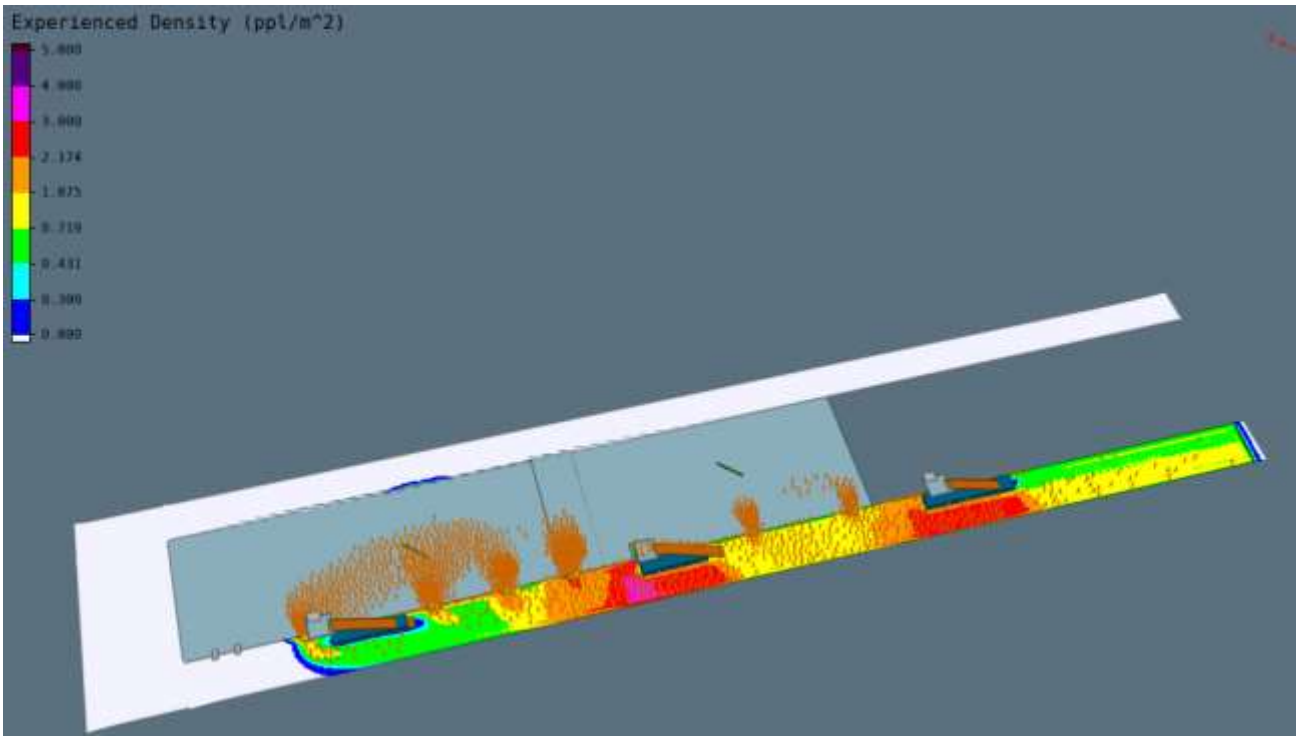
Apron

A1 Apron Crowding

The following areas of Pier 2/3 (highlighted Orange, Red and Pink) have been identified as an area potentially requiring further design considerations to help prevent falls or the build-up of crowds where significant queuing may be possible. This is based on phased evacuation of largest population (excluding the populations that may move east).

Such solutions may include but not be limited to balustrading; increasing fire ratings of floors and phasing evacuation; or adding exits at ground floor east or even reducing population capacity.

Images taken below are taken from preliminary modelling carried out for the purpose of defining pinch points only at this stage:



Appendix B

NSW Fire & Rescue Response

B1 NSW Fire & Rescue Response

NSW Fire & Rescue Recommendations (BFS16/2629)		
Ref	Recommendation	ARUP Response
1	That the maximum compartment size is to be maintained within 2000m ^{2} floor area to limit the risk to occupants and fire fighters in the event of an emergency. FRNSW recommend that adequate compliant separation be provided between compartments to limit fire/smoke spread throughout the development and that new compartment walls shall comply with minimum requirements of the NCC. Limiting the compartment sizes will provide a sufficient period of time to afford first responders with an opportunity to protect property on arrival.	The current Concept Fire Strategy is in line with this recommendation.
2	That a full quantitative egress strategy of the wharves and piers together with the public domain be undertaken to assess the time taken to evacuate the area in the event of an incident that requires full and immediate evacuation such as a hazmat or terrorist act. FRNSW have concerns regarding timely access to the area during an emergency incident. It is expected that a staged evacuation of the precinct may not be acceptable in the event of such an incident and that there may be significant delays regarding accessing the area during mass occupant evacuation of the area. It should also be noted that FRNSW do not have the ability to utilise the proposed water based fire tender that has been assumed in Section 3.9 – Fire Brigade Access of the fire engineering report and that access will be via Hickson Road.	The current Concept Fire Strategy addresses the risk of a single fire scenario within the building in accordance with the BCA. A staged evacuation of the building in this single fire event will be demonstrated to meet the Performance Requirements of the BCA as the detailed design and Fire Engineering Report are progressed. The risk associated with hazmat or terrorist actions (as raised by FRNSW) is considered to be outside the current scope of Fire Engineering. Arup propose to undertake pedestrian evacuation modelling of the wharf precinct in order to assess the items raised by FRNSW. The fact that FRNSW do not have the ability to use the water based fire tender is noted and the Fire Brigade access

		provisions shall be updated accordingly in the Fire Engineering Report.
3	With regards that "appropriate protection of unprotected openings". In the event that the calculations show excess received radiation, consideration should be provided to the "holding capacity" of the apron and how close occupants could potentially be to these unprotected openings.	The required fire protection to the unprotected openings is to be assessed. As part of the assessment the location and number of occupants on the apron shall be considered.
4	That the egress design proposed for the subject development should take into consideration the effects associated with stairs and lifts being contained within the same fire isolated shaft as identified on page 18 of the BCA report	We understand at present there are no lifts located within fire-isolated stair shafts.
5	That all Performance Solutions which rely on egress strategies should take into consideration the delays associated with the proposed double knock style of system (where two smoke detectors or one smoke detector and one manual call point are used). See Section 3.5.2 second paragraph, page 16 of the FER for SSDA. This system may have major egress and fire brigade intervention ramifications in the event of arson or a terrorist attack which should be considered as part of the assessment.	All Performance Solutions shall consider the potential delay associated with a double knock style of system. Notwithstanding activation or sprinklers will activate an immediate alarm/ evacuation notification. Arson, with respect to a single fire event occurring is considered as part of the strategy. The risk associated with terrorist actions (as raised by FRNSW) is considered to be outside the scope of Fire Engineering as this may well include non-fire rated incidents. To be assessed by others during the design development.
6		The risk associated with terrorist actions (as raised by FRNSW) is considered to be outside the scope of Fire Engineering as this may well include non-fire rated

	That adequate justification is provided for proposing a 4-6 minute staging evacuation delay between zones for the subject development as outlined on page 17 of the FER for SSDA. This delay may have major egress and fire brigade intervention ramifications in the event of arson or a terrorist attack.	incidents. To be assessed by others during the design development.
7	That a fast response sprinkler system be installed throughout the development without exception. Additional enhancement of the system above these requirements would be welcomed by FRNSW.	The current Concept Fire Strategy proposes a fast response sprinkler system to all areas of the building. It is however noted that due to potential existing site constraints, that may be identified as the design develops, the ability to provide a compliant sprinkler system to specific areas may not be feasible. For these specific areas (if any) we propose to provide a Performance Solution but full compliance will be the initial aim of the design.
8	With regards to the installation of a smoke exhaust system, FRNSW do not consider the requirement as stipulated in the National Construction Code to be an onerous requirement as suggested in Section 3.8 of the fire engineering report. With consideration to the reduced fire resistance levels proposed together with occupant loads characteristics and the limited fire brigade access, FRNSW recommend the installation of a smoke hazard management system to limit fire consequences for current and future use. FRNSW does not consider future fire engineering reviews and reassessments to be an appropriate approach in future-proofing the design of a state significant development.	The omission of smoke exhaust was proposed on the basis that the auditoria stage areas were to be limited to <50m2 floor area therefore not requiring smoke exhaust in accordance with the BCA or where >50m2 requiring management control to limit to use of sets. This was outlined to the design team and Client in a detailed design note to clarify the implications for ongoing management. As the desire for flexibility around these spaces has since been highlighted, smoke exhaust is proposed to be provided to the ACO auditoria and Bell rehearsal space 1 where a stage >50m2 in floor area has the potential to be provided. The ATYP auditoria includes fixed design constraints whereby the stage floor area cannot be extended >50m2 in floor area, therefore smoke exhaust is not proposed for this space in line with the DtS requirements of the BCA.

		Smoke exhaust systems for the actual building design are to be provided to deliver sufficient exhaust rates to satisfy the Performance Requirements of the BCA as part of a Performance Solution.
9	That the fire hydrant system is designed in accordance with the requirements of Australian Standard [AS] 2419.1 – 2005), consideration may need to be given to the relocation of the hydrant boosters to improve fire fighter access.	The current booster position is visible from the Road, accessible for FRNSW personnel and in accordance with AS 2419.1-2005. We therefore consider the arrangement to be acceptable particularly given the existing nature of the building and difficulties associated with accommodating in a heritage listed façade and corresponding impact on existing parts of the building served by this system and outside the scope of this project (Shore Sheds).
10	That the facility's emergency plan consider the specific needs of disabled occupants and that appropriate evacuation management measures are implemented to ensure that all occupants can be safely evacuated.	A management plan shall be provided by the building occupiers which shall consider the specific needs for mobility impaired occupants as the detailed design develops and Fire Engineering Report documented. As with all public buildings of this nature we advise clients to consider the evacuation of mobility impaired occupants over the DtS provisions of the BCA and where possible provide a design that will minimise management intervention (within the constraints of the existing building) and facilitate a more equitable egress strategy. The fire compartmentation will facilitate horizontal evacuation where possible and compliment management evacuation using evacuation chairs etc. The sprinklers will minimise smoke production and fire spread increasing time to evacuation. This will be developed in more detail as part of the evacuation strategy.

11	FRNSW recommend that that the existing base building Fire Engineered Solution for the Shore Sheds titled "TM Management Services Pty Ltd, Walsh Bay Shore Studio 2 and 3, Fire Safety Assessment Report August 2003" be reviewed to ensure that the new works do not impact on existing requirements associated with previous report. The FER should also confirm that the existing requirements have been considered and any impacts on the new proposal have been addressed.	The existing base build fire engineered solution for the shore sheds shall be reviewed as part of the detailed design development for Walsh Bay. Provisionally the existing strategy is not affected by the proposed design.
12	With consideration to the proposed atrium, enhanced fire safety system may be required to be installed throughout the development to ensure occupant evacuation can be conducted within an accepted time period.	Considering the 4 storey connection, it is proposed to provide a Performance Solution whereby an enhanced level of fire compartmentation and horizontal egress routes are to be provided so to allow occupants to evacuate away from the atrium through fire and smoke walls to reach an adjacent compartment ('place of relative safety') from where they can continue their evacuation remote from the 4 storey connection. As such, the potential risk to occupants associated with a 4 storey connection is reduced, with the aim of satisfying the Performance Requirements of the BCA. Subsequently the need for specific atrium fire safety provisions is not considered necessary. This solution is to be further demonstrated within the FEBQ/FER documentation as the detailed design develops as part of the normal approvals process.