STEVE WATSON & PARTNERS

# Darling Harbour Live

## BCA Assessment Report

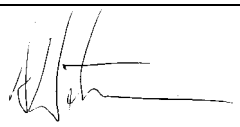
**REPORT 2012/0256 R1.5**

**March 2013**

BUILDING REGULATIONS CONSULTANTS AND CERTIFIERS
FIRE SAFETY ENGINEERS

LEVEL 5, 432 KENT STREET, SYDNEY NSW 2000
TEL +61 2 9283 6555 | FAX +61 2 9283 8500
sydney@swpartners.com.au
www.swpartners.com.au
ABN 48 102 366 576

# Report Revision History

| Revision | Date | Reason for Revision | Prepared by | Reviewed | Approved by |
|---|---|---|---|---|---|
| R1.5 | 11.03.13 | DA Submission | Paul Curjak | Steve Watson | Anthony Ljubicic |
| | | |  |  |  |

This report supports a State Significant Development Application (SSD 12_5752) submitted to the Minister for Planning and Infrastructure pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Application seeks approval for construction of the Public Private Partnership (PPP) component of the Sydney International Convention, Exhibition and Entertainment Precinct (SICEEP) Project at Darling Harbour.

The SICEEP Project will deliver Australia's global city with world class convention, exhibition and entertainment facilities that can compete effectively in the national and international events markets. The SICEEP Project importantly forms a critical element of the NSW Government's aspiration to "make NSW number one again". The SICEEP Project also involves the creation of a new neighbourhood and a community hub.

**OVERVIEW OF PROPOSED DEVELOPMENT**

The proposed development involves construction of the PPP component of the SICEEP Project, comprising new, integrated and world-class convention, exhibition and entertainment facilities with associated retail and public domain upgrades.

The application more specifically seeks approval for the following development:

- Demolition of existing improvements on the site, including existing Sydney Convention Centre (part) and Sydney Exhibition Centre;
- Associated tree removal and replanting;
- Construction of a new, integrated and world-class Convention, Exhibition and Entertainment Centre;
- Public domain improvements, including:
  - reinvigorating and expanding Tumbalong Park;
  - provision (part) of a new active north-south pedestrian connection (known as the Boulevard);
  - provision of new east-west connections, including Harbourside Place and Tumbalong Place;
  - Provision of a pedestrian bridge link from Quarry Street;
  - Retention of the tidal cascade water feature;
  - Reconfiguration and upgrade of Darling Drive (part);
  - Provision of a new square adjoining the Chinese Garden;
  - Provision of a new open space 'event deck' (connected with the Exhibition Centre);

  - Integrated art, play zones, water play and recreation areas;
  - Provision of retail kiosks;
- Provision of ground level parking within the Exhibition and Entertainment Centre facilities;
- Ground and elevated loading docks (accessed off Darling Drive) for Convention, Exhibition and Entertainment Centre facilities;
- Two vehicle drop off points off Darling Drive;
- Provision of signage; and
- Extension and augmentation of physical infrastructure / utilities as required.

## BACKGROUND

The existing convention, exhibition and entertainment centre facilities at Darling Harbour were constructed in the 1980s and have provided an excellent service for Sydney and NSW.

The facilities however have limitations in their ability to service the contemporary exhibition and convention industry which has led to a loss in events being held in Sydney.

The NSW Government considers that a precinct-wide renewal and expansion is necessary and is accordingly committed to Sydney reclaiming its position on centre stage for hosting world-class events with the creation of the SICEEP Project.

Following an extensive and rigorous Expressions of Interest and Request for Proposals process, Darling Harbour Live (formerly known as 'Destination Sydney'- a consortium comprising AEG Ogden, Lend Lease, Capella Capital and Spotless) was announced by the NSW Government in December 2012 as the preferred proponent to transform Darling Harbour and create the new Sydney International Convention, Exhibition and Entertainment Precinct.

Key features of the Darling Harbour Live Preferred Master Plan include:

- Delivering world-class convention, exhibition and entertainment facilities, including:
  - Up to 40,000m$^2$ exhibition space;
  - Over 8,000m$^2$ of meeting rooms space, across 40 rooms;
  - Overall convention space capacity for more than 12,000 people;
  - A ballroom capable of accommodating 2,000 people; and
  - A premium, red-carpet entertainment facility with a capacity of 8,000 persons.
- Providing up to 900 hotel rooms in a hotel complex at the northern end of the Precinct.
- A vibrant and authentic new neighbourhood at the southern end of the precinct, called 'The Haymarket', home to an IQ Hub focused on the creative industries and high-tech businesses, apartments, student accommodation, shops, cafes and restaurants.
- Renewed and upgraded public domain, including an outdoor event space for up to 25,000 people at an expanded Tumbalong Park.
- Improved pedestrian connections linking to the proposed Ultimo Pedestrian Network drawing people between Central, Chinatown and Cockle Bay Wharf as well as east-west between Ultimo/Pyrmont and the City.

## SITE DESCRIPTION

The SICEEP Site is located within the Darling Harbour precinct. Darling Harbour is a 60 hectare waterfront precinct on the south-western edge of the Sydney Central Business District that provides a mix of functions including recreational, tourist, entertainment and business.

With an area of approximately 20 hectares, the SICEEP Site is generally bound by the Light Rail Line to the west, Harbourside shopping centre and Cockle Bay to the north, Darling Quarter, the Chinese Garden and Harbour Street to the east, and Hay Street to the south.

The SICEEP Site has been divided into three distinct redevelopment areas (from north to south) – Bayside, Darling Central and The Haymarket. The PPP Application Site area is located within Bayside and Darling Central as shown in Figure 1.

## PLANNING APPROVALS STRATEGY

In response to separate contractual agreements with the NSW Government and staging requirements, Darling Harbour Live is proposing to submit a number of separate development applications for key elements of the overall Project.

This Application involves the PPP component of the SICEEP Project, comprising the convention centre, exhibition centre, entertainment facility, and associated public domain upgrades.

Development of The Haymarket is to be staged and accordingly a staged development application is to be lodged. Detailed development applications will follow seeking approval for specific aspects of The Haymarket.

A separate development application will also be submitted for the Hotel Complex.

# EXECUTIVE SUMMARY

This report has been prepared for Darling Harbour Live to provide an assessment of the proposed design of the PPP facilities against the Deemed-to-Satisfy provisions of the relevant sections of the BCA 2012.

Section 8 of this report details the non-compliances identified at this stage of the design that require an Alternative Solution to satisfy the Performance Requirements of the BCA.

This report confirms that the design is capable of complying with the requirements of the relevant sections of the BCA subject to resolution of the identified areas of non-compliance and minor amendments to the plans at the detailed design stage.

During the design development stage the following will be required for review:

- Structural design documentation and certification
- Services design documentation and certification

# TABLE OF CONTENTS

# 1. PURPOSE

The purpose of this report is to provide an assessment of the design documentation for the proposed project against the current requirements of the BCA 2012.

The assessment is undertaken for the purpose of, and to the extent necessary for, construction certification to be issued under Part 4A of the NSW Environmental Planning and Assessment Act 1979 (The Act) and Regulation 2000 (EPAR).

# 2. SCOPE AND LIMITATIONS

## 2.1. SCOPE

The scope of this assessment is limited to the design documentation referenced in Appendix B of this report.

## 2.2. LIMITATIONS

The following limitations apply to the assessment:

- The plans are assessed to the extent necessary to issue a construction certificate under Part 4a of The Act. This means that the design has been assessed as able to comply with the BCA ie – the submitted plans are consistent with the BCA but certain design details may be not specified at this stage.
- Details in regard to access for people with disabilities have been assessed by Morris-Goding Accessibility Consulting in their report dated 1st March 2013 Revision 1 to the extent of the deemed-to-satisfy provisions of the BCA, AS1428.1 and Disabilities Discrimination Act 1992.
- The assessment does not consider the requirements of legislation other than the nominated sections of the EP&A Act which might address building works such as OH&S, Construction Safety or the like.
- Generally the assessment does not incorporate the detailed requirements of the Australian Standards.

# 3. STATUTORY FRAMEWORK

The following table summarises the key statutory issues relating to fire safety and the BCA in relation to the certification of new building works.

| Issue | EPAR Clause Ref | Comment | Relevant section of this report |
|---|---|---|---|
| New Work | 145 | All new works must comply | 6 |

## 3.1. NEW WORK

Clause 145 of the Environmental Planning and Assessment Regulation 2000 (EPAR) requires that all new work comply with the current requirements of the BCA.

This means that all works proposed in the plans are required to comply but that existing features of an existing building need not comply with the BCA unless required to under other clauses of the legislation.

# 4. ASSESSMENT DATA SUMMARY

The following basic assessment data has been drawn from the provisions of the BCA 2012.

## 4.1. ASSUMPTIONS

Assumptions made in the preparation of this report are listed below:

Sydney International Convention Centre

1. The assessment of the required sanitary facilities has been provided on the spreadsheet provided to Lend Lease. The current revision is 'R6'.
2. The population assessment has been produced in agreement with Lend Lease, project Fire Engineer, project Architects and SWP and confirmed by AEG Ogden.
3. The evacuation of Plenary #2 is assumed to be a split of 70/30. 70% of people will evacuate via the exits on RL 7.0 with 30% evacuating via RL10.9.
4. The building is a Class 9b assembly building however it is not an 'Entertainment Venue' by definition from the Environmental Planning and Assessment Regulation 2000. ***'Entertainment venue'*** means a building used as a cinema, theatre or concert hall or an indoor sports stadium.
5. An operator commitment letter is required to be provided confirming acceptance of our maximum populations permitted. This letter is attached in Appendix E.

ICC Exhibition Centre

1. An operator commitment letter is required to be provided confirming acceptance of our maximum populations permitted. This letter is attached in Appendix E.
2. The population assessment has been produced in agreement with Lend Lease, project Fire Engineer, project Architects and SWP and confirmed by AEG Ogden.

Entertainment Centre

1. The assessment of the required sanitary facilities has been provided on the spreadsheet provided to Lend Lease. The current revision is 'R6'.
2. The population assessment has been produced in agreement with Lend Lease, project Fire Engineer, project Architects and SWP and confirmed by AEG Ogden.
3. It is assumed that patrons within the auditorium along the lower part of the seating are able to egress via the fire stairs accessed on level 1.

## 4.2. INTERPRETATIONS

A number of issues within the BCA are recognised to be interpretive in nature. Where these issues are encountered, interpretations are made that are consistent with Standard Industry Practise and/or Steve Watson & Partners policy formulated in regard of each issue. The issues identified to date are listed below:

1. If not more than 10% of a floor is used for a purpose which is a minor classification then the minor classification takes on the major classification of the floor.

## 5. SUMMARY OF CONSTRUCTION DETERMINATION

The following table summarises the details from which the assessment is based:

Sydney International Convention Centre, ICC Exhibition Centre, Entertainment Centre:

| | |
|---|---|
| Classification | **5, 6, 7a, 7b, 9b** |
| Number of storeys contained | **8** |
| Rise in storeys | **8** |
| Type of construction required | **A** |
| Effective height | **32.5m**<br>RL2.5 – Level 0 Carpark and Entrance Foyer<br>RL35.0- Upper Concourse |

# 6. ISSUES REQUIRING RESOLUTION

## 6.1. ALTERNATIVE SOLUTIONS PROPOSED / REQUIRED

It is proposed to satisfy the following non-compliances by alternative solutions:

Sydney International Convention Centre

| Item | Non-Compliance | DTS Clause | Description | Performance Requirement |
|---|---|---|---|---|
| 1. | Reduction in structural fire resistance | C1.1 | It has been proposed to reduce the required structural fire resistance | CP1 |
| 2. | Building exceeds maximum size of fire compartment | C2.2, C2.3 | The building has been assessed as a non compliant large isolated building | CP1 |
| 3. | Perimeter vehicular access has not been provided | C2.4 | Vehicular access is not provided around the entire perimeter of the building | CP9 |
| 4. | Stairway connects more than 3 storeys | D1.3 | The circulation stairs in the pre-function area is proposed to be used as a required non fire isolated stairway. | DP5 |
| 5. | Increase in exit travel distance | D1.4 | A number of areas have non compliant egress travel distance which is required to be addressed. | DP4, EP2.2 |
| 6. | Increased distance between alternative exits | D1.5 | A number of areas have non compliant distance between alternative exits which are required to be addressed. | DP4, EP2.2 |
| 7. | Reduction in required egress widths | D1.6 | SWP have accepted preliminary egress width calculations undertaken by the fire engineer. These numbers are to be finalised during the design development. | DP6, EP2.2 |
| 8. | Zone smoke control | E2.2 | Performance based zone smoke control is proposed | EP2.2 |
| 9. | Smoke exhaust compartments exceeded | E2.2 | Performance based smoke exhaust system is proposed | EP2.2 |
| 10. | The atrium is not proposed to be separated from the remainder of the building by bounding walls set back not more than 3.5m from the perimeter of the atrium well | G3.3 | Atrium provisions to be assessed on a performance basis. | EP2.2 & EP4.3 |
| 11. | Bounding walls are not proposed to be constructed in accordance with the requirement of Clause G3.4 | G3.4 | Atrium provisions to be assessed on a performance basis | EP2.2 & EP4.3 |

| Item | Non-Compliance | DTS Clause | Description | Performance Requirement |
|---|---|---|---|---|
| 12. | The roof of the atrium is not proposed to be fire rated in accordance with Table 3 of Specification C1.1 and not be protected by a sprinkler system in accordance with Specification E1.5 | G3.6 | Atrium provisions to be assessed on a performance basis | EP2.2 & EP4.3 |
| 13. | Fire services required to atrium | G3.8 | Atrium provisions to be assessed on a performance basis | EP2.2 & EP4.3 |
| 14. | Platform width | H1.4 | Platform width is proposed to be reduced | DP2, DP6 & EP2.2 |
| 15. | Number of risers in an aisle without a landing | H1.4 | | DP2, DP6 & EP2.2 |

## ICC Exhibition Centre

| Item | Non-Compliance | DTS Clause | Description | Performance Requirement |
|---|---|---|---|---|
| 1. | Reduction in structural fire resistance | C1.1 | It has been proposed to reduce the required structural fire resistance | CP1 |
| 2. | Building exceeds maximum size of fire compartment | C2.2, C2.3 | The building has been assessed as a non compliant large isolated building | CP1 |
| 3. | Perimeter vehicular access has not been provided | C2.4 | Vehicular access is not provided around the entire perimeter of the building | CP9 |
| 4. | Stairways serving as required exits which are not fire isolated | D1.3 | The stairways between levels 3, 4 and 5 are proposed to be used as a required non fire isolated stairway. | DP5 |
| 5. | Increase in exit travel distance | D1.4 | A number of areas have non compliant egress travel distance which is required to be addressed. | DP4, EP2.2 |
| 6. | Increased distance between alternative exits | D1.5 | A number of areas have non compliant distance between alternative exits which are required to be addressed. | DP4, EP2.2 |
| 7. | Reduction in required egress widths | D1.6 | SWP have accepted preliminary egress width calculations undertaken by the fire engineer. These numbers are to be finalised during the design development. | DP6, EP2.2 |
| 8. | Travel by non-fire isolated stairways or ramps | D1.9 | Upper Mezzanine –Level 5 (RL25.6) exceeds the 80m permitted by the BCA. The worst case scenario from this floor is approx 155m. | DP5, EP2.2 |

| Item | Non-Compliance | DTS Clause | Description | Performance Requirement |
|---|---|---|---|---|
| 9. | Horizontal exits | D1.11 | The horizontal exits from the exhibition halls on level 1 and level 4 do not have sufficient clear area on the side of the fire wall to which occupants are evacuating. | DP4, DP6, EP2.2 |
| 10. | Fire hydrants | E1.3 | There will be a number of shortfalls in hydrant coverage. These are proposed to be addressed on a performance basis. | EP1.3 |
| 11. | Hose reels | E1.4 | There will be a number of shortfalls in hose reel coverage. These are proposed to be addressed on a performance basis | EP1.1 |
| 12. | Zone smoke control | E2.2 | Performance based zone smoke control is proposed | EP2.2 |
| 13. | Smoke exhaust compartments exceeded | E2.2 | Performance based smoke exhaust system is proposed | EP2.2 |
| 14. | The atrium is not proposed to be separated from the remainder of the building by bounding walls set back not more than 3.5m from the perimeter of the atrium well | G3.3 | Atrium provisions to be assessed on a performance basis. | EP2.2 & EP4.3 |
| 15. | Bounding walls are not proposed to be constructed in accordance with the requirement of Clause G3.4 | G3.4 | Atrium provisions to be assessed on a performance basis | EP2.2 & EP4.3 |
| 16. | The roof of the atrium is not proposed to be fire rated in accordance with Table 3 of Specification C1.1 and not be protected by a sprinkler system in accordance with Specification E1.5 | G3.6 | Atrium provisions to be assessed on a performance basis | EP2.2 & EP4.3 |
| 17. | Fire services required to atrium | G3.8 | Sprinklers systems, smoke control, fire detection and alarm systems, and sound systems and intercom systems for emergency purposes are required to be installed in compliance with Specification G3.8 | EP2.2 & EP4.3 |

## Entertainment Centre

| Item | Non-Compliance | DTS Clause | Description | Performance Requirement |
|---|---|---|---|---|
| 1. | Reduction in fire resistance level | C1.1 | It has been proposed to reduce the required fire resistance level. | CP1 & CP2 |
| 2. | Building exceeds maximum size of fire compartment | C2.2, C2.3 | The building has been assessed as a non compliant large isolated building | CP1, CP2 and EP2.2 |

| Item | Non-Compliance | DTS Clause | Description | Performance Requirement |
|---|---|---|---|---|
| 3. | Requirements for open spaces and vehicular access | C2.4 | Vehicular access is not provided around the entire perimeter of the building | CP9 |
| 4. | Exit travel distance | D1.4 | A number of areas have non compliant egress travel distance which is required to be addressed. | DP4, EP2.2 |
| 5. | Distance between alternative exits | D1.5 | A number of areas have non compliant distance between alternative exits which are required to be addressed. | DP4, EP2.2 |
| 6. | Reduction in required egress widths | D1.6 | SWP have accepted preliminary egress width calculations undertaken by the fire engineer. These numbers are to be finalised during the design development.<br>Note that: In a Class 9b entertainment venue where one or more paths of travel merge, the width of the combined paths of travel must be not less than the sum of the required widths of those paths of travel. | DP6, EP2.2 |
| 7. | Travel by non-fire-isolated stairways or ramps | D1.9 | The open stairs serving the corporate function rooms on level 5 and chorus dressing rooms on level 2 do not discharge to a level which is provided with direct egress to a road or open space. | DP4 and EP2.2 |
| 8. | Non-required stairs, ramps or escalators | D1.12 | The escalators connect more than 3 storeys. | CP2 and EP2.2 |
| 9. | Automatic smoke detection system. | E2.2 | It is proposed to use extended detector spacing in some areas. Detectors are proposed to be deleted from ceiling and floor voids.<br>It is proposed to provide an isolation switch for the smoke detectors in the auditorium to isolate the smoke detection when theatrical smoke is used. | EP2.2 |
| 10. | Zone smoke control | E2.2 | Performance based zone smoke control is proposed | EP2.2 |
| 11. | Smoke exhaust compartments exceeded | E2.2 | Performance based smoke exhaust system is proposed | EP2.2 |
| 12. | The atrium is not proposed to be separated from the remainder of the building by bounding walls set back not more than 3.5m from the perimeter of the atrium well | G3.3 | Atrium provisions to be assessed on a performance basis. | EP2.2 & EP4.3 |

| Item | Non-Compliance | DTS Clause | Description | Performance Requirement |
|---|---|---|---|---|
| 13. | Bounding walls are not proposed to be constructed in accordance with the requirement of Clause G3.4 | G3.4 | Atrium provisions to be assessed on a performance basis | EP2.2 & EP4.3 |
| 14. | The roof of the atrium is not proposed to be fire rated in accordance with Table 3 of Specification C1.1 and not be protected by a sprinkler system in accordance with Specification E1.5 | G3.6 | Atrium provisions to be assessed on a performance basis | EP2.2 & EP4.3 |
| 15. | Fire services required to atrium | G3.8 | Sprinklers systems, smoke control, fire detection and alarm systems, and sound systems and intercom systems for emergency purposes are required to be installed in compliance with Specification G3.8 | EP2.2 & EP4.3 |
| 16. | Number of seats between aisles | NSWH101.11.1 | It is proposed to increase the number of seats based on the Green Guide | DP2, DP6 & EP2.2 |
| 17. | Platform width | NSWH101.11.7 | Platform width is proposed to be reduced | DP2, DP6 & EP2.2 |
| 18. | Number of risers in an aisle without a landing | NSW101.13.3 | | DP2, DP6 & EP2.2 |

## 7. ISSUES TO BE RESOLVED PRIOR TO CONSTRUCTION

The following key items will need to be addressed for each building and shown on the plans prior to the issue of a Construction Certificate.

- Access Consultant is to provide a detailed report;
- Part J assessment to be provided;
- Aggregate exit widths to be finalised;
- Services design details to be provided, these include:
    - Fire services (sprinklers etc)
    - Mechanical
    - Hydraulic
    - Electrical

## 8. STATUTORY FIRE SAFETY MEASURES

The Statutory Fire Safety Measures listed in Appendix C of this report are required to be certified upon completion of the project and prior to occupation of the building by the owner of the building, by issuing a Final Fire Safety Certificate under the Act.

The owner is also required under the Act to certify each of the Fire Safety Measures annually by issuing a Fire Safety Statement.

## 9. CONCLUSIONS

The design is capable of complying with the requirements of the relevant sections of the BCA subject to resolution of the identified areas of non-compliance and minor amendments to the plans at the detailed design stage.

During the design development stage the following will be required for review:

- Access report
- Part J assessment
- Structural design documentation and certification
- Services design documentation and certification
- Fire engineering report

# 10. APPENDIX A – DETAILED ASSESSMENT DATA

The indicative floor areas are shown below and will be further refined during design development with Lend Lease.

## 10.1. FLOOR AREAS AND VOLUMES

Sydney International Convention Centre

| *Floor* | *Approx Area (m²)* | *Comment* |
|---|---|---|
| Ground Floor (RL 3.3) Lobby | 17300 | |
| Convex (RL 7.0) | 16100 | |
| Plenary 1 & 2 (RL 10.9) | 18000 | |
| Plenary 1 & 2 (RL 14.0) | 520 | |
| Plenary 3 (RL 17.2) | 7087 | |
| Meeting (RL 24.5) | 9703 | |
| Meeting Plant (RL 27.5) | 1573 | |
| The Grand Ballroom (RL 32.0) | 7179 | |
| The Grand Ballroom Plant (RL 36.0) | 1023 | |

ICC Exhibition Centre

| *Floor* | *Approx Area (m²)* | *Comment* |
|---|---|---|
| Carpark – Level 0 (RL2.5) | 25200 | |
| Lower Exhibition – Loading – Level 1 (RL6.0) | 2500 | Excluding exhibition halls 1-4 and driveway areas |
| Loading dock driveway areas | 5810 | |
| Exhibition Halls 1-4 | 19539 | |
| Lower Exhibition – Mezzanine – Level 1M (RL9.0) | 2303 | |
| Lower Exhibition – Pre-Function – Level 2 (RL12.0) | 5100 | |
| Lower Mezzanine – Plant 1 – Level 3 (RL17.0) | 5500 | |
| Upper Exhibition – Pre-Function – Level 4 (RL21.5) | 3300 | Excluding exhibition halls 5-7 |
| Exhibition Halls 5-7 | 13365 | |
| Upper Mezzanine – Level 5 (RL 25.60) | 9060 | Including Event Deck |
| Plant 2 – Level 5M (RL29.35) | 1759 | |

Entertainment Centre

| *Floor* | *Approx Area ($m^2$)* | *Comment* |
|---|---|---|
| Level 0 – Carpark and Foyer Entrance (RL 2.5) | 10,700 | |
| Level 1 – Main Foyer (RL 6.0) | 10,300 | |
| Level 2 – Lower Concourse (RL 12.0) | 8,500 | |
| Level 2M – Venue Management (RL 15.0) | 550 | |
| Level 3 – Box Level (RL 18.0) | 4,500 | |
| Level 3M – Plant Level (RL20.0) | 250 | |
| Level 4 – Corporate Function 01 (RL 24.0) | 2,300 | |
| Level 5 Corporate Function 02 (RL 30.0) | 7179 | |
| Upper Concourse (RL 35.0) | 1023 | |

## 10.2. EXITS

The indicative exits from the building are set out below. These will be further refined during design development with Lend Lease:

Sydney International Convention Centre

| *Exit No* | *Area* | *Type* | *No of storeys connected* | *Comments* |
|---|---|---|---|---|
| 1. | Ground Floor (RL 3.3) Lobby | Single door | 1 | SE discharge from corridor |
| 2. | Ground Floor (RL 3.3) Lobby | Double door | 1 | SE discharge from 'Chillers' room |
| 3. | Ground Floor (RL 3.3) Lobby | Double door | 1 | SE discharge from 'Water Tank' room |
| 4. | Ground Floor (RL 3.3) Lobby | Double door | 1 | SE discharge from 'Switch #1' room |
| 5. | Ground Floor (RL 3.3) Lobby | Single door | 1 | SE discharge from 'FM Services Maintenance Workshop' into fire isolated corridor |
| 6. | Ground Floor (RL 3.3) Lobby | Single door | 1 | SE discharge into fire isolated corridor adjacent 'Building Services Equipment Store |
| 7. | Ground Floor (RL 3.3) Lobby | Double door | 1 | SW discharge from 'Plantroom' room |
| 8. | Ground Floor (RL 3.3) Lobby | Single door and double door | 1 | SW discharge from corridor adjacent 'Staff Locker Room' |
| 9. | Ground Floor (RL 3.3) Lobby | Double door | 1 | SW discharge from corridor adjacent BOH storage area |
| 10. | Ground Floor (RL 3.3) Lobby | Auto sliding door | 1 | NW discharge from foyer area |
| 11. | Ground Floor (RL 3.3) Lobby | Auto sliding door | 1 | NW discharge from foyer area |
| 12. | Ground Floor (RL 3.3) Lobby | Auto sliding door | 1 | NW discharge from foyer area |
| 13. | Ground Floor (RL 3.3) Lobby | Auto sliding door | 1 | NW discharge from foyer area |
| 14. | Ground Floor (RL 3.3) Lobby | Auto sliding door | 1 | NE discharge from foyer area |
| 15. | Ground Floor (RL 3.3) Lobby | Auto sliding door | 1 | NE discharge from foyer area |
| 16. | Ground Floor (RL 3.3) Lobby | 4x Double doors | 1 | NE discharge from corridor |
| 17. | Ground Floor (RL 3.3) Lobby | Single door | 1 | Leads into fire isolated corridor discharging to front of building at NE |
| 18. | Convex (RL 7.0) | Double door | 1 | Leads into fire isolated corridor from foyer corridor |
| 19. | Convex (RL 7.0) | Double door | 1 | Leads into fire isolated corridor from main foyer area |

| *Exit No* | *Area* | *Type* | *No of storeys connected* | *Comments* |
|---|---|---|---|---|
| 20. | Convex (RL 7.0) | Single door | 1 | Leads into fire isolated corridor from amenities |
| 21. | Convex (RL 7.0) | Single door | 1 | Leads into fire isolated corridor from amenities |
| 22. | Convex (RL 7.0) | Double door | 1 | Leads into fire isolated corridor from BOH area |
| 23. | Convex (RL 7.0) | 3x Double door | 1 | Leads into fire isolated corridor from BOH Pyrmont theatre function area |
| 24. | Convex (RL 7.0) | Non fire isolated stairway | 1 | Stairway discharge to SW of building |
| 25. | Convex (RL 7.0) | Non fire isolated stairway | 2 | Leads to convention foyer on ground floor |
| 26. | Convex (RL 7.0) | Non fire isolated stairway | 2 | Leads to convention foyer on ground floor |
| 27. | Central fire stair | Fire isolated stairway (scissor stair) | 8 | |
| 28. | North East fire stair | Fire isolated stairway (scissor stair) | 5 | |
| 29. | North West fire stair | Fire isolated stairway | 2 | |
| 30. | Plenary 1 & 2 (RL 10.9) | Fire isolated stairway | 1 | Exit from Auditorium only |

ICC Exhibition Centre

| *Exit No* | *Area* | *Type* | *No of storeys connected* | *Comments* |
|---|---|---|---|---|
| 1. | Exhibition Hall 4 | Fire isolated stairway | 1 | 5 double doors discharge to Darling Drive |
| 2. | Exhibition Hall 4 | Fire isolated stairway | 1 | 4 double doors discharge to Darling Drive |
| 3. | Exhibition Hall 4 | Double door | 1 | 3 double doors discharge to South of building |
| 4. | Exhibition Hall 4 | Double door | 1 | 2 double doors discharge to South of building |
| 5. | Exhibition Hall 3 | Fire isolated stairway | 1 | 7 double doors discharge to Darling Drive |
| 6. | Exhibition Hall 3 | Horizontal exit | 1 | |
| 7. | Exhibition Hall 2 | Horizontal exit | 1 | |
| 8. | Exhibition Hall 2 | Fire isolated stairway | 1 | 3 double doors discharge to Darling Drive |
| 9. | Exhibition Hall 2 | Fire isolated stairway | 1 | 3 double doors discharge to Darling Drive |
| 10. | Exhibition Hall 1 | Horizontal exit | 1 | 3 double doors |
| 11. | Exhibition Hall 1 | Doorway | 1 | |
| 12. | Lower Exhibition – loading – level 1 | Fire isolated corridor | 1 | 1 double door discharge to Darling Drive |
| 13. | Lower Exhibition – loading – level 1 | Non fire isolated stairway | 2 | Stairway leads to entry foyer |
| 14. | Lower Exhibition – loading – level 1 | Non fire isolated stairway | 2 | Stairway leads to entry foyer |
| 15. | Lower Exhibition – loading – level 1 | Non fire isolated stairway | 2 | Stairway leads to entry foyer |
| 16. | Lower Exhibition – loading – level 1 | Non fire isolated stairway | 2 | Stairway leads to entry foyer |
| 17. | Lower Exhibition – loading – level 1 | Fire isolated stairway | 2 | Stairway leads to Daring Harbour Walk |
| 18. | Entry foyer | Sliding door | 1 | Discharge to Darling Harbour Walk |
| 19. | Lower Mezzanine – Plant 1 – Level 3 | Non fire isolated stairway | 2 | Stairway leads to entry foyer |
| 20. | Lower Mezzanine – Plant 1 – Level 3 | Non fire isolated stairway | 2 | Stairway leads to entry foyer |

| *Exit No* | *Area* | *Type* | *No of storeys connected* | *Comments* |
|---|---|---|---|---|
| 21. | Lower Mezzanine – Plant 1 – Level 3 | Non fire isolated stairway | 2 | Stairway leads to entry foyer |
| 22. | Exhibition Hall 7 | Horizontal exit | 1 | 4 double doors to exhibition concourse |
| 23. | Exhibition Hall 7 | Horizontal exit | 1 | Discharge to event deck |
| 24. | Exhibition Hall 7 | Horizontal exit | 1 | Discharge to event deck |
| 25. | Exhibition Hall 6 | Double doors | 1 | Discharge to loading dock |
| 26. | Exhibition Hall 6 | Horizontal exit | 1 | 4 double doors to exhibition concourse |
| 27. | Exhibition Hall 5 | Double doors | 1 | Discharge to loading dock |
| 28. | Exhibition Hall 5 | Horizontal exit | 1 | 4 double doors to exhibition concourse |
| 29. | Exhibition Hall 5 | Horizontal exit | 1 | Discharge to North stairway/passageway |

## Entertainment Centre

| *Exit No* | *Area* | *Type* | *No of storeys connected* | *Comments* |
|---|---|---|---|---|
| 1. | Level 0 (RL 2.5) | Fire passage | 2 | |
| 2. | Level 0 (RL 2.5) | Fire stair | 2 | Egress is provided into the fire stair from the carpark and corridor serving the stores |
| 3. | Level 0 (RL 2.5) | Single door | - | Single door leads directly from carpark to outside adjacent lift lobby |
| 4. | Level 0 (RL 2.5) | Double doors | - | |
| 5. | Level 0 (RL 2.5) | Double doors | - | |
| 6. | Level 1 (RL 6.0) | Fire Stair | 2 | |
| 7. | Level 1 (RL 6.0) | Stair | 2 | |
| 8. | Level 1 (RL 6.0) | Fire Stair | 2 | |
| 9. | Level 1 (RL 6.0) | Fire Stair | 2 | |
| 10. | Level 1 (RL 6.0) | Fire Stair | 3 | |
| 11. | Level 2 (RL 12.0) | Fire Stair | 5 | |
| 12. | Level 2 (RL 12.0) | Fire Stair | 5 | |
| 13. | Level 2 (RL 12.0) | Stair | 3 | Stair passes by Levels 0 and 1. |
| 14. | Level 2 (RL 12.0) | Fire Stair | 4 | Discharges into level 1. |
| 15. | Level 2 (RL 12.0) | Fire Stair | 3 | |
| 16. | Level 2 (RL 12.0) | Fire Stair | 6 | Stair connects into stair along grid line 17 |
| 17. | Level 2 (RL 12.0) | Fire Stair | 6 | |

| *Exit No* | *Area* | *Type* | *No of storeys connected* | *Comments* |
|---|---|---|---|---|
| 18. | Level 2 (RL 12.0) | Doors leading to Bridge Link | - | |
| 19. | Level 2M (RL 15.0) | Fire Stair | 6 | |
| 20. | Level 3 (RL 18.0) | Fire Stair | 5 | |
| 21. | Level 3 (RL 18.0) | Fire Stair | 5 | |
| 22. | Level 3 (RL 18.0) | Fire Stair | 4 | |
| 23. | Level 3 (RL 18.0) | Fire Stair | 6 | |
| 24. | Level 3 (RL 18.0) | Fire Stair | 6 | |
| 25. | Level 4 (RL 24.0) | Fire Stair | 5 | |
| 26. | Level 4 (RL 24.0) | Fire Stair | 6 | |
| 27. | Level 4 (RL 24.0) | Fire Stair | 6 | |
| 28. | Level 5 (RL 30.0) | Fire Stair | 5 | |
| 29. | Level 5 (RL 30.0) | Fire Stair | 6 | |
| 30. | Level 5 (RL 30.0) | Fire Stair | 6 | |
| 31. | Level 5 (RL 30.0) | Open Stair | 2 | Open stair discharges to level 4. |

## 11. APPENDIX B – REFERENCED DOCUMENTATION

The following documentation was used in the preparation of this report:

Sydney International Convention Centre

| *Drawing No.* | *Title* | *Issue* | *Date* | *Drawn By* |
|---|---|---|---|---|
| CO_AR_0100 _L0 | GA Plans – Lobby – Level 0 (RL 3.3) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0101 _L1 | GA Plan – Convex – Level 1 (RL 7.0) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0102 _L2 | GA Plan – Plenary 1 & 2 – Level 2 (RL 10.9) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0103 _L2M | GA Plan – Plant – Level 2M (RL 13.8) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0104 _L3 | GA Plan – Plenary 3 – Level 3 (RL 17.2) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0105 _L3M | GA Plan – Plant – Level 3M (RL 20.5) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0106 _L4 | GA Plan – Meeting – Level 4 (RL 24.5) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0107 _L4M | GA Plan – Plant – Level 4M (RL 27.5) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0108 _L5 | GA Plan – The Grand Ballroom – Level 5 (RL 32.0) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0109 _L6 | GA Plan – Plant – Level 6 (RL 36.0) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0110 _L7 | GA Plan – Plant – Level 7 (RL 40.0) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0111 _RF | GA Plan – Roof – Level RF (RL 45.0) | 3 | 08.02.13 | Hassell + Populous |
| CO_AR_0120 | North Elevation | 1 | 06.02.13 | Hassell + Populous |
| CO_AR_0121 | East Elevation | 1 | 06.02.13 | Hassell + Populous |
| CO_AR_0122 | West Elevation | 1 | 06.02.13 | Hassell + Populous |
| CO_AR_0123 | South Elevation | 1 | 06.02.13 | Hassell + Populous |
| CO_AR_0150 | Section 1 – East-West | 1 | 06.02.13 | Hassell + Populous |
| CO_AR_0151 | Section 2 – North-South – Through Plenary | 1 | 06.02.13 | Hassell + Populous |
| CO_AR_0152 | Section 3 – North-South – Through Ballroom | 1 | 06.02.13 | Hassell + Populous |
| CO_AR_1025 | External Wall System – East Facade | 1 | 06.02.13 | Hassell + Populous |
| CO_AR_1026 | External Wall System 2 – North Facade - Plenary | 1 | 06.02.13 | Hassell + Populous |

| Drawing No. | Title | Issue | Date | Drawn By |
|---|---|---|---|---|
| CO_AR_1027 | External Wall System 3 – West Facade | 1 | 06.02.13 | Hassell + Populous |

ICC Exhibition Centre

| Drawing No. | Title | Issue | Date | Drawn By |
|---|---|---|---|---|
| EX_AR_0100 _L0 | GA Plan – Carpark – Level 0 (RL2.5) | 2 | 25.01.13 | Hassell + Populous |
| EX_AR_0101 _L1 | GA Plan – Lower Exhibition – Loading – Level 1 (RL6.0) | 2 | 25.01.13 | Hassell + Populous |
| EX_AR_0102 _L1M | GA Plan – Lower Exhibition – Mezzanine – Level 1M (RL9.0) | 2 | 25.01.13 | Hassell + Populous |
| EX_AR_0103 _L2 | GA Plan – Lower Exhibition – Pre-Function – Level 2 (RL12) | 2 | 25.01.13 | Hassell + Populous |
| EX_AR_0104 _L3 | GA Plan – Lower Exhibition – Plant 1 – Level 3 (RL17) | 2 | 25.01.13 | Hassell + Populous |
| EX_AR_0105 _L4 | GA Plan – Upper Exhibition – Pre-Function – Level 4 (RL21.50) | 2 | 25.01.13 | Hassell + Populous |
| EX_AR_0106 _L5 | GA Plan – Upper Mezzanine – Level 5 (RL25.60) | 2 | 25.01.13 | Hassell + Populous |
| EX_AR_0107 _L5M | GA Plan – Plant 2 – Level 5M (RL29.35) | 2 | 25.01.13 | Hassell + Populous |
| EX_AR_0108 _RF | GA Plan – Exhibition Hall – Roof - Level RF (RL39.35) | 2 | 25.01.13 | Hassell + Populous |
| EX_AR_0120 | North Elevation | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_0121 | East Elevation | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_0122 | South Elevation | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_0123 | West Elevation | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_0150 | Section 1 | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_0151 | Section 2 | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_0152 | Section 3 | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_0153 | Section 4 | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_1025 | External Wall System 1 – East Facade | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_1026 | External Wall System 2 – East Facade – Lower Hall | 00 | 25.01.13 | Hassell + Populous |

| *Drawing No.* | *Title* | *Issue* | *Date* | *Drawn By* |
|---|---|---|---|---|
| EX_AR_1310 _L0 | Fire – Carpark – Level 0 (RL2.5) | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_1311 _L1 | Fire – Lower Exhibition – Loading - Level 1 (RL6.0) | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_1312 _L1M | Fire – Lower Exhibition Mezzanine – Level 1M (RL9.0) | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_1313 _L2 | Fire – Lower Exhibition – Pre-Function - Level 2 (RL12.0) | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_1314 _L3M | Fire – Lower Mezzanine – Plant 1 - Level 3M (RL17.0) | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_1315 _L4 | Fire – Upper Exhibition – Pre-Function - Level 4 (RL21.5) | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_1316 _L5 | Fire – Upper Mezzanine – Level 5 (RL25.6) | 00 | 25.01.13 | Hassell + Populous |
| EX_AR_1317 _L5M | Fire – Plant 2 - Level 5M (RL29.35) | 00 | 25.01.13 | Hassell + Populous |

Entertainment Centre

| *Drawing No.* | *Title* | *Issue* | *Date* | *Drawn By* |
|---|---|---|---|---|
| TH_AR_0100_L0 | GA Plans – Carpark and Entrance Foyer – Level 0 (RL 2.5) | 04 | 13.02.2013 | Hassell + Populous |
| TH_AR_0101_L1 | GA Plan – Main Foyer – Level 1 (RL 6.0) | 04 | 13.02.2013 | Hassell + Populous |
| TH_AR_0102_L2 | GA Plans – Lower Concourse – Level 2 (RL 12.0) | 04 | 13.02.2013 | Hassell + Populous |
| TH_AR_0103_L2M | GA Plans – Venue Management – Level 2M (RL 15.0) | 04 | 13.02.2013 | Hassell + Populous |
| TH_AR_0104_L3 | GA Plans – Box Level - Level 3 (RL 18.0) | 04 | 13.02.2013 | Hassell + Populous |
| TH_AR_0106_L4 | GA Plans – Corporate Function 01 – Level 4 (RL 24.0) | 04 | 13.02.2013 | Hassell + Populous |
| TH_AR_0107_L5 | GA Plans – Corporate Function 02 – Level 5 (RL 30.0) | 04 | 13.02.2013 | Hassell + Populous |
| TH_AR_0108_RF | GA Plans – Roof (RL 43.3) | 04 | 13.02.2013 | Hassell + Populous |
| TH_AR_0120 | Elevation – North | 02 | 13.02.2013 | Hassell + Populous |
| TH_AR_0121 | Elevation – East | 02 | 13.02.2013 | Hassell + Populous |
| TH_AR_0122 | Elevation – South | 02 | 13.02.2013 | Hassell + Populous |
| TH_AR_0123 | Elevation – West | 02 | 13.02.2013 | Hassell + Populous |

## 12. APPENDIX C – STATUTORY FIRE SAFETY MEASURES

Schedule of Statutory Fire Safety Measures

Sydney International Convention Centre

| Measure | Standard of Performance |
|---|---|
| Access panels, doors and hoppers to fire resisting shafts | BCA2012 Clause C3.13 and tested prototypes (AS 1530.4 – 2005) |
| Automatic fail safe devices | Scheduled devices release upon trip of smoke detection, fire detection or sprinkler activation in accordance with BCA2012 Clause D2.21. |
| Automatic fire detection and alarm system *(within atriums)* | BCA2012 Specification G3.8 and AS 1670.1 – 2004 |
| Automatic fire detection and alarm system *(smoke detection system to operate zone smoke control or stair pressurisation system)* | BCA2012 Clause 5 of Specification E2.2a and AS/NZS 1668.1 – 1998 |
| Automatic fire detection and alarm system *(smoke detection system to automatically shutdown air-handling system or smoke detection system to activate smoke exhaust system)* | BCA2012 Clause 5 of Specification E2.2a and AS/NZS 1668.1 – 1998*(System monitoring in accordance with AS1670.3-2004)* |
| Automatic fire suppression systems *(Sprinklers)* | BCA2012 Specification E1.5 and AS 2118.1 – 1999 |
| Emergency lifts | BCA2012 Clause E3.4 and AS 1735.2 – 2001 or Appendix A of AS 1735.1 – 2003 |
| Emergency lighting | BCA2012 Clause E4.2, E4.4 and AS 2293.1 – 2005 |
| Sound System and Intercommunication System for Emergency Purposes (aka EWIS) | BCA2012 Clause E4.9, Specification G3.8 and AS 1670.4 – 2004, AS 4428.4 – 2004 |
| Exit signs | BCA2012 Clause E4.5, NSW E4.6, E4.8 and AS 2293.1 – 2005 |
| Fire control centre | BCA2012 Specification E1.8 |
| Fire dampers | BCA2012 Clause C3.15 and AS/NZS 1668.1 – 1998 (AS 1682.1-1990 and AS 1682.2-1990) |
| Fire doors | BCA2012 Specification C3.4 and AS 1905.1 – 2005 |
| Fire hydrants systems | BCA2012 Clause E1.3 and AS 2419.1 – 2005 |
| Fire seals protecting opening in fire resisting components of the building | BCA2012 Clause C3.15, Specification C3.15 and AS 1530.4 – 2005 and AS 4072.1 – 2005 and installed in accordance with the tested prototype. |
| Hose reel system | BCA2012 Clause E1.4 and AS 2441 – 2005 |
| Lightweight construction | BCA2012 Specifications C1.8, Clause A2.3 and AS 1530.4-2005 |
| Mechanical air handling system *(automatic shut down of air-handling system)* | BCA2012 Clause E2.2 and AS/NZ 1668.1-1998 |

| Measure | Standard of Performance |
|---|---|
| Mechanical air handling system *(air-handling system design to operate as a smoke control system)* | BCA2012 Clause E2.2 and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(automatic air pressurisation system)* | BCA2012 Table E2.2a and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(zone smoke control system)* | BCA2012 Table E2.2a and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(automatic smoke exhaust system)* | BCA2012 Specification E2.2b |
| Portable fire extinguishers | BCA2012 Clause E1.6 and AS 2444 – 2001 |
| Smoke dampers | AS/NZS 1668.1 – 1998 (AS 1682.1-1990 and AS 1682.2-1990) |
| Smoke doors | BCA2012 Specifications C2.5 and C3.4 and AS 1288 – 2006 |
| Warning and operational signs | BCA2012 Clauses C3.6, D1.17, D2.23, E1.4, E3.3, and Specifications D1.12, E1.8 and G3.8 |
| Fire Engineering Alternative Solution<br>• Automatic fire detection and alarm system<br>• Sound System and Intercommunication System for Emergency Purposes (aka EWIS)<br>• Mechanical air handling system *(automatic shut down of air-handling system)*<br>• Mechanical air handling system *(automatic smoke exhaust system)*<br>• Mechanical air handling system *(air-handling system design to operate as a smoke control system)*<br>• Mechanical air handling system *(automatic smoke exhaust system)* | Fire Engineering Alternative Solution |

Note that the fire safety schedule may need to be amended subject to the inclusion of a fire engineered alternative solution.

## ICC Exhibition Centre

| Measure | Standard of Performance |
|---|---|
| Access panels, doors and hoppers to fire resisting shafts | BCA2012 Clause C3.13 and tested prototypes (AS 1530.4 – 2005) |
| Automatic fail safe devices | Scheduled devices release upon trip of smoke detection, fire detection or sprinkler activation in accordance with BCA2012 Clause D2.21. |

| Measure | Standard of Performance |
|---|---|
| Automatic fire detection and alarm system *(within atriums)* | BCA2012 Specification G3.8 and AS 1670.1 – 2004 |
| Automatic fire detection and alarm system *(smoke detection system to operate zone smoke control or stair pressurisation system)* | BCA2012 Clause 5 of Specification E2.2a and AS/NZS 1668.1 – 1998 |
| Automatic fire detection and alarm system *(smoke detection system to automatically shutdown air-handling system or smoke detection system to activate smoke exhaust system)* | BCA2012 Clause 5 of Specification E2.2a and AS/NZS 1668.1 – 1998*(System monitoring in accordance with AS1670.3-2004)* |
| Automatic fire suppression systems *(Sprinklers)* | BCA2012 Specification E1.5 and AS 2118.1 – 1999 |
| Emergency lifts | BCA2012 Clause E3.4 and AS 1735.2 – 2001 or Appendix A of AS 1735.1 – 2003 |
| Emergency lighting | BCA2012 Clause E4.2, E4.4 and AS 2293.1 – 2005 |
| Sound System and Intercommunication System for Emergency Purposes (aka EWIS) | BCA2012 Clause E4.9, Specification G3.8 and AS 1670.4 – 2004, AS 4428.4 – 2004 |
| Exit signs | BCA2012 Clause E4.5, NSW E4.6, E4.8 and AS 2293.1 – 2005 |
| Fire control centre | BCA2012 Specification E1.8 |
| Fire dampers | BCA2012 Clause C3.15 and AS/NZS 1668.1 – 1998 (AS 1682.1-1990 and AS 1682.2-1990) |
| Fire doors | BCA2012 Specification C3.4 and AS 1905.1 – 2005 |
| Fire hydrants systems | BCA2012 Clause E1.3 and AS 2419.1 – 2005 |
| Fire seals protecting opening in fire resisting components of the building | BCA2012 Clause C3.15, Specification C3.15 and AS 1530.4 – 2005 and AS 4072.1 – 2005 and installed in accordance with the tested prototype. |
| Hose reel system | BCA2012 Clause E1.4 and AS 2441 – 2005 |
| Lightweight construction | BCA2012 Specifications C1.8, Clause A2.3 and AS 1530.4-2005 |
| Mechanical air handling system *(automatic shut down of air-handling system)* | BCA2012 Clause E2.2 and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(air-handling system design to operate as a smoke control system)* | BCA2012 Clause E2.2 and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(automatic air pressurisation system)* | BCA2012 Table E2.2a and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(zone smoke control system)* | BCA2012 Table E2.2a and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(automatic smoke exhaust system)* | BCA2012 Specification E2.2b |

| Measure | Standard of Performance |
|---|---|
| Portable fire extinguishers | BCA2012 Clause E1.6 and AS 2444 – 2001 |
| Smoke dampers | AS/NZS 1668.1 – 1998 (AS 1682.1-1990 and AS 1682.2-1990) |
| Smoke doors | BCA2012 Specifications C2.5 and C3.4 and AS 1288 – 2006 |
| Warning and operational signs | BCA2012 Clauses C3.6, D1.17, D2.23, E1.4, E3.3, and Specifications D1.12, E1.8 and G3.8 |
| Fire Engineering Alternative Solution<br>• Automatic fire detection and alarm system<br>• Fire Hydrant<br>• Fire Hose Reel<br>• Sound System and Intercommunication System for Emergency Purposes (aka EWIS)<br>• Mechanical air handling system *(automatic shut down of air-handling system)*<br>• Mechanical air handling system *(automatic smoke exhaust system)*<br>• Mechanical air handling system *(air-handling system design to operate as a smoke control system)*<br>• Mechanical air handling system *(automatic smoke exhaust system)* | Fire Engineering Alternative Solution |

Entertainment Centre

| Measure | Standard of Performance |
|---|---|
| Access panels, doors and hoppers to fire resisting shafts | BCA2012 Clause C3.13 and tested prototypes (AS 1530.4 – 2005) |
| Automatic fail safe devices | Scheduled devices release upon trip of smoke detection, fire detection or sprinkler activation in accordance with BCA2012 Clause D2.21. |
| Automatic fire detection and alarm system *(within atriums)* | BCA2012 Specification G3.8 and AS 1670.1 – 2004 |
| Automatic fire detection and alarm system *(smoke detection system to operate zone smoke control or stair pressurisation system)* | BCA2012 Clause 5 of Specification E2.2a and AS/NZS 1668.1 – 1998 |

| Measure | Standard of Performance |
|---|---|
| Automatic fire detection and alarm system *(smoke detection system to automatically shutdown air-handling system or smoke detection system to activate smoke exhaust system)* | BCA2012 Clause 5 of Specification E2.2a and AS/NZS 1668.1 – 1998 *(System monitoring in accordance with AS1670.3-2004)* |
| Automatic fire suppression systems *(Sprinklers)* | BCA2012 Specification E1.5 and AS 2118.1 – 1999 |
| Emergency lifts | BCA2012 Clause E3.4 and AS 1735.2 – 2001 or Appendix A of AS 1735.1 – 2003 |
| Emergency lighting | BCA2012 Clause E4.2, E4.4 and AS 2293.1 – 2005 |
| Sound System and Intercommunication System for Emergency Purposes (aka EWIS) | BCA2012 Clause E4.9, Specification G3.8 and AS 1670.4 – 2004, AS 4428.4 – 2004 |
| Exit signs | BCA2012 Clause E4.5, NSW E4.6, E4.8 and AS 2293.1 – 2005 |
| Fire control centre | BCA2012 Specification E1.8 |
| Fire dampers | BCA2012 Clause C3.15 and AS/NZS 1668.1 – 1998 (AS 1682.1-1990 and AS 1682.2-1990) |
| Fire doors | BCA2012 Specification C3.4 and AS 1905.1 – 2005 |
| Fire hydrants systems | BCA2012 Clause E1.3 and AS 2419.1 – 2005 |
| Fire seals protecting opening in fire resisting components of the building | BCA2012 Clause C3.15, Specification C3.15 and AS 1530.4 – 2005 and AS 4072.1 – 2005 and installed in accordance with the tested prototype. |
| Hose reel system | BCA2012 Clause E1.4 and AS 2441 – 2005 |
| Lightweight construction | BCA2012 Specifications C1.8, Clause A2.3 and AS 1530.4-2005 |
| Mechanical air handling system *(automatic shut down of air-handling system)* | BCA2012 Clause E2.2 and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(air-handling system design to operate as a smoke control system)* | BCA2012 Clause E2.2 and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(automatic air pressurisation system)* | BCA2012 Table E2.2a and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(zone smoke control system)* | BCA2012 Table E2.2a and AS/NZ 1668.1-1998 |
| Mechanical air handling system *(automatic smoke exhaust system)* | BCA2012 Specification E2.2b |
| Portable fire extinguishers | BCA2012 Clause E1.6 and AS 2444 – 2001 |
| Smoke dampers | AS/NZS 1668.1 – 1998 (AS 1682.1-1990 and AS 1682.2-1990) |
| Smoke doors | BCA2012 Specifications C2.5 and C3.4 and AS 1288 – 2006 |

| Measure | Standard of Performance |
|---|---|
| Warning and operational signs | BCA2012 Clauses C3.6, D1.17, D2.23, E1.4, E3.3, and Specifications D1.12, E1.8 and G3.8 |
| Fire Engineering Alternative Solution<br>• Automatic fire detection and alarm system<br>• Sound System and Intercommunication System for Emergency Purposes (aka EWIS)<br>• Mechanical air handling system *(automatic shut down of air-handling system)*<br>• Mechanical air handling system *(automatic smoke exhaust system)*<br>• Mechanical air handling system *(air-handling system design to operate as a smoke control system)*<br>• Mechanical air handling system *(automatic smoke exhaust system)* | Fire Engineering Alternative Solution |

# 13. APPENDIX D – FIRE ENGINEERING PRINCIPLES

Below is a copy of the Fire Engineering alternative solutions principles provided by AECOM which has been reviewed and accepted by SWP.

## 13.1. INTRODUCTION

This document provides an overview of key non-compliances to the Building Code of Australia (BCA) Deemed-to-Satisfy (DtS) provisions 2012 that we anticipate will be supported through fire engineering solutions and a fire engineering strategy.

## 13.2. FIRE STRATEGY SUMMARY

We have undertaken initial analysis of each venue, on a floor-by-floor basis, to determine the most effective egress strategy and locations for fire compartment walls. We have sought to accommodate phased evacuation where possible, where egress capacity needs to be provided for only one zone at a time and not entire venues simultaneously. This approach is supported in international fire engineering codes and guidelines. The egress strategy is facilitated by fire protection measures such as sprinklers and smoke exhaust, which we have looked at rationalizing. Compartmentation has been located with consideration to the architectural and operational objectives of the venues, whilst minimising the length of fire walls needed. This reduces the likelihood of future penetrations compromising the integrity of the design, resulting in a more robust fire strategy and easier buildability.

An overview of fire strategy provisions for egress, fire compartmentation and smoke exhaust is provided in the fire strategy drawings issued in December 2012, which are based on our most recent analysis of the concept design.

The building fire strategy will be developed in further detail and documented in the Fire Engineering Brief (FEB). This will also identify the proposed detailed analysis that will be carried out to support the Alternative Solutions and acceptance criteria. The FEB will be provided to project stakeholders including Fire and Rescue New South Wales for review and feedback. Once stakeholders have agreed to the Fire Engineering Brief proposals, advanced analysis and assessments will be carried out and Alternative Solutions will be documented in a Fire Engineering Report for regulatory approval.

## 13.3. PROPOSED ALTERNATIVE SOLUTIONS

Table 1 summarises the fire engineering solutions currently proposed in the design. These non-compliances will need to be confirmed by the Building Certifier. There are likely to be additional fire engineering solutions as the detailed design is developed. We will update this list of fire engineering solutions at design stages 1 and 2.

In Table 2 we have identified additional fire engineering solutions that can be included in the Fire Engineering Brief, but these solutions are particularly contentious and require further development during the detailed design stage.

All other aspects of the building should be designed to the Deemed-to-Satisfy BCA Provisions. Additional non-compliances should be identified by stakeholders and communicated to us as soon as possible

As with any fire engineering solution, the solutions identified below carry an approvals risk until they have been agreed with the certifier and Fire Brigade. We will provide all necessary analysis to support the fire engineering solutions below.

**Table 1 BCA Non-Compliances and Proposed Alternative Solutions**

Alternative Solutions have been grouped by area within the development. The development is a single 'United Building' under Part A4 of the BCA.

| No. | BCA Non-Compliance | Mitigation Measures |
|---|---|---|
| **Site Wide** | | |
| 1. | Restricted vehicle access around site (C2.4b) | 6 m minimum width needed around the building perimeter for vehicle access to meet the DtS provisions. Any deviations (Darling Harbour side, between Exhibition and MFEC) will be addressed to provide fire brigade services access to the full perimeter of all buildings. |
| 2. | Fire control room not located at main entrance (E1.8) | The existing fire control room location will be maintained. While not at the main entrance, this will provide good fire vehicle access and will be away from large crowds of people that could be present at the front of the building. Mimic panels will be provided at the entrance to all buildings. |
| 3. | Hydrant sprinkler booster not located at the main entrance (E1.3 & E1.5) | The existing fire control room location will be maintained. While not at the main entrance, this will provide good fire vehicle access and will be away from large crowds of people that could be present at the front of the building. |
| 4. | Sprinkler zoning is not proposed to be the same as the detection system for the operation of the smoke hazard management system (Spec 1.5) | As a result of the multiple uses of the spaces and the phasing of the evacuation, it is proposed to only zone the smoke detectors for each of the smoke zones. Given that these are anticipated to operate prior to the sprinklers, this is considered appropriate. |
| 5. | Sprinkler water supply not achieving Grade 1 classification (E1.5) | The water supply will be designed to AS2118.1-2006. This will avoid the need for an on-site storage tank. |
| **Convention Centre** | | |
| 6. | Reduced Structural Fire Resistance (C1.1) | Initial analysis has shown that it should be possible to support omission of applied fire protection to the structure greater than 10 m above the seating in the signature plenary. |
| 7. | Extended Travel distances of up to 27 m to a point of choice, 60 m to the nearest exit and 110 m between exits (D1.4) | The Convention Centre shall be provided with a performance designed combination of smoke detection, sprinklers and smoke exhaust system. The provision of these fire safety systems is to facilitate occupant evacuation before the on-set of untenable conditions. |
| 8. | Reduced dimension of exits. Exit widths will be reduced based on a notional queuing time of 5 minutes (D1.6 & D1.13) | Adjusted exit width based on fire engineering literature concerning maximum occupancy and required time necessary to evacuate the space.<br><br>The maximum occupancies are based on occupant load's and will therefore not be affected by increased patronage during the buildings life. |
| 9. | Use of non fire-isolated stairs connecting more than 3 levels for egress (D1.3) | The circulation stairs in the pre-function area will be used as escape stairs. This is supported with the provision of fire or smoke separation between the accommodation and pre-function spaces as well as the smoke control system in the pre-function space. |
| 10. | Omission of zone smoke control (Spec E2.2b) | Based on the provision of the smoke control system omission of a zone smoke control system will be supported with a fire engineering solution. |
| 11. | Oversized Smoke reservoir size with an area of approximately 2,500 m² in the signature plenary and 3,000 m² in the ballroom (Spec. E2.2b) | A performance-based smoke control system is proposed to account for oversized reservoirs in the Convention Centre. CFD will be used to support the performance based design. |
| 12. | Reduced smoke exhaust rate in Plenary and the ballroom (Spec E2.2b) | A performance based design will be used to support the following smoke exhaust rates based on the operation of sprinklers and/or limits to combustibles through the use of California foam in the seating of the signature plenary:<br>Signature Plenary – 100 – 140 $m^3/s$<br>Signature Banquet –two smoke exhaust zones, each 15-25 $m^3/s$ of exhaust<br>Pre- function – 30-40 $m^3/s$ |

| | | |
|---|---|---|
| 13. | Omission of smoke exhaust to Plenary BOH, meeting rooms and banquet BOH (E2.2b) | This space will we have a relatively low population with short travel distances to the outside and adjoining spaces. |
| 14. | Make-up air velocity increased to 5 $ms^{-1}$ (E2.2b) | The BCA states the velocity of make-up air for a smoke exhaust system must not be greater than 2.5 $ms^{-1}$ through doorways. Other international standards and research will be used as well as the CFD modelling to support the increased makeup air velocities. |
| 15. | AS 1670.1 smoke detection system with extended spacing (Spec G3.8) | As the building contains an atrium the BCA DtS provisions call for smoke detection to AS1670.1 throughout. In the large spaces it is proposed to allow extended detector spacing (as per AS1668). This applies to open areas (greater than 400 $m^2$) and smoke migration paths. |
| 16. | Provision of a switch to isolate smoke detectors where theatrical smoke is used (E2.2a) | Theatrical smoke could be used in the signature plenary. In this area an isolation system will be provided to prevent false alarms. Management procedures will be developed to support the automatic detection systems being isolated when theatrical smoke is being used. |
| 17. | Omission of smoke detection from ceiling voids and under floor voids (Spec G3.8) | All occupied spaces will be provided with AS1670.1 smoke detection (with extended spacing). The ceiling and under floor voids will be provided with sprinklers, where needed by code. On this basis and to avoid the potential for false alarms a fire engineering solution will be developed to support omission of smoke detectors within the ceiling and under floor voids. |
| 18. | Omission of drencher sprinklers to atrium glazing (G3) | Areas of the atrium constructed with Glazing will not need to be provided with drenchers as the smoke exhaust system will maintain smoke temperatures below the failure temperature of the glazing. |
| 19. | Speech intelligibility not being achieved throughout the signature plenary (G3) | Due to the layout and volume of the signature plenary it is not possible to achieve speech intelligibility in these areas. Based on the high ceiling and simple layout, omission of a system to achieve compliant speech intelligibility will be developed. |
| 20. | Omission of fire separation between POPE and non-POPE areas (NSW H101) | The non-POPE store rooms are proposed to be separated from the POPE areas with smoke separation rather than fire separation based on the provision of sprinklers in the adjoining POPE and Non-POPE store rooms. |
| 21. | Omission of stair pressurisation in accommodation stairs (E2.2) | Due to the impracticality of pressuring a circulation stair and with the provision of the smoke exhaust system the removal of stair pressurisation will be supported. |
| 22. | Fire resistance of doors to plenary (Spec C1.1-3) | 2 x fire doors each with an FRL of -/60/60 to be provided between plenary and pre function space, where DtS provisions need 1 x door with a FRL of -/120/120. |
| **Link Building** | | |
| 23. | Reduced exit widths (D1.6 & D1.13) | Supported with a longer queuing time and with the cascading of the spaces into several evacuation zones. The maximum occupancies are based on occupant load's and will therefore not be affected by increased patronage during the buildings life. |
| 24. | Omission of Stair Pressurisation (E2.2b) | Due to the impracticality of pressuring a circulation stair and with the provision of the smoke exhaust system the removal of stair pressurisation will be supported. |
| 25. | Omission of zone smoke control (Spec E2.2b) | Based on the provision of the smoke control system omission of a zone smoke control system will be supported with a fire engineering solution. |
| 26. | Omission of smoke control from the meeting rooms and the production kitchen (Spec. E2.2b) | Smoke exhaust is not proposed from the meeting rooms across the link building. This is based on the spaces being fire separated from the adjacent accommodation. |
| 27. | Provision of a switch to isolate smoke detectors where theatrical smoke is used (E2.2a) | Theatrical smoke could be used in the secondary plenary. In this area an isolation system will be provided to prevent false alarms. Management procedures will be developed to support the automatic detection systems being isolated when theatrical smoke is being used. |
| 28. | AS 1670.1 smoke detection system with extended spacing (Spec G3.8) | As the building contains an atrium the BCA DtS provisions call for smoke detection to AS1670.1 throughout. In the large spaces it is proposed to allow extended detector spacing (as per AS1668). This applies to open areas (greater than 400 $m^2$) and smoke migration paths. |

| | | |
|---|---|---|
| 29. | Omission of smoke detection from ceiling voids and under floor voids (Spec G3.8) | All occupied spaces will be provided with AS1670.1 smoke detection (with extended spacing). The ceiling and under floor voids will be provided with sprinklers, where needed by code. On this basis and to avoid the potential for false alarms a fire engineering solution will be developed to support omission of smoke detectors within the ceiling and under floor voids. |
| 30. | Speech intelligibility not being achieved throughout the secondary plenary and secondary banquet. (G3) | Due to the layout and volume of the secondary plenary and secondary banquet it is not possible to achieve speech intelligibility in these areas. Based on the high ceiling and focal point, omission of a system to achieve compliant speech intelligibility will be developed. |
| 31. | Omission of fire separation between POPE and non-POPE areas (NSW H101) | The non-POPE store rooms are proposed to be separated from the POPE areas with smoke separation rather than fire separation based on the provision of sprinklers in the adjoining POPE and Non-POPE store rooms. |
| 32. | Extended Travel distances of up to 27 m to a point of choice, 60 m to the nearest exit and 110 m between exits (D1.4) | The Link Building will be provided with performance designed smoke detection, sprinklers and smoke exhaust system. The provision of these fire safety systems will be used to support extended travel distances. |
| **Exhibition Centre** | | |
| 33. | Reduced Structural Fire Resistance (C1.1) | Initial analysis has shown that it should be possible to support omission of applied fire protection to the structure in the trusses above each of the exhibition halls. |
| 34. | Fire resistance of plenary doors (Spec C1.1-3) | 2 x fire doors with FRL of -/60/60 to be provided between plenary and pre function space, where DtS provisions need 1 x door with a FRL of -/120/120. |
| 35. | Number of exits required (D1.2) | Back-of-house mezzanine between RL12 and RL 18 has one fire isolated exit and one non fire isolated exit. Two fire isolated exits should be provided to meet BCA DtS provisions. |
| 36. | Extended Travel distances of up to 120 m to the nearest exit and 240 m between exits (D1.4) | The Exhibition Centre will be provided with performance designed smoke detection, sprinklers and smoke exhaust system. The provision of these fire safety systems will be used to support extended travel distances. |
| 37. | Extended travel distance via non-fire isolated stairways (D1.9) | Escape distances from the upper mezzanine (RL25.6) to the road are up to 155 m via the circulation stairs which exceeds the BCA DtS limit of 80 m. This will be supported by the provision of fire safety systems. |
| 38. | Horizontal exits from exhibition halls do not provide space on other side of the wall for entire evacuating population (D1.11) | Escape conditions in the fire compartment will be addressed with active fire systems including smoke control. In addition, the neighbouring fire compartment into which they are escaping will only be used for transit to a final exit and will not be completely filled i.e. there will be a flow of occupants into the neighbouring fire compartment and simultaneously there will be an equivalent flow out; therefore it will never be full. |
| 39. | Reduced dimension of exits. Exit widths will be reduced based on a notional queuing time of 5 minutes (D1.6 & D1.13) | Adjusted exit width based on fire engineering literature concerning maximum occupancy and required time necessary to evacuate the space. The following exit width will be provided from the halls:<br>Hall L1: 8 m<br>Hall L2: 18 m<br>Hall L3: 7.5 m<br>Hall L4: 8.5 m<br>Hall U1: 7.5 m<br>Hall U2: 6 m<br>Hall U3: 14 m<br>The maximum occupancies are based on occupant load's and will therefore not be affected by increased patronage during the buildings life. The above stair widths are clear widths measured between handrails, which will be spaced at no more than 2 m intervals. |
| 40. | Oversized Smoke reservoir size with the following approximate areas:<br>Hall L1: 5,000 m² | A performance based smoke control system is proposed to account for oversized reservoirs in the Exhibition Centre. CFD will be used to support the performance based design. |

| | | |
|---|---|---|
| | Hall L2: 6,000 m²<br>Hall L3: 4,500 m²<br>Hall L4: 5,500 m²<br>Hall U1: 4,500 m²<br>Hall U2: 4,000 m²<br>Hall U3: 4,500 m²<br>(Spec. E2.2b) | The Exhibitions Halls will each be split into separate smoke reservoir zones. 100 $m^3/s$ of smoke exhaust each. Four smoke zones in Lower Halls and three in the Upper Halls. High level smoke resistant baffles will be provided between halls to the base of the trusses. Makeup air will be provided through doors/louvers opening direct to outside. |
| 41. | Omission of zone smoke control (Spec E2.2b) | Based on the provision of the smoke control system omission of a zone smoke control system will be supported with a fire engineering solution. |
| 42. | Smoke exhaust rate (E2.2b) | The Lower Pre-Function Atrium will be provided with 150-170 $m^3/s$ of smoke exhaust. The Upper Pre–Function space will require 75-90 $m^3/s$ smoke exhaust. Both systems could be combined with the mixed mode air handling plant. |
| 43. | No Smoke exhaust in Retail (E2.2b) | The retail spaces between the pre-function and exhibition halls have small compartment sizes with expedient egress available to occupants to areas provided with smoke control. |
| 44. | Smoke exhaust in loading dock (E2.2b) | The loading dock will be divided into five smoke control zones, each provided with 60 $m^3/s$ of smoke extract to maintain a clear layer in the loading dock. This will allow occupants to escape along the loading dock to complete their escape. |
| 45. | Fire hydrant shortfall in coverage within the exhibition halls (E1.3) | With the need to maintain a column free space it's not possible to achieve fire hydrant coverage in the upper exhibition halls. With the provision of a smoke exhaust system the large size of the halls and simple layout the use of two lengths of hose from the hydrants, therefore 60 m + 10 m throw is considered appropriate. |
| 46. | Fire hose reel shortfall in coverage within the exhibition halls (E1.4) | We propose providing standard length hose reels around the perimeter of the halls at 60m intervals. There will be a shortfall in hose reel coverage to the middle of the exhibition halls. Fire extinguishers will need to be located around the exhibition halls to achieve adequate coverage. Movable fire extinguisher cabinets could be considered. |
| 47. | Omission of fire separation between POPE and non-POPE store rooms (NSW H101) | The non-POPE store rooms are proposed to be separated from the POPE areas with smoke separation rather than fire separation based on the provision of sprinklers in the adjoining POPE and Non-POPE store rooms. |
| 48. | AS 1670.1 smoke detection system with extended spacing (Spec G3.8) | As the building contains an atrium the BCA DtS provisions call for smoke detection to AS1670.1 throughout. In the large spaces it is proposed to allow extended detector spacing (as per AS1668). This applies to open areas (greater than 400 m²) and smoke migration paths. |
| 49. | Omission of smoke detection from ceiling voids and under floor voids (Spec G3.8) | All occupied spaces will be provided with AS1670.1 smoke detection (with extended spacing). The ceiling and under floor voids will be provided with sprinklers, where needed by code. On this basis and to avoid the potential for false alarms, a fire engineering solution will be developed to support omission of smoke detectors within the ceiling and under floor voids. |
| 50. | Provision of a switch to isolate smoke detectors where theatrical smoke is used (E2.2a) | Theatrical smoke could be used in the exhibition halls. In these areas an isolation system will be provided to prevent false alarms. Management procedures will be developed to support the automatic detection systems being isolated when theatrical smoke is being used. |
| 51. | Omission of sprinklers and smoke detection beneath external awnings forming part of the roof (E1.5, E2.2a) | The external awnings of the roof extend more than 2.5 m at their points. As the roofs are at high level well above occupied areas, these will not adversely affect occupants escape and omission of sprinklers beneath these roofs is considered reasonable. |
| 52. | Speech intelligibility not being achieved throughout the exhibition halls (G3) | Due to the layout and volume of the exhibition halls it is not possible to achieve speech intelligibility in these areas. Based on the high ceiling and simple layout, omission of a system to achieve compliant speech intelligibility will be developed. |
| 53. | Omission of Stair Pressurisation (E2.2b) | Due to the impracticality of pressuring a circulation stair and with the provision of the smoke exhaust system the removal of stair pressurisation will be supported. |
| 54. | The roof atria space is proposed to not be fire rated in accordance with Table 3 of Specification C1.1 and not be protected by a sprinkler system in accordance with Specification E1.5. (G3.6) | As the roof of the atrium is at high level well above occupied areas, these will not adversely affect occupants escape and omission of sprinklers beneath these roofs is considered reasonable. |

| Entertainment Centre (MFEC) | | |
|---|---|---|
| 55. | Reduced Structural Fire Resistance (C1.1) | Initial analysis has shown that it should be possible to support omission of applied fire protection to the structure greater than 10 m above the seating in the signature plenary. |
| 56. | Extended Travel distances of up to 27 m to a point of choice, 60 m to an exit and 110 m between exits (D1.4) | The MFEC will be provided with performance designed smoke detection, sprinklers and smoke exhaust system. The provision of these fire safety systems will be used to support extended travel distances. |
| 57. | Non-fire isolated stairways from Level 5 and Level 2 do not discharge at a level with direct egress to a road or open space (D1.9) | Occupants using the non-fire isolated stair will continue to road level via another stair. The stair transfer route will be designed so that way-finding straight forward and occupants can readily identify where the second stair is. |
| 58. | Reduced dimension of exits. Exit widths will be reduced based on a notional queuing time of 5 minutes (D1.6 & D1.13) | Adjusted exit width based on fire engineering literature concerning maximum occupancy and required time necessary to evacuate the space. Exit width from the MFEC will be provided from each level will be:<br>RL +29 = 5 m<br>RL +17 = 11.5 m<br>RL +12 = 16.5 m<br>RL +6 = 14.5 m<br>The maximum occupancies are based on occupant load's and will therefore not be affected by increased patronage during the buildings life. The above stair widths are clear widths measured between handrails, which will be spaced at no more than 2 m intervals. |
| 59. | Use of non fire isolated stairs for egress (D1.8) | The circulation stairs in the pre-function area will be used as escape stairs. This is supported with the provision of fire or smoke separation between the accommodation and pre-function spaces as well as the smoke control system in the pre-function space. |
| 60. | Smoke reservoir size in the main plenary of approximately 5,200 m² (Spec. E2.2b) | A performance based smoke control system is proposed to account for oversized reservoirs in the Main Floor Area. CFD will be used to support the performance based design. The smoke exhaust system will be provided with 100 – 140 $m^3/s$ of smoke exhaust. |
| 61. | Omission of zone smoke control (Spec E2.2b) | Based on the provision of the smoke control system omission of a zone smoke control system will be supported with a fire engineering solution. |
| 62. | AS 1670.1 smoke detection system with extended spacing (Spec G3.8) | As the building contains an atrium the BCA DtS provisions call for smoke detection to AS1670.1 throughout. In the large spaces it is proposed to allow extended detector spacing (as per AS1668). This applies to open areas (greater than 400 m²) and smoke migration paths. |
| 63. | Provision of a switch to isolate smoke detectors where theatrical smoke is used (E2.2a) | Theatrical smoke could be used in the auditorium. In this area an isolation system will be provided to prevent false alarms. Management procedures will be developed to support the automatic detection systems being isolated when theatrical smoke is being used. |
| 64. | Omission of smoke detection from ceiling voids and under floor voids (Spec G3.8) | All occupied spaces will be provided with AS1670.1 smoke detection (with extended spacing). The ceiling and under floor voids will be provided with sprinklers, where needed by code. On this basis and to avoid the potential for false alarms a fire engineering solution will be developed to support omission of smoke detectors within the ceiling and under floor voids. |
| 65. | Speech intelligibility not being achieved throughout the plenary and some DOH areas (G3) | Due to the layout and volume of the plenary and BOH areas it is not possible to achieve speech intelligibility in these areas. Based on the relatively low fire loads and/or familiarity of occupants, omission of a system to achieve compliant speech intelligibility will be developed. |
| 66. | Omission of fire separation between POPE and non-POPE areas (NSW H101) | The non-POPE store rooms are proposed to be separated from the POPE areas with smoke separation rather than fire separation based on the provision of sprinklers in the adjoining POPE and Non-POPE store rooms. |
| 67. | Omission of stair pressurisation in accommodation stairs and back of | Due to the impracticality of pressuring a circulation stair and with the provision of the |

| | | |
|---|---|---|
| | house stairs (Spec E2.2b) | smoke exhaust system the removal of stair pressurisation will be supported. |
| 68. | Smoke exhaust omitted in BOH and toilets (E2.2b) | TBC. This space will we be minimally populated with short travel distances to the outside and adjoining spaces. |
| **Car Park** | | |
| 69. | Travel distances of up to 25 m to a point of choice, 50 m to an exit and 80 m between exits (D1.4) | The car park will be provided with smoke detection and sprinklers which coupled with the low fire loads and occupancy will allow the extended travel distances to be supported. |
| 70. | Speech intelligibility not being achieved throughout the car park (G3) | Due to the layout and surface finishes in the car park it is not possible to achieve speech intelligibility in the car park. Based on the provision of evacuation sounders and the relatively low occupancy omission of a system to achieve speech intelligibility will be developed. |

**Table 2 Potential BCA Non-Compliances and Proposed Alternative Solutions**

| No. | Potential BCA DtS Non-Compliance | Alternative Solutions |
|---|---|---|
| 1. | Removal of sprinkler systems (C2.3) | There is scope to support omission of sprinklers where they are greater than 10 m above the combustibles they are protecting. Whilst this is supportable it is likely to be considered as very contentious and is unlikely to be supported by the Fire Brigade. While we can propose this we suggest this is allowed for until this is agreed with the Fire Brigade. |
| 2. | Removal of hose reels (E1.4) | With the provision of sufficient fire hydrants it should be possible to support omission of fire hose reels from the exhibition halls, signature plenary and MFEC. However, from previous projects we know that this will be considered as a contentious solution by the Fire Brigade and we suggest that hose reels are allowed for at this stage. |

# 14. APPENDIX E – OPERATOR LETTER

7th March 2013

Mr Malcolm Macintyre
Project Director
Darling Harbour Live Partnership
Level 31, 50 Bridge Street
**Sydney NSW 2000**

## RE: DARLING HARBOUR LIVE – MAXIMUM POPULATIONS

On behalf of ICC Sydney Pty Ltd ("Operator"), we hereby advise that the maximum populations shown in the attached Table A ("Primary Core Facilities – Maximum Populations") prepared by Lend Lease PM & C are acceptable and generally in accordance with the attached Table B ("Primary Core Facilities – Estimated Capacities in Various Modes") spreadsheet dated 6th March 2013 and reviewed by AEG Ogden, subject to Lend Lease PM & C applying its best endeavours and in good faith during Design Development to:

- Increase the population of Exhibition Hall 8 from a rate of 1.5 sq.m/person to 0.8 sq.m per person for Cocktail Mode as per Table B.
- Provide a population density to a maximum of 3 persons/sq.m (0.33 sq.m/person) to the flat floor area in front of the stage in The Theatre for General Admission mode, which may increase the total population to approximately 9,000 persons in this mode.

This advice is provided as Operator input to the Design Development Process on the basis that:

a) the Operator is not a constructor, designer, architect or engineer and any advice provided by the Operator is provided on the basis that the Operator is a public assembly facilities operator who complies with Good Industry Practice; and

b) to the extent any other professional advice is required to enable the Darling Harbour Live Partnership to comply with its obligations, the Darling Harbour Live Partnership will need to obtain that advice from others.

Yours Sincerely,
**AEG Ogden**

**Harvey Lister**
**Chairman and Chief Executive**

Enc. Table A (Prepared by Lend Lease PM & C)
Table B (Reviewed by AEG Ogden)

**AEG OGDEN PTY LTD**
'The Pavilion on the Lake', Brisbane Entertainment Centre, Melaleuca Drive, Boondall QLD 4034, Australia
GPO Box 1040, Brisbane QLD 4001, Australia **ABN 12 010 835 551**
**Tel: +61 7 3363 3666** Fax: +61 7 3265 5899 Email: *admin@aegogden.com* Website: *www.aegogden.com*

**PRIMARY CORE FACILITIES - MAXIMUM POPULATIONS**

| Space | Approx Area (m2) | Ratio m2/person | Maximum populations for key functional spaces |
|---|---|---|---|
| PLENARY SPACES | | | |
| DARLING HARBOUR THEATRE (Plenary #1 - Signature) | | | 2,500 |
| PYRMONT THEATRE (Plenary #2 - Secondary) | | | 1,000 |
| COCKLE BAY BALLROOM (Plenary #3 - Tertiary) | | | 941 |
| FORMAL MEETING SPACES | | | |
| *Meeting Room Cluster 1* | 707 | 0.8 | 884 |
| *Meeting Room Cluster 2* | 1,945 | 0.8 | 2,431 |
| *Meeting Room Cluster 3* | 2,252 | 0.8 | 2,815 |
| *Meeting Rooms Cluster 4, ICC Exhibition Centre - Lower* | 1,364 | 0.8 | 1,705 |
| *Meeting Room Cluster 5, ICC Exhibition Centre-Lower* | 1,102 | 0.8 | 1,378 |
| BANQUETING SPACES | | | |
| THE GRAND BALLROOM (Signature Banqueting Space) | 3,000 | 0.8 | 3,750 |
| EXHIBITION SPACES | | | |
| - Exhibition Hall 1 | 4,589 | 1.5 | 3,059 |
| - Exhibition Hall 2 | 5,505 | 1.5 | 3,670 |
| - Exhibition Hall 3 | 4,588 | 1.5 | 3,059 |
| - Exhibition Hall 4 | 4,857 | 0.8 | 6,071 |
| *ICC Exhibition Centre - Upper THE CHANDELIER ROOM* | | | |
| - Exhibition Hall 5 | 4,455 | 1.5 | 2,970 |
| - Exhibition Hall 6 | 4,455 | 1.5 | 2,970 |
| - Exhibition Hall 7 | 4,455 | 0.8 | 5,569 |
| *ICC Bayside Exhibition* | | | |
| Exhibition Hall 8 | 2500 | 1.5 | 1,667 |
| THE THEATRE (MFEC) | | | |
| The Theatre Auditorium | | n/a | 8,000 |

# RFP High Level Output Specification - Appendix A.02

Briefed Governing Criteria from HLOS

## PRIMARY CORE FACILITIES - ESTIMATED CAPACITIES IN VARIOUS MODES

| Space | Area (m2) | Room Subdivisions (m2) | Room Modes and Capacities (Persons or Booths) | | | | | | Location | Building Level | Space Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Theatre | Classroom | Cabaret | Banquet | Cocktails | Exhibition Booths | | | |
| **PLENARY SPACES** | | | | | | | | | | | |
| **DARLING HARBOUR THEATRE** (Plenary #1 - Signature) | **na** | | **2,500** | na | na | na | na | na | ICC Bayside (Northern Sector) | Stage & Main Foyer at RL 10.9, Upper Foyers at RL 17.2 and RL 24.5. | The new Darling Harbour Theatre to accommodate 2,500 delegates in two seating tiers. Lower Tier approximately 2,000 seats, Upper Tier approximately 500 seats. Reduced modes of 500, 1500 and 2000 seats. Location is in close proximity to the nominated Formal Meeting Room Cluster 3 for 2,500 delegates in breakout sessions at RL 24.5. |
| **PYRMONT THEATRE** (Plenary #2 - Secondary) | **na** | | **1,000** | na | na | na | na | na | ICC Bayside (Northern Sector) | RL 10.9 | Existing Parkside Auditorium totally refurbished. Location is in close proximity to the nominated Formal Meeting Room Cluster 2 for 1,000 delegates in breakout sessions. |
| **COCKLE BAY BALLROOM** (Plenary #3 - Tertiary) | **753** | | **750** | **511** | **339** | **452** | **941** | **50** | ICC Bayside (Northern Sector) | RL 17.2 | Dedicated multi-purpose flat floor space. Location is in close proximity to the nominated Formal Meeting Room Cluster 1 for 750 delegates in breakout sessions. |
| **FORMAL MEETING SPACES** | | | | | | | | | | | |
| **Total Meeting Rooms** | ***7,550*** | ***sq.m*** | ***8,359*** | ***persons.*** | ***51 Meeting Rooms when fully subdivided, including Board Rooms and Corporate Function Rooms in The T*** | | | | | | HLOS requires 6,000 Meeting Rooms. |
| ***Meeting Room Cluster 1*** | **707** | | **795** | **480** | **318** | **424** | **884** | na | ICC Bayside (Northern Sector) | Meeting Room Level, RL17.2 | 6 Formal Meeting Rooms serving Cockle Bay Ballroom (Tertiary Plenary). |
| ***Meeting Room Cluster 2*** | **1,945** | | **2,188** | **1,320** | **875** | **1,167** | **2,431** | na | ICC Bayside (Northern Sector) | Meeting Room Level, RL10.9 | 9 Formal Meeting Rooms serving the Pyrmont Theatre (Secondary Plenary). This includes Meeting Room P2-9 of 1,035 sq.m. |
| ***Meeting Room Cluster 3*** | **2,252** | | **2,534** | **1,528** | **1,013** | **1,351** | **2,815** | na | ICC Bayside (Northern Sector) | Meeting Room Level, RL24.5 | 10 Formal Meeting Rooms serving Darling Harbour Theatre (Signature Plenary). |
| ***Meeting Rooms Cluster 4, ICC Exhibition Centre - Lower*** | **1,364** | | **1,535** | **926** | **614** | **818** | **1,705** | na | ICC Darling Central (Central Sector) | Lower Exhibition Mezzanine, RL17.0 | 4 Formal Meeting Rooms and 4 Hospitality Suites (designed as Formal Meeting Rooms) serving the ICC Exhibition Centre and overflow from ICC Bayside. |
| ***Meeting Room Cluster 5, ICC Exhibition Centre-Lower*** | **1,102** | | **1,240** | **748** | **496** | **661** | **1,378** | na | ICC Darling Central (Central Sector) | Upper Exhibition Mezzanine, RL 25.6 | 5 Formal Meeting Rooms and 3 Hospitality Suites (designed as Formal Meeting Rooms) serving the ICC Exhibition Centre and overflow from ICC Bayside. |
| ***Board Rooms*** | **180** | | **68** | na | na | na | na | na | ICC Bayside (Northern Sector) | RL10.9 | 6 Board Rooms adjacent Venue Administration. |
| **BANQUETING SPACES** | | | | | | | | | | | |
| **THE GRAND BALLROOM** (Signature Banqueting Space) | **3,000** | | **3,375** | **2,036** | **1,350** | **2,000** | **3,750** | **200** | ICC Bayside (Northern Sector) | Grand Ballroom Level, RL 32.0 | Premium City and Harbour views from Northern and Eastern Pre-Function areas. Ability to subdivide into two smaller banqueting spaces. Area allowance 2000 persons @ 1.5m2/person |
| Subdivision B2 | | 1,000 | 1,125 | 679 | 450 | 667 | 1,250 | 67 | ICC Bayside (Northern Sector) | Grand Ballroom Level, RL 32.0 | |
| Subdivision B2 | | 1,000 | 1,125 | 679 | 450 | 667 | 1,250 | 67 | ICC Bayside (Northern Sector) | Grand Ballroom Level, RL 32.0 | |
| Subdivision B2 | | 1,000 | 1,125 | 679 | 450 | 667 | 1,250 | 67 | ICC Bayside (Northern Sector) | Grand Ballroom Level, RL 32.0 | |
| **PRE-FUNCTION SPACES** | | | | | | | | | | | |
| Pre-function Areas for Plenary and Banquet Spaces only | **5,973** | | **6,250** | | | | | | ICC Bayside (Northern Sector) | | City and Harbour views for all Pre-Function areas. Allowance of 0.8m2/person able to be accommodated in Plenary and Banqueting spaces has been provided. 4,250 persons in Plenary plus 2,000 persons in banquet mode in the Grand Ballroom=6,250 persons. Pre-Function Areas: Grand Ballroom = 1750sq.m, P1=2,031sq.m, P2=826sq.m, P3=1,366sq.m. |
| **EXHIBITION SPACES** | | | | | | | | | | | |
| **Net Exhibition Space HLOS** | **35,000** | | | | | | | | | | |
| **Net Exhibition Space Achieved** | **34,515** | | | | | | | | | | |
| ***ICC Exhibition Centre - Lower*** | 19,539 | | | | | | | | | | |
| - Exhibition Hall 1 | | 4,589 | 5,163 | 3,114 | 1,665 | 2,220 | 5,736 | 306 | ICC Darling Central (Central Sector) | RL 6.0 | Columns at 27 metre centres both ways. 10.5 metre clear height |
| - Exhibition Hall 2 | | 5,505 | 6,193 | 3,736 | 2,070 | 2,760 | 6,881 | 367 | ICC Darling Central (Central Sector) | RL 6.0 | Columns at 27 metre centres both ways. 10.5 metre clear height |
| - Exhibition Hall 3 | | 4,588 | 5,162 | 3,113 | 1,485 | 1,980 | 5,735 | 306 | ICC Darling Central (Central Sector) | RL 6.0 | Columns at 27 metre centres both ways. 10.5 metre clear height |
| - Exhibition Hall 4 | | 4,857 | 5,464 | 3,296 | 1,800 | 2,400 | 6,071 | 324 | ICC Darling Central (Central Sector) | RL 6.0 | Columns at 27 metre centres both ways. 10.5 metre clear height |
| ***ICC Exhibition Centre - Upper THE CHANDELIER ROOM*** | 12,476 | | | | | | | | | | Column Free multi-functional space |
| - Exhibition Hall 5 | | 4,455 | 5,012 | 3,023 | 1,440 | 1,920 | 5,569 | 297 | ICC Darling Central (Central Sector) | RL 21.5 | Column Free |
| - Exhibition Hall 6 | | 4,455 | 5,012 | 3,023 | 1,440 | 1,920 | 5,569 | 297 | ICC Darling Central (Central Sector) | RL 21.5 | Column Free |
| - Exhibition Hall 7 | | 4,455 | 5,012 | 3,023 | 1,440 | 1,920 | 5,569 | 297 | ICC Darling Central (Central Sector) | RL 21.5 | Column Free |
| ***ICC Bayside Exhibition*** | | | | | | | | | | | |
| Exhibition Hall 8 | 2500 | | na | na | 788 | 1,050 | 3,125 | 167 | ICC Bayside (Northern Sector) | RL 7.0 | Columns at 18 metre X 15 metres. Approximately 8.2 metre clear height |
| **TELSTRA THEATRE (MFEC)** | | | | | | | | | | | |
| Telstra Theatre Auditorium | | | **8,000** | | | | | | ICC Darling Central (Central Sector) | RL 6.0 stage level. | 8000 saleable seats in an all seated configuration for concert/live performances. An end-stage fan shape seating arrangement, with a flexible cut-off curtaining system to reduce to 6000 as well as smaller modes such as 3000, and 4500 seats for both entertainment and plenary purposes. Basketball/Netball capability. |
| - 6,000 Mode | | | 6,000 | na | na | na | na | na | | | Maximum requirement for plenary mode. |
| - 4,500 Mode | | | 4,500 | na | na | na | na | na | | | |
| - 3,000 Mode | | | 3,000 | na | na | na | na | na | | | To accept plenary capacities too big for Darling Harbour Theatre. |
| Corporate Function Rooms Cluster 6 | 250 | | 281 | 170 | 113 | 150 | 313 | na | ICC Darling Central (Central Sector) | RL 24.0 | Ability to subdivide into 2. Additional adjacent internal breakout space of 150m2 available. |
| Corporate Function Rooms Cluster 7 | 250 | | 281 | 170 | 113 | 150 | 313 | na | ICC Darling Central (Central Sector) | RL 29.0 | Ability to subdivide into 2. Additional internal Breakout area of 284 sq.m provided adjacent to the Corporate Function Room. |
| Foyers and Pre-function Areas to 6,000 plenary mode floors only. | 4,800 | | 8,878 | na | na | na | | na | ICC Darling Central (Central Sector) | RL, 4.1, RL 12.0, RL 17.0, RL 24.0, RL 29.0, RL35.6. | Telstra Theatre must be serviced by adequately sized pre-function and foyer spaces with the ability to service ticketing functions. Allowance of 0.8m2/person for Foyer and Pre-function spaces in 6,000 Plenary mode. Areas: Foyer=1,002sq.m, Concourse1=1,542sq.m plus 511sq.m Exhibition Bridge to RL 12.0 Exhibition Concourse, and Exhibition Concourse =1,745sq.m. Excludes Telstra Theatre Upper Concourse and Corporate Function Room circulations. |

### Space Capacity Criteria

| | | | Theatre | Classroom | Cabaret | Banquet | Cocktails | Exhibition Booths |
|---|---|---|---|---|---|---|---|---|
| Space Allowance per Person (m2) | | | 0.8 | 1.4 | 2.0 | 1.5 | 0.8 | 15 |
| Area Discount for Stage/Speaker's Platform | | | 10% | 5% | 10% | 10% | 0% | 0% |