FIRE ENGINEERING REPORT

PREPARED FOR
NSW Health Infrastructure
c/- Aurora Projects Pty Ltd

PROJECT
Goulburn Rehabilitation Unit
Sub-Acute Bed Program

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REPORT REGISTER

The following report register documents the development and issue of this Report as undertaken by this office.

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AUTHORISATION

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1.0 EXECUTIVE SUMMARY

This Fire Engineering Report has been prepared by Impact Fire Pty Ltd for NSW Health Infrastructure, c/- Aurora Projects Pty Ltd, and relates to the new Rehabilitation Unit at Goulburn Hospital.

Impact Fire Pty Ltd has been commissioned to conduct a Fire Engineering Analysis of proposed variations from the Deemed to Satisfy (DTS) provisions of the Building Code of Australia 2011 (BCA) relating to the subject development.

Table 1 below summarises the Variations to the BCA DTS Provisions, the relevant BCA Performance Requirements, the Assessment Methods, and the Methods of Analysis and Acceptance Criteria that have been used in the Fire Engineering Analysis.

Table 1: Summary of Variations to BCA DTS Provisions, Relevant BCA Performance Requirements, Assessment Methods, and Methods of Analysis and Acceptance Criteria

Alternative Solution	BCA DTS Provisions	Variations to BCA DTS Provisions	BCA Performance Requirements
1	**Clause C1.1, Specification C1.1** Fire resisting construction	To relocate an existing single storey demountable building of lightweight non fire rated construction, where it will be located less than 3m from an existing building.	**CP1, CP2**
	BCA Compliance and Assessment Method	**A0.5(b)(i)** and **A0.9(b)(ii)**, as detailed in Section 9.	
	Method of Analysis and Acceptance Criteria	Qualitative analysis method based on the Design Fire Scenarios and Acceptance Criteria detailed in Section 10.	
2	**Clause C2.7** Separation by fire walls	To construct a fire wall that is not continuous from the floor of the lowest level to the roof of the highest level.	**CP2**
	BCA Compliance and Assessment Method	**A0.5(b)(i)** and **A0.9(b)(ii)**, as detailed in Section 9.	
	Method of Analysis and Acceptance Criteria	Qualitative analysis method based on the Design Fire Scenarios and Acceptance Criteria detailed in Section 10.	
3	**Clause C3.3** Separation of external walls and associated openings in different fire compartments **Clause C3.5** Doorways in fire walls	To have the glazed wall of the link to the new Rehabilitation Unit located within 4m of the new Rehabilitation Unit, which are to be considered as different fire compartments. To have the doorway to the new Rehabilitation Unit from the link fitted with glazed doors, in lieu of self-closing fire doors with an FRL of at least -/120/30. To have the glazed wall of a meeting room on ground floor located within 4m of the existing hospital, which are to be considered as different fire compartments. To have parts of the glazed walls bounding the courtyard within 4m of	**CP2**

		the 1 hour fire wall that separates the ward areas on ground floor.	
	BCA Compliance and Assessment Method	**A0.5(b)(i)** and **A0.9(b)(ii)**, as detailed in Section 9.	
	Method of Analysis and Acceptance Criteria	Qualitative analysis method based on the Design Fire Scenarios and Acceptance Criteria detailed in Section 10.	
4	**Clause D1.3** When fire-isolated stairways and ramps are required	To not construct the egress stair on the southern side of the Rehabilitation Unit as a fire-isolated exit.	**DP5**
	BCA Compliance and Assessment Method	**A0.5(b)(i)** and **A0.9(b)(ii)**, as detailed in Section 9.	
	Method of Analysis and Acceptance Criteria	Qualitative analysis method based on the Design Fire Scenarios and Acceptance Criteria detailed in Section 10.	

Based on the Fire Engineering Analysis presented in this report, it is the opinion of Impact Fire Pty Ltd that the proposed variations to the BCA DTS provisions will satisfy BCA Performance Requirements CP1, CP2 and DP5, subject to the implementation of the following Fire Engineering Scope of Works.

1. All building works associated with the new Rehabilitation Unit shall comply with the relevant Deemed to Satisfy (DTS) provisions of Sections C, D and E of the BCA, except for the variations outlined in Table 1.

2. The southern external wall of the existing building to the north of the relocated demountable shall be upgraded as necessary to achieve an FRL of at least 120/120/120, to prevent the spread of fire between buildings.

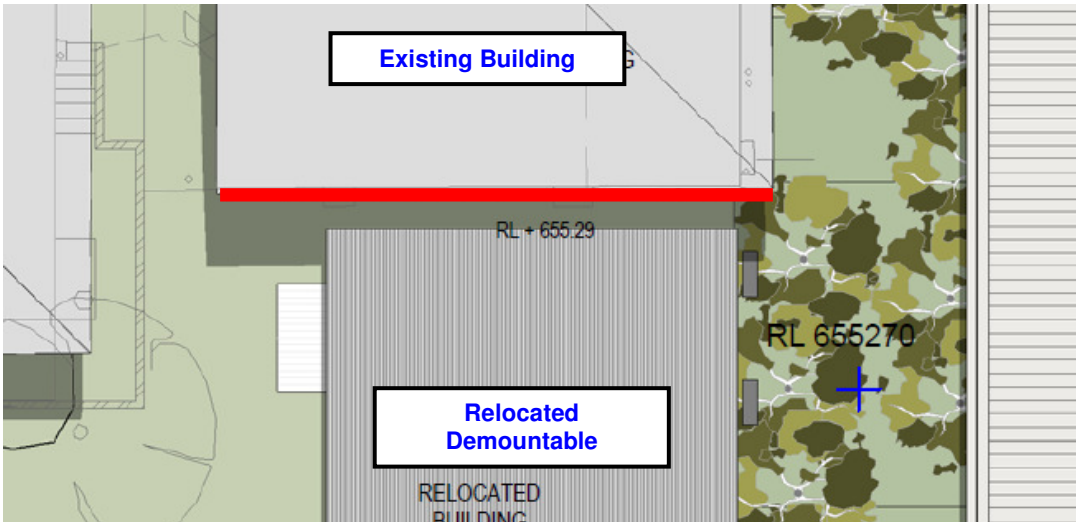


Figure 1: Part Site Plan

3. The non-continuous fire wall between the existing hospital and the new Rehabilitation Unit shall achieve an FRL of at least 120/120/120.

   Building elements, other than roof battens with a dimension of 75mm x 50mm or sarking, shall not penetrate through the fire wall.

   Any services penetrations through the fire wall shall be protected in accordance with Clause C3.15 of the BCA. Any doorways through the fire wall shall be protected with self-closing fire doors that achieve an FRL of at least -/120/30.

4. The new link shall be fire separated from the new Rehabilitation Unit in construction that achieves an FRL of at least 120/120/120. The link shall form part of the same fire compartment as the existing building.

   The glazed external wall to the new link shall be protected on both sides with wall wetting sprinklers.

   The glazed doors from the new link to the new Rehabilitation Unit shall be protected on both sides with wall wetting sprinklers. These doors shall be fitted with self-closing devices that bring the doors to the fully closed and latched position. The doors shall also be fitted with approved smoke seals.

   All glazing shall comprise of at least 6mm fixed toughened safety glass fitted in non-combustible frames.

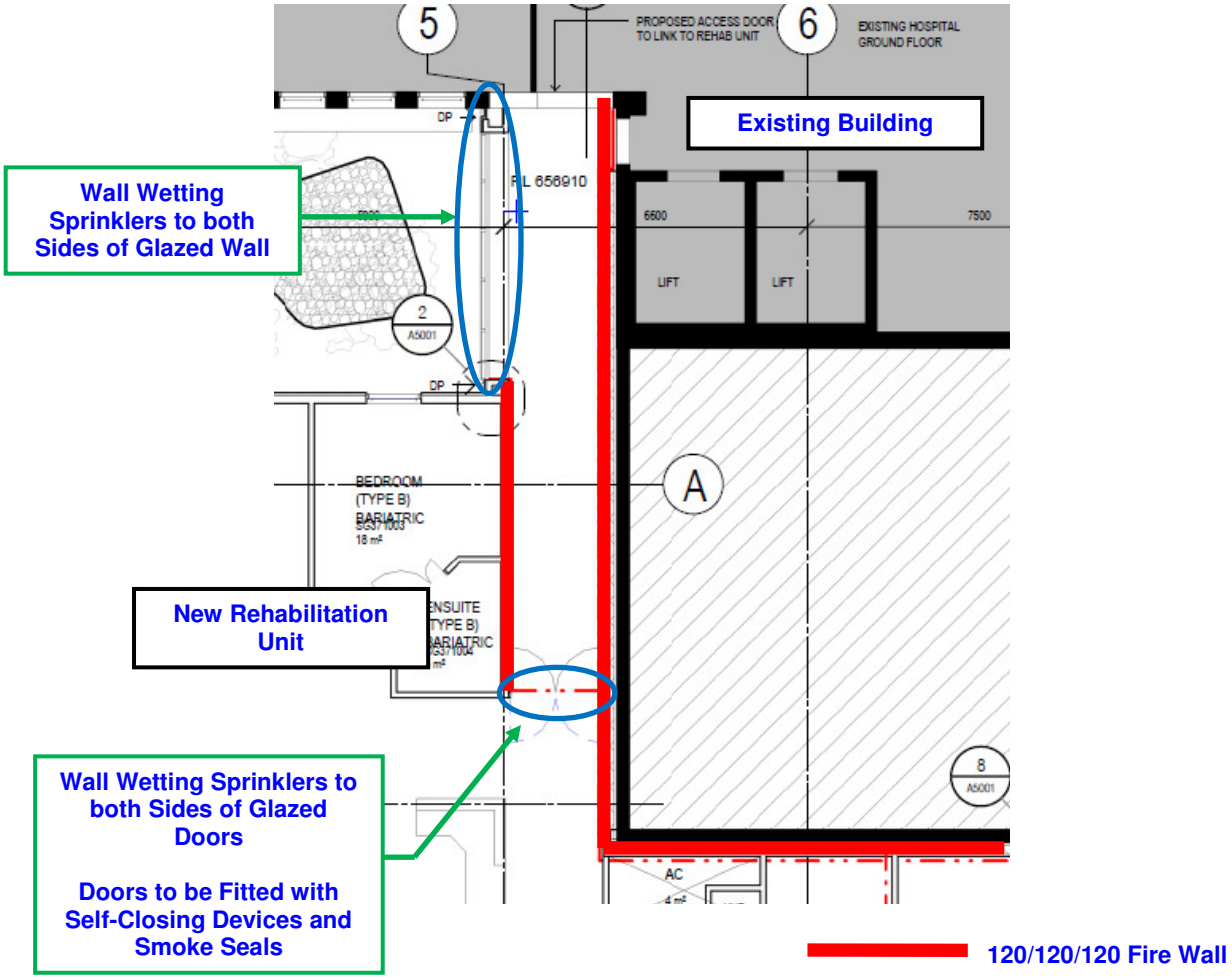


Figure 2: Part Ground Floor Plan

5. The external wall adjacent the meeting room (no. SG371068) on ground floor shall achieve an FRL of at least 120/120/120, for a distance of at least 4m past the glazing to the meeting room.

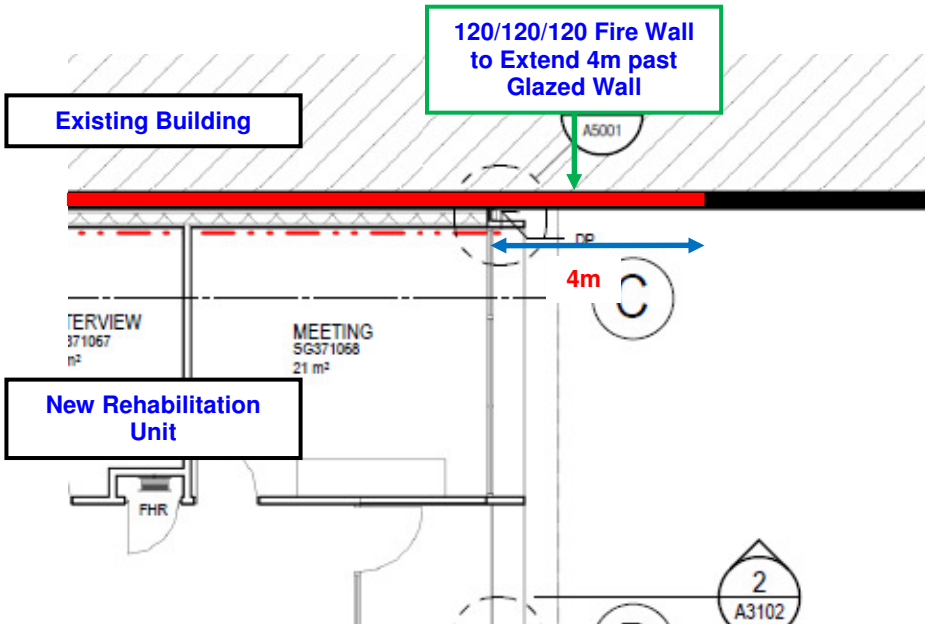


Figure 3: Part Ground Floor Plan

6. The glazed wall bounding the courtyard, which forms part of the fire wall separating the ward areas, shall be protected with internal wall wetting sprinklers.

   The glazed walls bounding the courtyard adjacent the fire wall shall be protected with internal wall wetting sprinklers for a distance of at least 4m past the fire wall.

   All glazing shall comprise of at least 6mm fixed toughened safety glass fitted in non-combustible frames.

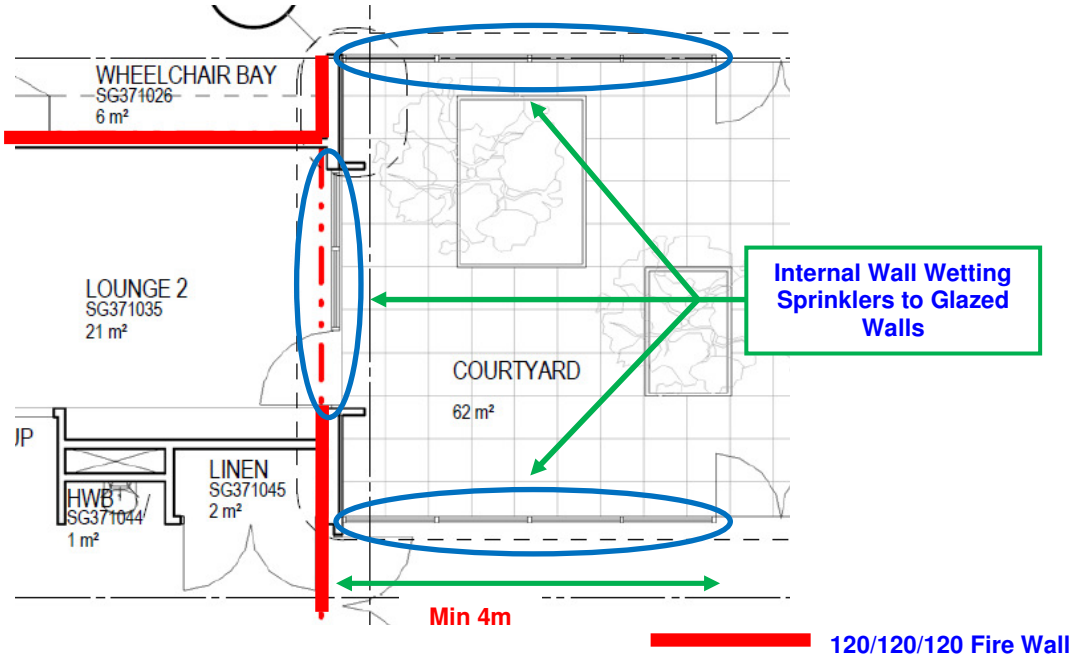


Figure 4: Part Ground Floor Plan

7. All Fire Safety Systems that are required for the new Rehabilitation Unit under the relevant DTS provisions of the BCA shall be provided and maintained in accordance with relevant Australian Standards. These fire safety systems include, but may not be limited to, the following:

    - Wall Wetting Sprinklers - AS 2118.2 (2010).
    - Fire Hydrants - BCA Clause E1.3, AS 2419.1 (2005).
    - Fire Hose Reels - BCA Clause E1.4, 2441 (2005), and as varied within this Report.
    - Portable Fire Extinguishers - BCA Clause E1.6, AS 2444 (2001), and as varied within this Report.
    - Automatic Smoke Detection and Alarm System - BCA Spec E2.2a, AS 1670.1 (2004).
    - Emergency Lighting - BCA Clauses E4.2 & E4.4, AS 2293.1 (2005).
    - Exit Signs - BCA Clauses E4.5, E4.6 & E4.8, AS 2293.1 (2005).
    - Sound System and Intercom System for Emergency Purposes - BCA Clause E4.9, AS 1670.4 (2004).

    NOTE: Refer to BCA Assessment Report for complete list of required fire safety systems / measures.

2.0 INTRODUCTION

2.1 PURPOSE OF REPORT

The purpose of this report is to present a Fire Engineering Analysis of proposed variations from the Deemed to Satisfy (DTS) provisions of the Building Code of Australia 2011 (BCA) relating to the new Rehabilitation Unit at Goulburn Hospital.

2.2 SCOPE OF REPORT

This report is limited to an assessment of the subject development against the proposed variations to Clauses C1.1, C2.7, C3.3 and D1.3 of the BCA, and Specification C1.1 of the BCA only, as identified in Section 6 of this report.

This report is consistent with the objectives and limitations of the BCA. Therefore, effects of arson (e.g. from multiple fire starts), terrorism, explosive devices, and sabotage of fire safety systems are considered outside the scope of this report.

'Absolute' or '100%' safety is not attainable, and there will always be a finite risk of injury, death or property loss. Also, fire and its effects on people and property are complex and variable. Thus, all stakeholders should understand that a fire safety system may not effectively cope with all possible scenarios.

2.3 BASIS OF REPORT

The content of this report is based on the following Legislations:

- The Building Code of Australia 2011 (BCA).
- NSW Environmental Planning & Assessment Act 1979.
- NSW Environmental Planning & Assessment Regulation 2000.

The content of this report is based on the following texts and references:

- International Fire Engineering Guidelines, 2005 Edition.
- Guide to the BCA, ABCB 2011.

The content of this report is based on the following Documentation:

- Architectural drawings of the subject development prepared by Woods Bagot (refer Appendix A for list of referenced drawings).
- BCA Assessment Report prepared by Blackett Maguire + Goldsmith Pty Ltd (Ref: 110349, Revision 3, dated 9 November 2011).

2.4 EXCLUSIONS

This report does NOT cover the following:

- A detailed BCA assessment of the subject development.
- Access for people with disabilities (Part D3 of the BCA).
- System or engineering design of any part of the subject development.
- Arson (other than as a source of initial ignition), multiple ignition sources, acts of terrorism.
- Protection of property (other than adjoining property).

- Business interruption or losses or personal or moral obligations of the owner/occupier.
- Occupational Health and Safety, and Work Cover Authority Regulations.

2.5 ASSUMPTIONS

It is assumed that apart from the proposed variations presented in Section 6 of this report, all other fire safety aspects associated with the new Rehabilitation Unit will comply with the relevant DTS provisions of the BCA.

2.6 REGULATORY FRAMEWORK

A Building Solution will comply with the BCA if it satisfies the Performance Requirements of the BCA. Clause A0.5 of the BCA states that compliance with the Performance Requirements can only be achieved by:

(a) complying with the Deemed to Satisfy provisions; or

(b) formulating an Alternative Solution which -

(i) complies with the Performance Requirements; or

(ii) is shown to be at least equivalent to the Deemed to Satisfy provisions;

(c) a combination of (a) and (b).

Clause A0.9 of the BCA states that the following Assessment Methods, or any combination of them, can be used to determine that a Building Solution complies with the Performance Requirements:

(a) Evidence to support that the use of a material, form of construction or design meets a Performance Requirement or a Deemed to Satisfy Provision as described in A2.2.

(b) Verification methods such as -

(i) the Verification Methods in the BCA; or

(ii) such other Verification Methods as the appropriate authority accepts for determining compliance with the Performance Requirements.

(c) Comparison with the Deemed to Satisfy provisions.

(d) Expert judgment

2.7 PROJECT STAKEHOLDERS

The relevant project stakeholders for the subject development are listed within Table 2 below.

Table 2: Project Stakeholders

Name	Company	Role
Alex Cooney	NSW Health Infrastructure	Client
Margaret Hardy	Woods Bagot	Architect
Brian Geddes Chris Watt	Aurora Projects Pty Ltd	Project Manager

Table 2: Cont'd

Name	Company	Role
David Blackett Matt Morrisey	Black Maguire + Goldsmith Pty Ltd	BCA Consultant
Jason Powell	Impact Fire Pty Ltd	Fire Safety Engineer

2.8 FIRE ENGINEERING BRIEF PROCESS

The purpose of the Fire Engineering Brief (FEB) process is to document the assumptions and parameters to be used in the Fire Engineering Analysis, so that an "in-principle" agreement can be reached between the relevant stakeholders.

For the subject development, the FEB process was conducted in the following way:

- Briefing with the Project Manager and BCA Consultant in regards to the proposed variations from the DTS provisions of the BCA.
- Liaison with all relevant stakeholders in regards to the proposed Alternative Solutions.
- In house discussions at Impact Fire Pty Ltd in regards to the Assessment Methods, and Methods of Analysis and Acceptance Criteria for the proposed Alternative Solutions.

NOTE: For the subject development, liaison with, and referral to, Fire & Rescue NSW under Clause 144 of the Environmental Planning and Assessment Regulation 2000 is not a legislative requirement.

3.0 DEVELOPMENT DESCRIPTION

3.1 DESCRIPTION OF PROPOSED DEVELOPMENT

The subject development relates to the new Sub-Acute Bed Program at the Goulburn Hospital.

The project includes the demolition of a number of existing buildings, the relocation of a demountable building, and the construction of a standalone 20 bed rehabilitation unit at Goulburn Hospital.

Figure 5: Part Site Plan

3.2 RELEVANT BCA REFERENCES

The relevant BCA References for the subject development are summarised in Table 3 below.

Table 3: Relevant BCA References

BCA Reference	BCA Assessment
Classification	Class 9a (health-care) Class 5 (administration)
Rise in Storeys	2
Minimum Type of Construction Required	Type B
Effective Height	Less than 12m
Maximum Fire Compartment Size	Complies

4.0 DOMINANT OCCUPANT CHARACTERISTICS

4.1 GENERAL

The subject building will primarily be occupied by Doctors, Nurses and other staff members, and patients.

It will be assumed that the population level associated with the subject building is based on the population densities given Table D1.13 of the BCA and / or as indicated on the referenced architectural drawings.

4.2 STATE, PHYSICAL AND MENTAL ATTRIBUTES

Doctors, Nurses and other staff members are expected to be awake, conscious, ambulatory and sober. It is assumed that relevant staff members require minimal response time in the event of an emergency.

Not all patients are expected to be awake, conscious and ambulatory.

NOTE: Emergency evacuation procedures in accordance with AS 3745 are to be developed and implemented for the subject building.

4.3 FAMILIARITY WITH THE BUILDING

Doctors, Nurses and other staff members are expected to be familiar with the primary access and egress routes from the building. With the provision of emergency evacuation procedures to AS 3745, all staff members are expected to be familiar with the location of all fire exits.

Patients are expected to be familiar with the route they entered the building, but are not necessarily expected to be familiar with the building configuration and the location of all fire exits without instructions from trained staff.

4.4 LEVEL OF ASSISTANCE AND EMERGENCY TRAINING

With the provisions of emergency evacuation procedures for the building to AS 3745, nominated staff members are expected to be trained as fire wardens in early fire fighting and emergency response. Furthermore, nominated staff members are also expected to be trained in the actions to be taken in the event of an emergency, especially in the actions to be undertaken when evacuating patients.

Patients are not expected to have any emergency evacuation training, and would generally rely on instructions and assistance from trained staff.

4.5 DISABLED OCCUPANTS

People with disabilities are considered to be assisted by able-bodied carers, staff members, family members and friends.

Managing the evacuation of people with disabilities relies on the individual building management systems, procedures and training, which are outside the scope of the BCA, but can substantially contribute to the overall evacuation efficiency. Therefore, disabled access and egress have not been specifically addressed in this report, and are assumed be addressed in the emergency evacuation plan and management procedures that are to be developed for the subject building.

5.0 HAZARDS AND PREVENTATIVE & PROTECTIVE MEASURES

5.1 HAZARD IDENTIFICATION

In identifying potential fire hazards, the following factors are considered:

- General building layout and construction.
- Building activities.
- Potential ignition sources.
- Combustible contents.

General Building Layout Construction

Refer to Section 3 of this Report for a description of the subject building and the proposed development works.

Building Activities

The subject building is primarily used as a Class 9a health-care building, with associated administration and amenities.

Potential Ignition Sources

Statistics show that the leading ignition factors of fires within this type of building occupancy are electrical appliances, short circuits and other electrical failures.

Combustible Contents

The following items are considered highly combustible within this type of development, and these material forms are considered to be the most likely to be ignited first.

- Cooking materials / appliances.
- Furniture, furnishings and surface finishes.
- Bedding and linen.
- Clothing.
- Floor and wall linings.
- Electrical equipment, electrical wiring, and cable insulation.
- Storage of paper, cardboard and other combustible materials / goods.
- Books, papers and stationary.
- Rubbish, trash and waste.

5.2 PREVENTATIVE AND PROTECTION MEASURES

Preventative Measures

The subject development will be required to implement a Management in Use type system where all required fire safety systems / measures are subjected to the maintenance regimes nominated under the relevant provisions of AS 1851-2005.

The Management in Use system will also need to incorporate the following measures as a minimum:

- Routine maintenance of all plant and equipment.
- Regular emptying of rubbish bins.
- Ensuring paths of travel to exits are kept free of anything that may obstruct or impede the free passage of persons.

Protective Measures

The following fire safety systems will be provided throughout the new Rehabilitation Unit as required under the relevant DTS provisions of the BCA:

- Wall Wetting Sprinklers - AS 2118.2 (2010).
- Fire Hydrants - BCA Clause E1.3, AS 2419.1 (2005).
- Fire Hose Reels - BCA Clause E1.4, 2441 (2005), and as varied within this Report.
- Portable Fire Extinguishers - BCA Clause E1.6, AS 2444 (2001), and as varied within this Report.
- Automatic Smoke Detection and Alarm System - BCA Spec E2.2a, AS 1670.1 (2004).
- Emergency Lighting - BCA Clauses E4.2 & E4.4, AS 2293.1 (2005).
- Exit Signs - BCA Clauses E4.5, E4.6 & E4.8, AS 2293.1 (2005).
- Sound System and Intercom System for Emergency Purposes - BCA Clause E4.9, AS 1670.4 (2004).

NOTE: Refer to BCA Assessment Report for complete list of required fire safety systems / measures.

6.0 PROPOSED VARIATIONS TO BCA DTS PROVISIONS

6.1 FIRE RESISTANCE AND STABILITY

Fire Resisting Construction - BCA Clause C1.1, Specification C1.1

- It is proposed to relocate an existing single storey demountable building of lightweight non fire rated construction, where it will be located less than 3m from an existing building.

  The external walls of the single storey demountable, which will be located within 3m of the existing building, will not achieve an FRL.

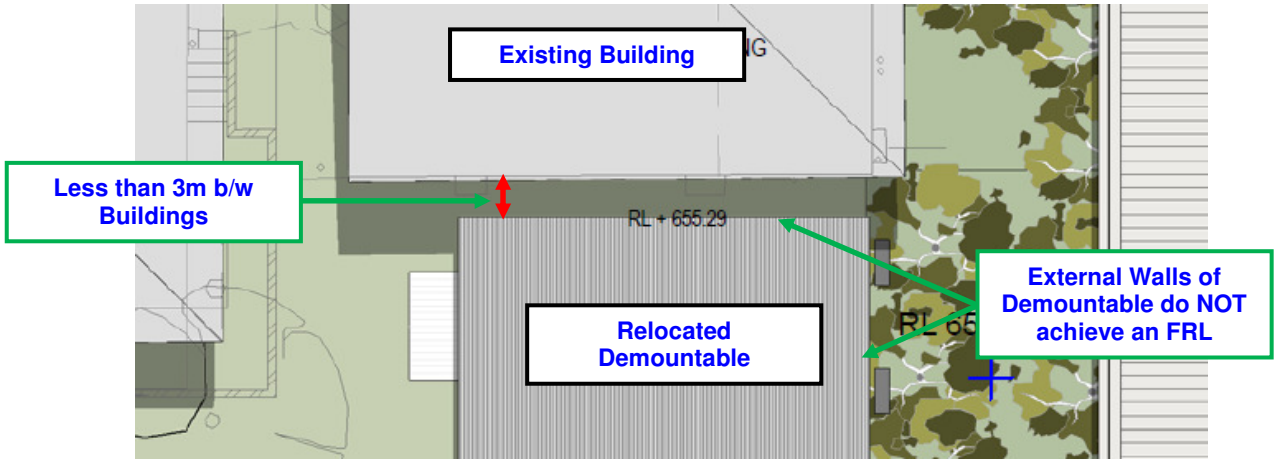


Figure 6: Part Site Plan

6.2 FIRE COMPARTMENTATION AND SEPARATION

Separation by Fire Walls - BCA Clause C2.7

- It is proposed to construct a fire wall that is not continuous from the floor of the lowest level to the roof of the highest level.

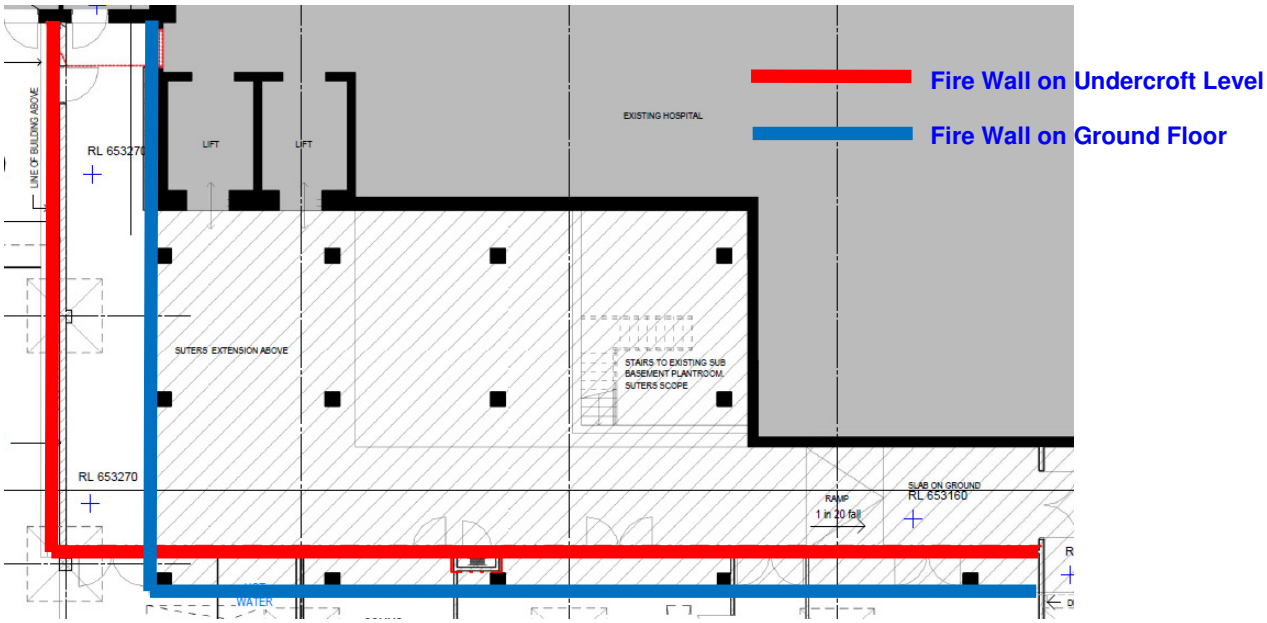


Figure 7: Part Undercroft Plan

6.3 PROTECTION OF OPENINGS

Separation of External Walls and Associated Openings in Different Fire Compartments - BCA Clause C3.3

- It is proposed to have the glazed wall of the link to the new Rehabilitation Unit located within 4m of the new Rehabilitation Unit, which are to be considered as different fire compartments.

  It is also proposed to have the doorway to the new Rehabilitation Unit from the link fitted with glazed doors, in lieu of self-closing fire doors with an FRL of at least -/120/30.

- It is proposed to have the glazed wall of a meeting room on ground floor located within 4m of the existing hospital, which are to be considered as different fire compartments.

- It is proposed to have parts of the glazed walls bounding the courtyard within 4m of the 1 hour fire wall that separates the ward areas on ground floor.

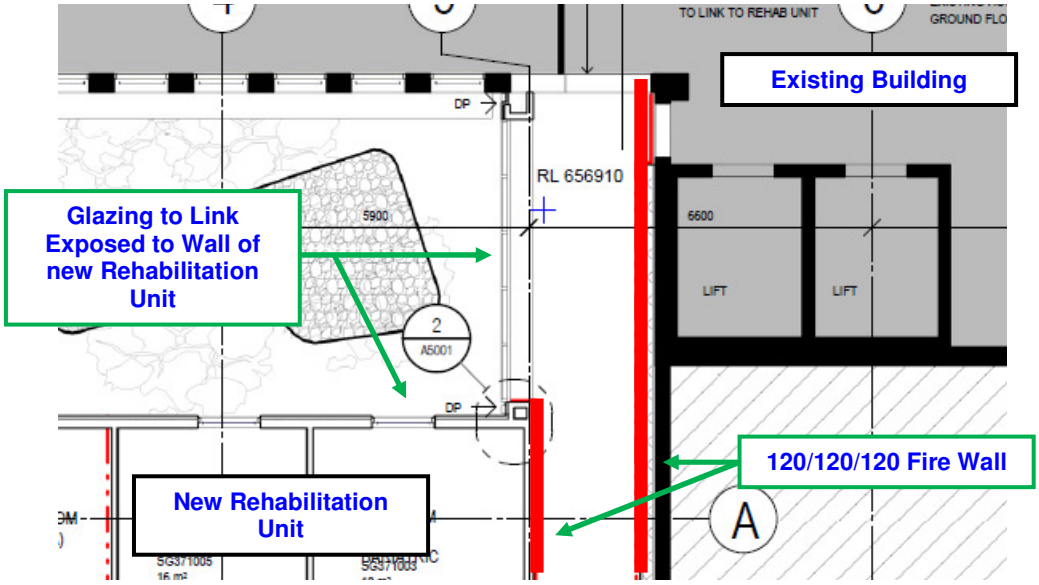


Figure 8: Part Ground Floor Plan

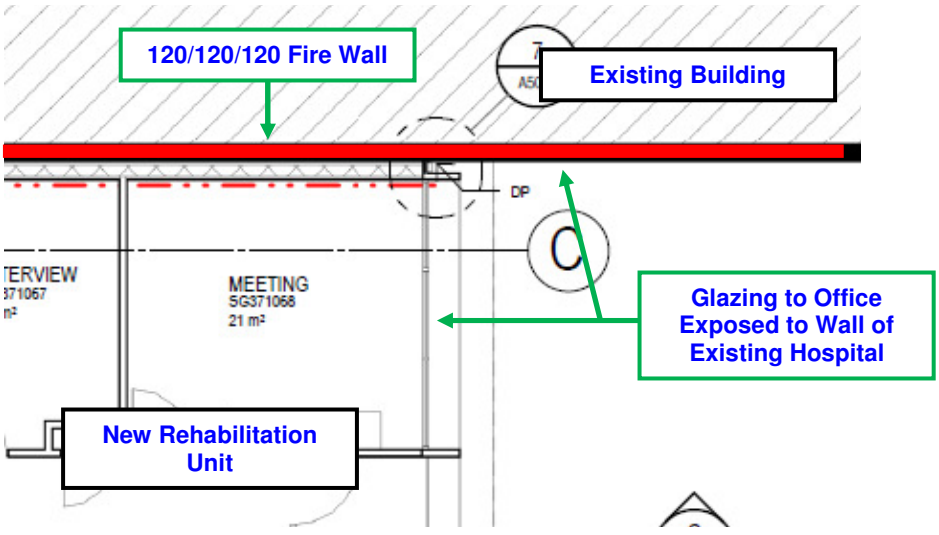


Figure 9: Part Ground Floor Plan

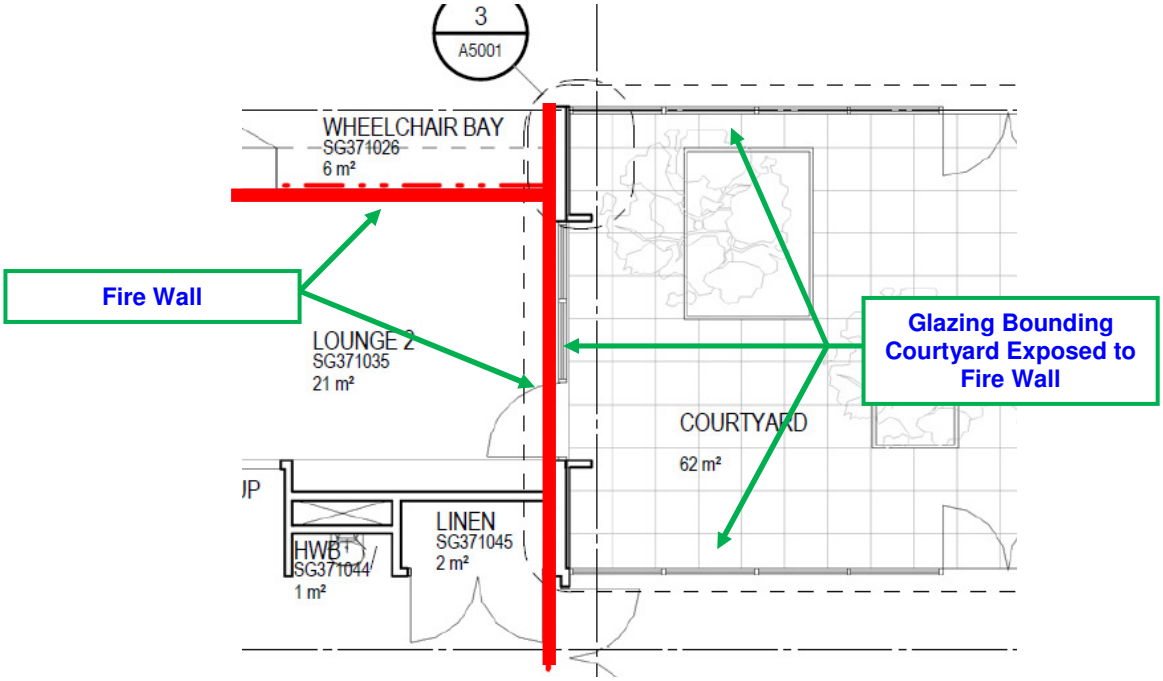


Figure 10: Part Ground Floor Plan

6.4 PROVISION FOR ESCAPE

When Fire-Isolated Stairways and Ramps are Required - BCA Clause D1.3

- It is not proposed to construct the egress stair on the southern side of the Rehabilitation Unit as a fire-isolated exit.

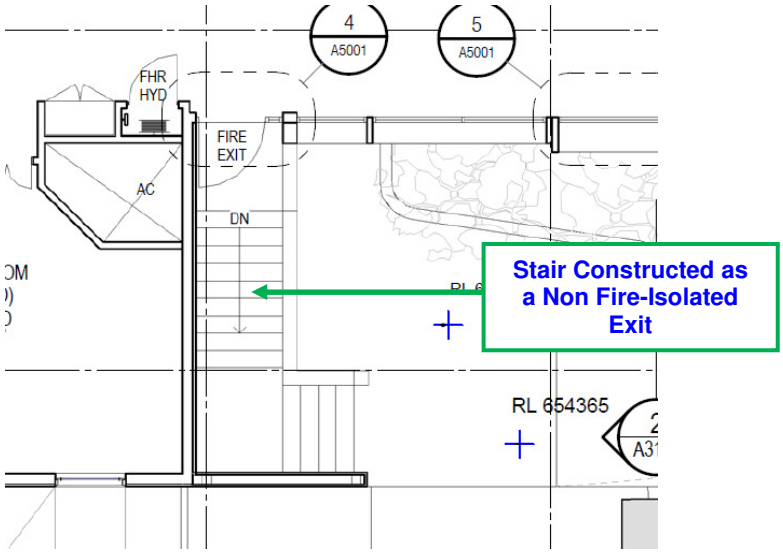


Figure 11: Part Ground Floor Plan

7.0 DESIGN OBJECTIVES

7.1 REGULATORY OBJECTIVES

The main objectives of the Building Code of Australia (BCA) include:

- Life safety of occupants.
- Facilitation of fire brigade operations.
- Protection of adjacent buildings.

The objectives of the BCA are met when the relevant Performance Requirements of the BCA are satisfied. Thus, an Alternative Solution will comply with the BCA if it satisfies the relevant Performance Requirements of the BCA.

7.2 RELEVANT PERFORMANCE REQUIREMENTS

Outlined below are the relevant Performance Requirements of the BCA in which the proposed variations to the DTS provisions of the BCA impact upon.

CP1 A building must have elements which will, to the degree necessary, maintain structural stability during a fire appropriate to -

(a) the function or use of the building; and

(b) the fire load; and

(c) the potential fire intensity; and

(d) the fire hazard; and

(e) the height of the building; and

(f) its proximity to other property; and

(g) any active fire safety systems installed in the building; and

(h) the size of any fire compartment; and

(i) fire brigade intervention; and

(j) other elements they support; and

(k) the evacuation time.

CP2 (a) A building must have elements which will, to the degree necessary, avoid the spread of fire -

(i) to exits; and
(ii) to sole-occupancy units and public corridors; and
(iii) between buildings; and
(iv) in a building.

(b) Avoidance of the spread of fire referred to in (a) must be appropriate to -

(i) the function or use of the building; and
(ii) the fire load; and
(iii) the potential fire intensity; and
(iv) the fire hazard; and
(v) the number of storeys in the building; and
(vi) its proximity to other property; and
(vii) any active fire safety systems installed in the building; and

(viii) the size of any fire compartment; and

(ix) fire brigade intervention; and

(x) other elements they support; and

(xi) the evacuation time.

DP5 To protect evacuating occupants from a fire in the building exits must be fire-isolated, to the degree necessary, appropriate to -

(a) the number of storeys connected by the exits; and

(b) the fire safety system installed in the building; and

(c) the function or use of the building; and

(d) the number of storeys passed through by the exits; and

(e) fire brigade intervention.

7.3 FIRE BRIGADE OBJECTIVES

Each fire agency throughout Australia, including the NSW Fire Brigades, has a fundamental set of legal obligations, which are defined under the Fire Agency Act for each State or Territory.

The objectives of the fire brigades involve the protection of life, property and the environment. The BCA outlines Deemed to Satisfy (DTS) provisions for buildings in relation to fire resistance, egress, and services and equipment (such as fire hydrants) to enable the objectives of the fire brigades to be fulfilled during fire brigade intervention.

8.0 TRIAL DESIGN FOR EVALUATION

8.1 GENERAL DESIGN

All building works associated with the new Rehabilitation Unit are to comply with the relevant Deemed to Satisfy (DTS) provisions of Sections C, D and E of the BCA, except for the variations outlined in Section 6.

8.2 ADDITIONAL REQUIREMENTS

The following additional requirements are to be implemented for the development as part of the fire safety strategy to address the proposed variations to the DTS provisions of the BCA.

Relocated Demountable

- The southern external wall of the existing building to the north of the relocated demountable is to be upgraded as necessary to achieve an FRL of at least 120/120/120, to prevent the spread of fire between buildings.

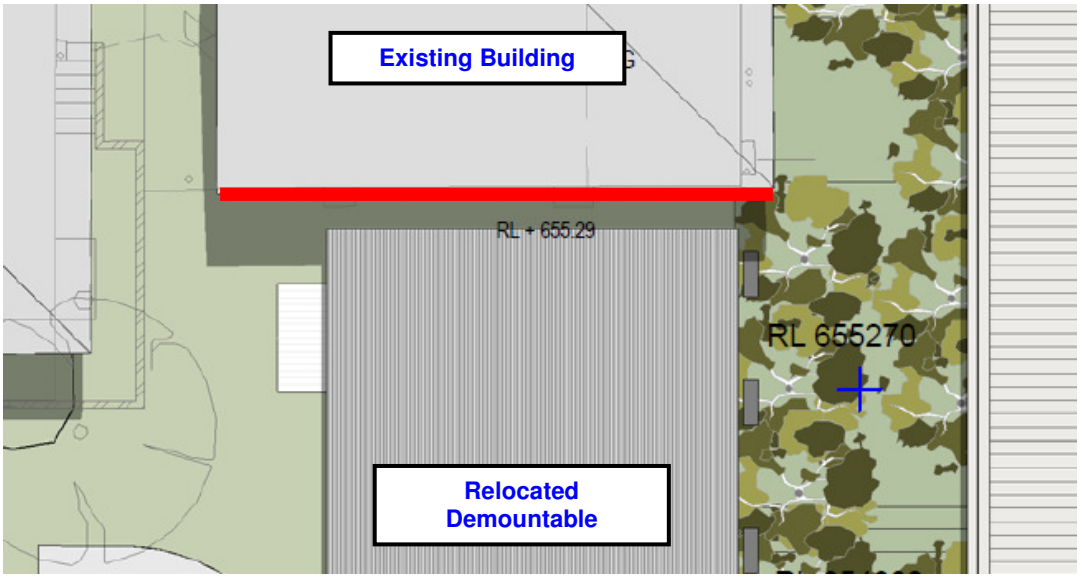


Figure 12: Part Site Plan

Non-Continuous Fire Wall

- The non continuous fire wall between the existing hospital and the new Rehabilitation Unit is to achieve an FRL of at least 120/120/120.

  Building elements, other than roof battens with a dimension of 75mm x 50mm or sarking, are not to penetrate through the fire wall.

  Any services penetrations through the fire wall are to be protected in accordance with Clause C3.15 of the BCA. Any doorways through the fire wall are to be protected with self-closing fire doors that achieve an FRL of at least -/120/30.

Protection of Openings in Different Fire Compartments

- The new link is to be fire separated from the new Rehabilitation Unit in construction that achieves an FRL of at least 120/120/120. The link is to form part of the same fire compartment as the existing building.

  The glazed external wall to the new link is to be protected on both sides with wall wetting sprinklers.

  The glazed doors from the new link to the new Rehabilitation Unit are to be protected on both sides with wall wetting sprinklers. These doors are to be fitted with self-closing devices that bring the doors to the fully closed and latched position. The doors are to also be fitted with approved smoke seals.

  All glazing is to comprise of at least 6mm fixed toughened safety glass fitted in non-combustible frames.

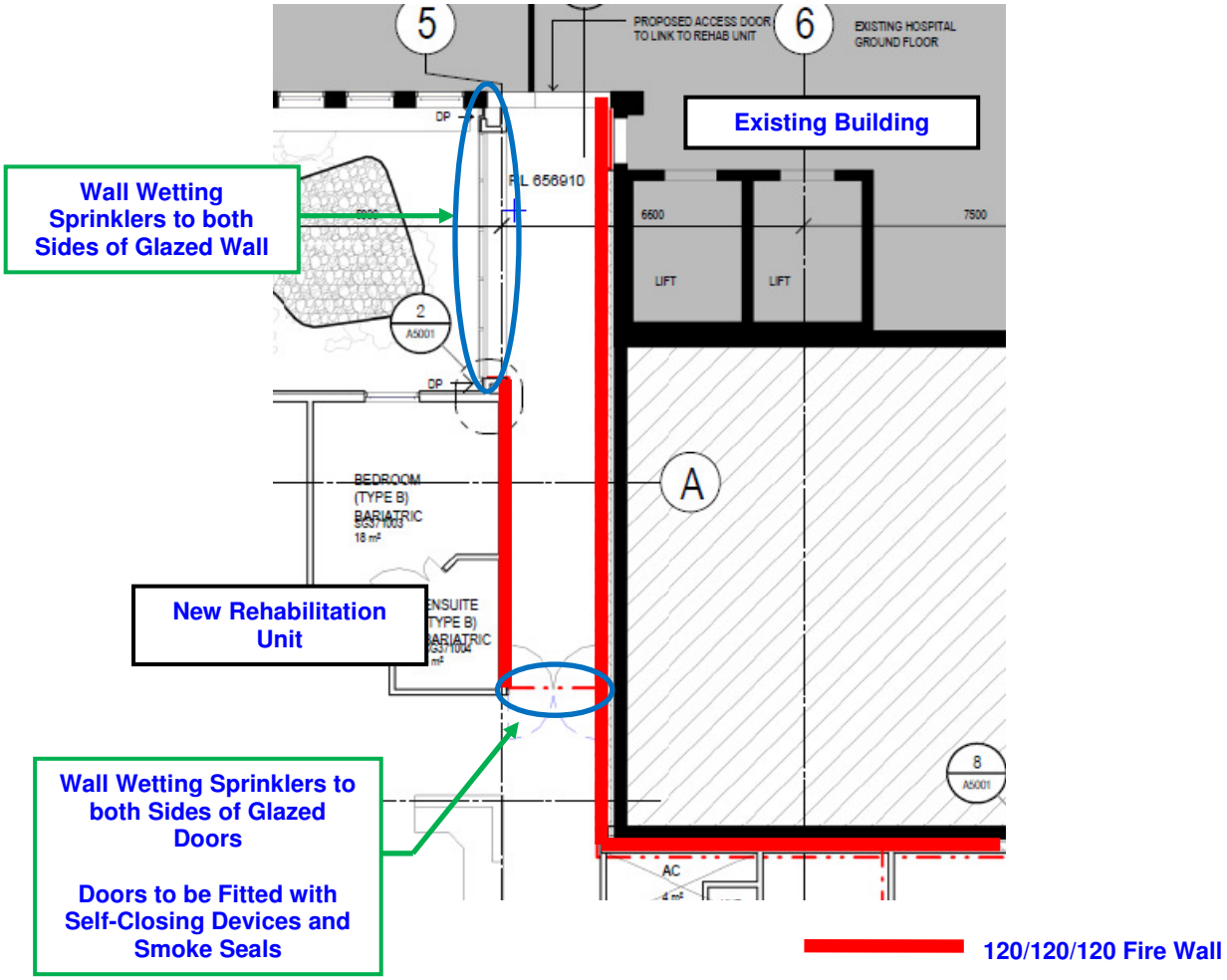


Figure 13: Part Ground Floor Plan

- The external wall adjacent the meeting room (no. SG371068) on ground floor is to achieve an FRL of at least 120/120/120, for a distance of at least 4m past the glazing to the meeting room.

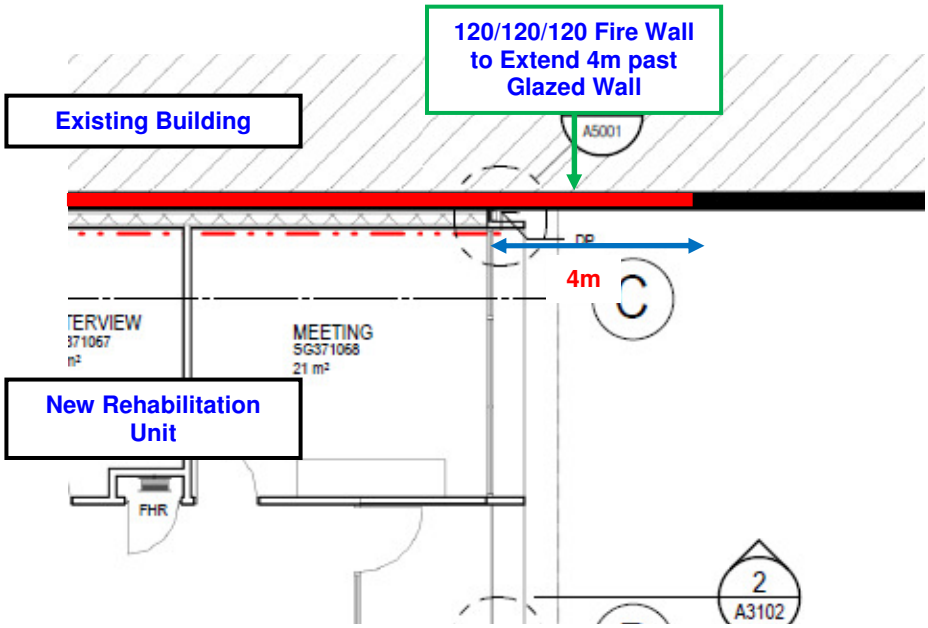


Figure 14: Part Ground Floor Plan

- The glazed wall bounding the courtyard, which forms part of the fire wall separating the ward areas, is to be protected with internal wall wetting sprinklers.

  The glazed walls bounding the courtyard adjacent the fire wall shall be protected with internal wall wetting sprinklers for a distance of at least 4m past the fire wall.

  All glazing is to comprise of at least 6mm fixed toughened safety glass fitted in non-combustible frames.

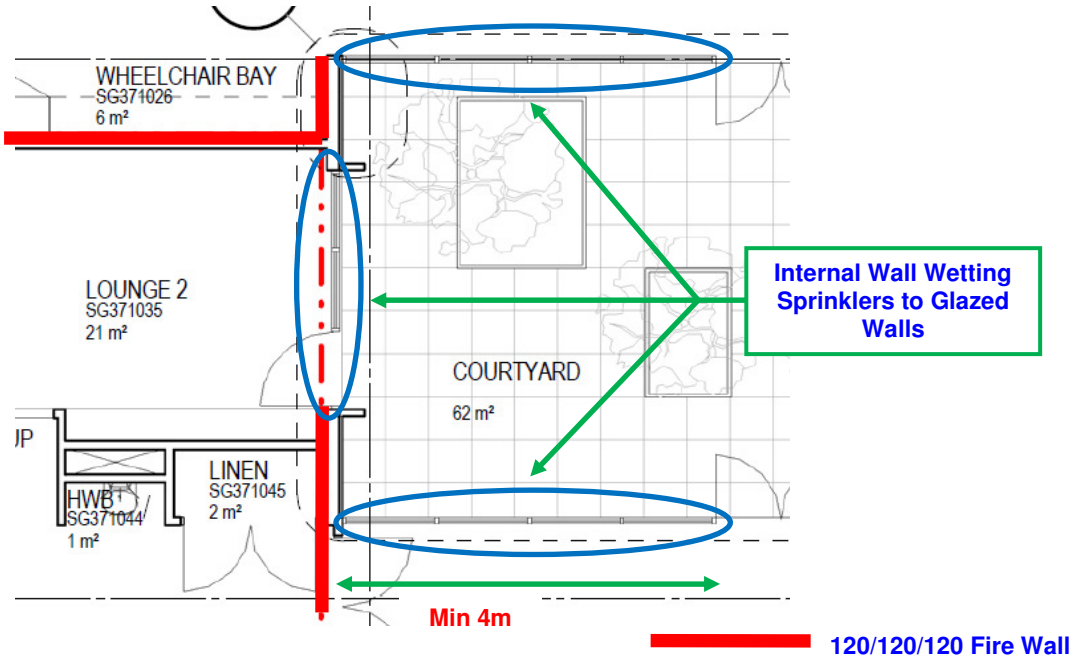


Figure 15: Part Ground Floor Plan

8.3 REQUIRED FIRE SAFETY SYSTEMS

The following fire safety systems are to be installed throughout new Rehabilitation Unit:

- Wall Wetting Sprinklers - AS 2118.2 (2010).
- Fire Hydrants - BCA Clause E1.3, AS 2419.1 (2005).
- Fire Hose Reels - BCA Clause E1.4, 2441 (2005), and as varied within this Report.
- Portable Fire Extinguishers - BCA Clause E1.6, AS 2444 (2001), and as varied within this Report.
- Automatic Smoke Detection and Alarm System - BCA Spec E2.2a, AS 1670.1 (2004).
- Emergency Lighting - BCA Clauses E4.2 & E4.4, AS 2293.1 (2005).
- Exit Signs - BCA Clauses E4.5, E4.6 & E4.8, AS 2293.1 (2005).
- Sound System and Intercom System for Emergency Purposes - BCA Clause E4.9, AS 1670.4 (2004).

NOTE: Refer to BCA Assessment Report for complete list of required fire safety systems / measures.

8.4 SUMMARY OF ALTERNATIVE SOLUTIONS

Table 4 below provides a summary of the proposed Alternative Solutions and associated BCA Performance Requirements.

Table 4: Summary of Alternative Solutions and Associated Performance Requirements

Alternative Solution	Variation to BCA DTS Provisions	BCA Performance Requirements
1	To relocate an existing single storey demountable building of lightweight construction, where it will be located less than 3m from an existing building.	**CP1, CP2**
2	To construct a fire wall that is not continuous from the floor of the lowest level to the roof of the highest level.	**CP2**
3	To have the glazed wall of the link to the new Rehabilitation Unit located within 4m of the existing hospital, which are to be considered as different fire compartments. To have the doorways to the new Rehabilitation Unit from the link fitted with glazed doors, in lieu of self-closing fire doors with an FRL of at least -/120/30. To have the glazed wall of a meeting room on ground floor located within 4m of the existing hospital, which are to be considered as different fire compartments. To have parts of the glazed walls bounding the courtyard within 4m of the 1 hour fire wall that separates the ward areas on ground floor.	**CP2**
4	To not construct the egress stair on the southern side of the Rehabilitation Unit as a fire-isolated exit.	**DP5**

9.0 APPROACHES AND METHODS OF ANALYSIS

9.1 APPROACHES

The Fire Engineering Analysis will utilise an Absolute Approach to assess the proposed Alternative Solutions.

An Absolute Approach is where an Alternative Solution is assessed against the relevant Performance Requirements of the BCA, as permitted under Clause A0.5(b)(i) of the BCA.

9.2 METHODS OF ANALYSIS

For each Alternative Solution, a Qualitative Analysis will be undertaken against the relevant Performance Requirements of the BCA, as permitted under Clause A0.9(b)(ii) of the BCA.

10.0 DESIGN FIRE SCENARIOS AND ACCEPTANCE CRITERIA

10.1 DESIGN FIRE SCENARIOS

General

To assess the Alternative Solutions, the following fire scenarios will be considered:

1. A fire within the relocated demountable building.
2. A fire within the existing building to the north of the relocated demountable building.
3. A fire within the existing building, immediately adjacent to and within 4m of the new Rehabilitation Unit.
4. A fire within the new Rehabilitation Unit, immediately adjacent to and within 4m of the existing building.
5. A fire within the ward area on ground floor adjacent to the glazed walls bounding the courtyard, and a fire within 4m of the 1 hour fire wall that separates the ward areas.

Design Fires

Considering that fire sprinklers will not be installed within the subject development, a fire can be expected to grow to flashover conditions involving a majority of the combustible items within the area of fire origin.

As a qualitative analysis will be used to assess the proposed Alternative Solutions, quantified design fires will not be adopted for the analysis.

10.2 ACCEPTANCE CRITERIA

Table 5 below provides a summary of the Acceptance Criteria when assessing the Alternative Solutions against the relevant Performance Requirements of the BCA.

Table 5: Summary of Acceptance Criteria

Alternative Solution	Acceptance Criteria
1	The Alternative Solution is to be shown to comply with BCA Performance Requirement CP1 and CP 2, in terms of: • Maintaining structural stability in the event of fire to the degree necessary. • Avoiding the spread of fire and smoke to the degree necessary. The analysis will consider the provision of a 2 hour fire rated external wall to the southern side of the existing building, which will be located adjacent to the relocated demountable.

Table 5: Summary of Acceptance Criteria

Alternative Solution	Acceptance Criteria
2	The Alternative Solution is to be shown to comply with BCA Performance Requirement CP2, in terms of: • Avoiding the spread of fire to the degree necessary. The analysis will consider the characteristics and use of the building, and the various fire safety systems installed to mitigate the spread of fire.
3	The Alternative Solution is to be shown to comply with BCA Performance Requirement CP2, in terms of: • Avoiding the spread of fire to the degree necessary. The analysis will consider the characteristics and use of the building, and the various fire safety systems installed to mitigate the spread of fire.
4	The Alternative Solution is to be shown to comply with BCA Performance Requirement DP5, in terms of: • Protecting evacuating occupants from a fire in the building to the degree necessary. The analysis will consider the characteristics of the stairway, and the level of separation provided from the remainder of the building whilst occupants are evacuating. The analysis will also consider the provision of an additional exit from ground floor, which exceeds the minimum DTS provisions of the BCA.

11.0 FIRE ENGINEERING ANALYSIS (ALTERNATIVE SOLUTION 1)

11.1 GENERAL

This Fire Engineering Analysis will consider whether the proposed Alternative Solution will achieve compliance with Performance Requirements CP1 and CP2 of the BCA.

11.2 BCA DTS PROVISIONS

In relation to the subject development, Clause C1.1 of the BCA requires the single storey demountable building to be of Type C construction in accordance with Specification C1.1 of the BCA. For buildings of Type C construction, external walls that are located between 1.5m and 3m from a fire source feature must achieve an FRL of at least 60/60/60 from the outside only.

As the relocated demountable will be located between 1.5m and 3m of an existing building to the north, the northern external wall is required to achieve an FRL of at least 60/60/60 from the outside.

11.3 BASIS OF BCA DTS PROVISIONS

The Guide to the BCA states that the intent of BCA Clause C1.1 is "***To establish the minimum fire-resisting construction required for Class 2-9 buildings***".

The Guide to the BCA further states "***When using an Alternative Solution, Part C1 does not apply and there is no need to refer to the types of construction***".

11.4 PROPOSED VARIATION TO BCA DTS PROVISIONS

As detailed in Section 6, it is proposed to relocate an existing single storey demountable building of lightweight non fire rated construction, where it will be located less than 3m from an existing building. The external walls of the single storey demountable, which will be located within 3m of the existing building, will not achieve an FRL.

11.5 ASSESSMENT OF ALTERNATIVE SOLUTION

The assessment of the Alternative Solution considers the following:

Fire in Relocated Demountable

- In the event of fire within the relocated demountable building, the external walls (which do not achieve an FRL) could fail due to the effects of fire under flashover conditions.

  For the subject demountable, such a scenario is allowable under the DTS provisions of the BCA as the external walls in a building of Type C construction are not required to have an FRL from the inside.

  However as the external wall to the adjacent existing building to the north will have an FRL of at least 120/120/120, fire spread from the relocated demountable to the existing building is expected to be mitigated.

Fire in Existing Building (adjacent Relocated Demountable)

- In the event of fire within the existing building to the north of the relocated demountable, fire spread to the relocated demountable is expected to be mitigated. This is due to the external wall of the existing building, facing the demountable, achieving an FRL of at least 120/120/120.

In consideration of the above, the provision of a 120/120/120 FRL to the external wall of the existing building (that faces the relocated demountable) will mitigate the potential for fire spread between the 2 buildings.

Refer also Figures 16 & 17 below.

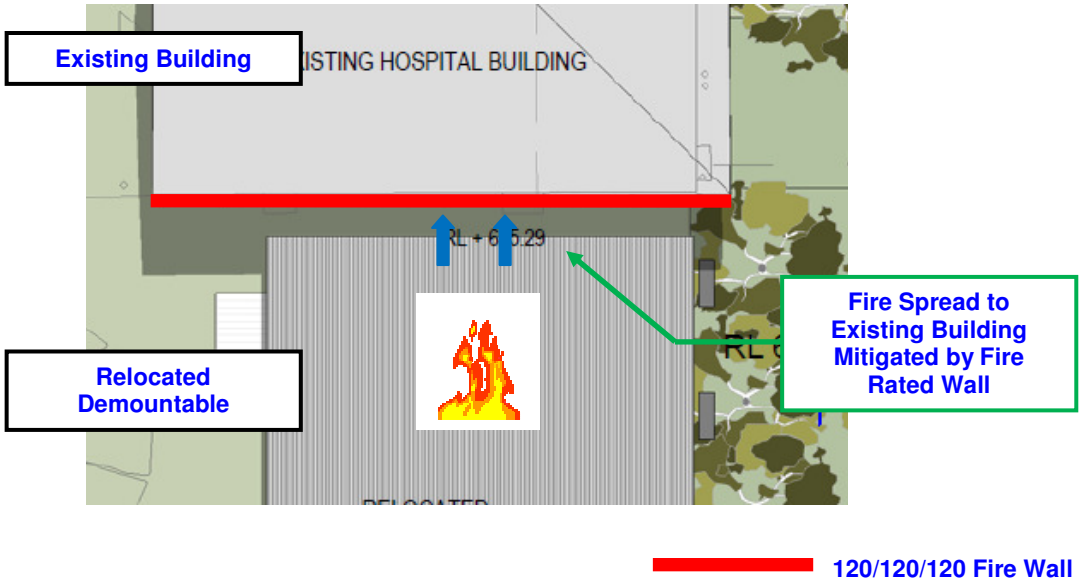


Figure 16: Part Site Plan

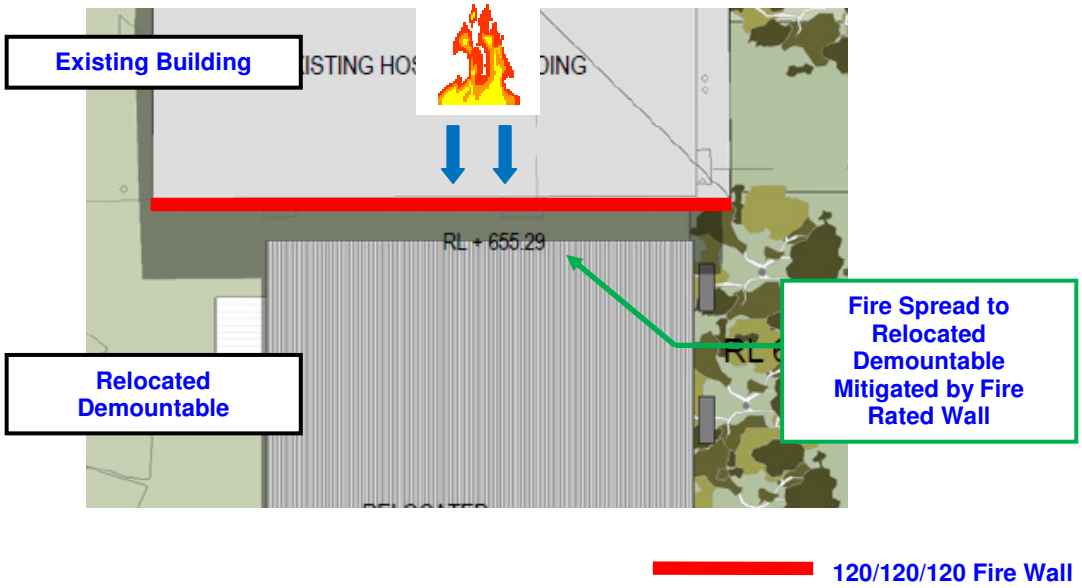


Figure 17: Part Site Plan

11.6 SATISFYING BCA PERFORMANCE REQUIREMENTS

The proposed Alternative Solution has been assessed against BCA Performance Requirements CP1 and CP2, as shown in Tables 6 and 7 below.

Table 6: Assessment of Compliance with the BCA Performance Requirement CP1

Performance Requirement CP1	Discussion
A building must have elements which will, to the degree necessary, maintain structural stability during a fire appropriate to -	
(a) the function or use of the building; and	As discussed in Section 11.5.
(b) the fire load; and	Considered at least equivalent to the DTS provisions of the BCA.
(c) the potential fire intensity; and	Considered at least equivalent to the DTS provisions of the BCA.
(d) the fire hazard; and	Considered at least equivalent to the DTS provisions of the BCA.
(e) the height of the building; and	Considered at least equivalent to the DTS provisions of the BCA.
(f) its proximity to other property; and	As discussed in Section 11.5.
(g) any active fire safety systems installed in the building; and	Considered at least equivalent to the DTS provisions of the BCA.
(h) the size of any fire compartment; and	Considered at least equivalent to the DTS provisions of the BCA.
(i) fire brigade intervention; and	Considered at least equivalent to the DTS provisions of the BCA.
(j) other elements they support; and	Considered at least equivalent to the DTS provisions of the BCA.
(k) the evacuation time.	Considered at least equivalent to the DTS provisions of the BCA.

Table 7: Assessment of Compliance with the BCA Performance Requirement CP2

Performance Requirement CP2	Discussion
(a) A building must have elements which will, to the degree necessary, avoid the spread of fire -	
(i) to exits; and	N/A
(ii) to sole-occupancy units and public corridors; and	N/A
(iii) between buildings; and	As discussed in Section 11.5.
(iv) in a building.	N/A
(b) Avoidance of the spread of fire referred to in (a) must be appropriate to -	
(i) the function or use of the building; and	As discussed in Section 11.5.
(ii) the fire load; and	Considered at least equivalent to the DTS provisions of the BCA.
(iii) the potential fire intensity; and	Considered at least equivalent to the DTS provisions of the BCA.

Table 7: Cont'd

Performance Requirement CP2	Discussion
(iv) the fire hazard; and	Considered at least equivalent to the DTS provisions of the BCA.
(v) the number of storeys in the building; and	Considered at least equivalent to the DTS provisions of the BCA.
(vi) its proximity to other property; and	As discussed in Section 11.5.
(vii) any active fire safety systems installed in the building; and	Considered at least equivalent to the DTS provisions of the BCA.
(viii) the size of any fire compartment; and	Considered at least equivalent to the DTS provisions of the BCA.
(ix) fire brigade intervention; and	Considered at least equivalent to the DTS provisions of the BCA.
(x) other elements they support; and	Considered at least equivalent to the DTS provisions of the BCA.
(xi) the evacuation time.	Considered at least equivalent to the DTS provisions of the BCA.

12.0 FIRE ENGINEERING ANALYSIS (ALTERNATIVE SOLUTION 2)

12.1 GENERAL

This Fire Engineering Analysis will consider whether the proposed Alternative Solution will achieve compliance with Performance Requirement CP2 of the BCA.

12.2 BCA DTS PROVISIONS

In relation to the subject development, Clause C2.7 of the BCA requires a fire wall to extend through all storeys and spaces in the nature of storeys that are common to that part and any adjoining part of the building. The fire wall must also be carried through to the underside of the roof covering.

12.3 BASIS OF BCA DTS PROVISIONS

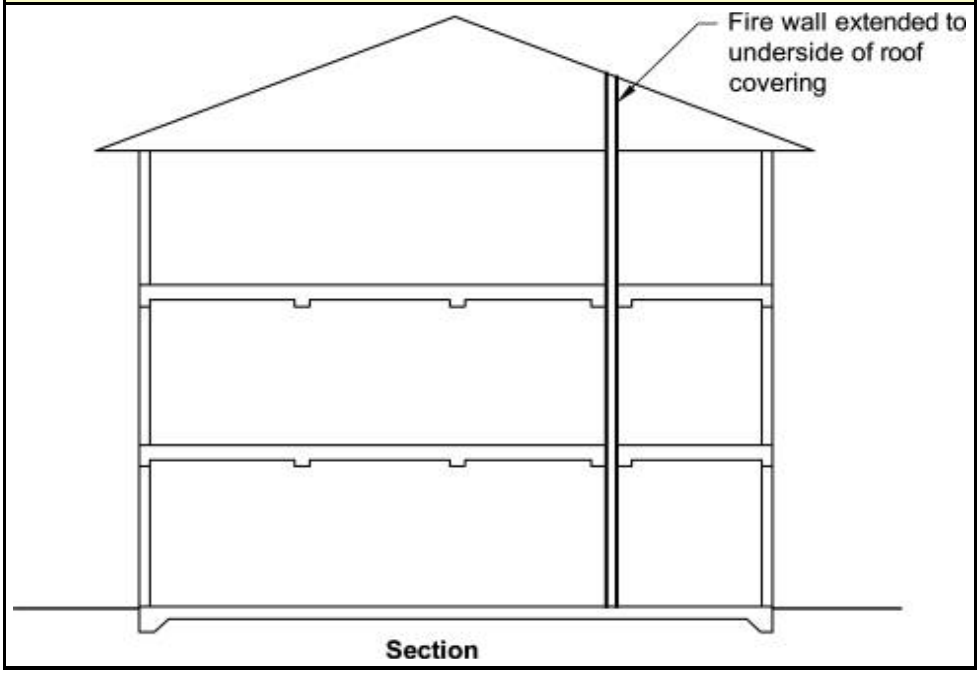
The Guide to the BCA states that the intent of BCA Clause C2.7 is "***To explain that buildings separated by a fire wall maybe considered as fire compartments or be regarded as separate buildings***".

In relation to the separation of buildings, the Guide to the BCA states: ***"C2.7(b) indicates the extent a fire wall divides a building into separate buildings for the Deemed-to-Satisfy Provisions of Sections C, D and E.***

The fire wall must extend through all storeys and similar spaces which are common to the subject parts of the building, and any adjoining part of the building, through to the underside of any roof covering…"

Figure C2.7(1)

EXAMPLE OF METHOD OF SEPARATING A BUILDING BY A FIRE WALL IN ACCORDANCE WITH C2.7(b)(ii)



12.4 PROPOSED VARIATION TO BCA DTS PROVISIONS

As detailed in Section 6, it is proposed construct a fire wall that is not continuous from the floor of the lowest level to the roof of the highest level.

12.5 ASSESSMENT OF ALTERNATIVE SOLUTION

The assessment of the Alternative Solution considers the following:

- For the proposed building design, the firewall does not consist of a continuous vertical wall, but separate fire walls interconnected to a floor slab that achieves the same FRL. The fire walls are expected to act in a similar manner to that identified by Figure C2.7(1) from the Guide to the BCA, as outlined above.

- The minor horizontal component (i.e the floor slab) will achieve the required FRL of 120/120/120 for a fire wall, and is considered to prevent the spread of fire between the structures to an equivalent degree as complying vertical separation.

- For the new Rehabilitation Unit to be considered as a separate building to that of the existing building, a fire within the new building should not affect the existing building or vice versa. It is considered improbable that a fire will grow sufficiently to cause the failure of the fire separation walls provided between the 2 buildings for the following reasons:

    - Any openings or penetrations through the separating fire walls will be suitably protected and / or fire stopped in accordance with the relevant deemed to satisfy provisions of the BCA for a fire wall.

    - The doorways providing access between the 2 buildings will be protected with self-closing fire doors to AS 1905.1, with an FRL of at least -/120/30.

    - Given the proposed construction of the building and the fire safety systems to be installed, it is improbable that a fire will develop to a level that would prevent fire brigade intervention.

In consideration of the above, the proposed construction of the separating fire walls will mitigate the potential for fire spread between buildings to the degree necessary.

12.6 SATISFYING BCA PERFORMANCE REQUIREMENTS

The proposed Alternative Solution has been assessed against BCA Performance Requirement CP2, as shown in Table 8 below.

Table 8: Assessment of Compliance with the BCA Performance Requirement CP2

Performance Requirement CP2	Discussion
(a) A building must have elements which will, to the degree necessary, avoid the spread of fire -	
(i) to exits; and	N/A
(ii) to sole-occupancy units and public corridors; and	N/A
(iii) between buildings; and	As discussed in Section 12.5.
(iv) in a building.	As discussed in Section 12.5.

Table 8: Assessment of Compliance with the BCA Performance Requirement CP2

Performance Requirement CP2	Discussion
(b) Avoidance of the spread of fire referred to in (a) must be appropriate to -	
(i) the function or use of the building; and	Considered at least equivalent to the DTS provisions of the BCA.
(ii) the fire load; and	Considered at least equivalent to the DTS provisions of the BCA.
(iii) the potential fire intensity; and	Considered at least equivalent to the DTS provisions of the BCA.
(iv) the fire hazard; and	Considered at least equivalent to the DTS provisions of the BCA.
(v) the number of storeys in the building; and	Considered at least equivalent to the DTS provisions of the BCA.
(vi) its proximity to other property; and	As discussed in Section 11.5.
(vii) any active fire safety systems installed in the building; and	Considered at least equivalent to the DTS provisions of the BCA.
(viii) the size of any fire compartment; and	Considered at least equivalent to the DTS provisions of the BCA.
(ix) fire brigade intervention; and	Considered at least equivalent to the DTS provisions of the BCA.
(x) other elements they support; and	Considered at least equivalent to the DTS provisions of the BCA.
(xi) the evacuation time.	Considered at least equivalent to the DTS provisions of the BCA.

13.0 FIRE ENGINEERING ANALYSIS (ALTERNATIVE SOLUTION 3)

13.1 GENERAL

This Fire Engineering Analysis will consider whether the proposed Alternative Solution will achieve compliance with Performance Requirement CP2 of the BCA.

13.2 BCA DTS PROVISIONS

In relation to the subject development, Clause C3.3 of the BCA states that the distance between parts of external walls and any openings within them in different fire compartments separated by a fire wall must not be less than that set out in Table C3.3 (***being 4m for the subject building***), unless -

- those parts of each wall have an FRL not less than 60/60/60; and
- any openings protected in accordance with C3.4.

Clause C3.4 of the BCA nominates acceptable methods of protection that are required under Clause C3.3, and for windows include:

- External wall wetting sprinklers that are used with windows that are automatic closing or permanently fixed in the closed position.
- Fire rated windows with an FRL of at least -/60/-.
- Automatic closing fire shutters with an FRL of at least -/60/-.

In relation to the subject development, Clause C3.5 of the BCA states that a doorway in a fire wall must be protected by a single fire door or fire shutter which has an FRL of not less than that required by Specification C1.1 for the fire wall except that each door or shutter must have an insulation level of at least 30.

13.3 PROPOSED VARIATION TO BCA DTS PROVISIONS

As detailed in Section 6:

- It is proposed to have the glazed wall of the link to new Rehabilitation Unit located within 4m of the existing hospital, which are considered as different fire compartments.

  Furthermore, it is proposed to have the doorway to the new Rehabilitation Unit from the link fitted with glazed doors, in lieu of self-closing fire doors with an FRL of at least -/120/30.

- It is proposed to have the glazed wall of a meeting room on ground floor located within 4m of the existing hospital, which are considered as different fire compartments.

- It is proposed to have parts of the glazed walls bounding the courtyard within 4m of the 1 hour fire wall that separates the ward areas on ground floor.

13.4 ASSESSMENT OF ALTERNATIVE SOLUTION

The assessment of the Alternative Solution considers the following:

Link to new Rehabilitation Unit

- In the event of fire adjacent the new link between the existing building and the new Rehabilitation Unit (refer Figure 18 below), fire spread between buildings via the glazed wall of the link or via the glazed double doors is expected to be mitigated due to the provision of wall wetting sprinklers to both sides of the glazing.

  The provisions of wall wetting sprinklers is expected to maintain the integrity of the glazing panels in the event of fire, thereby mitigating the spread of fire between buildings to the degree necessary.

  The effect of wall wetting sprinklers is to provide a curtain of water over the glazing panels. The curtain of water serves 2 purposes; it cools the glazing to maintain its integrity in the event of fire, and provides attenuation to received radiation from a fire.

  The glazed doors will also be fitted with approved smoke seals, thereby mitigating the spread of hot smoke between adjoining buildings to the degree necessary. This satisfies the intent of the BCA, which is "*to maintain the integrity of fire walls by limiting the spread of fire through doorways*". That is, the provision wall wetting sprinklers and smoke seals to the doors, will maintain the integrity of the fire walls.

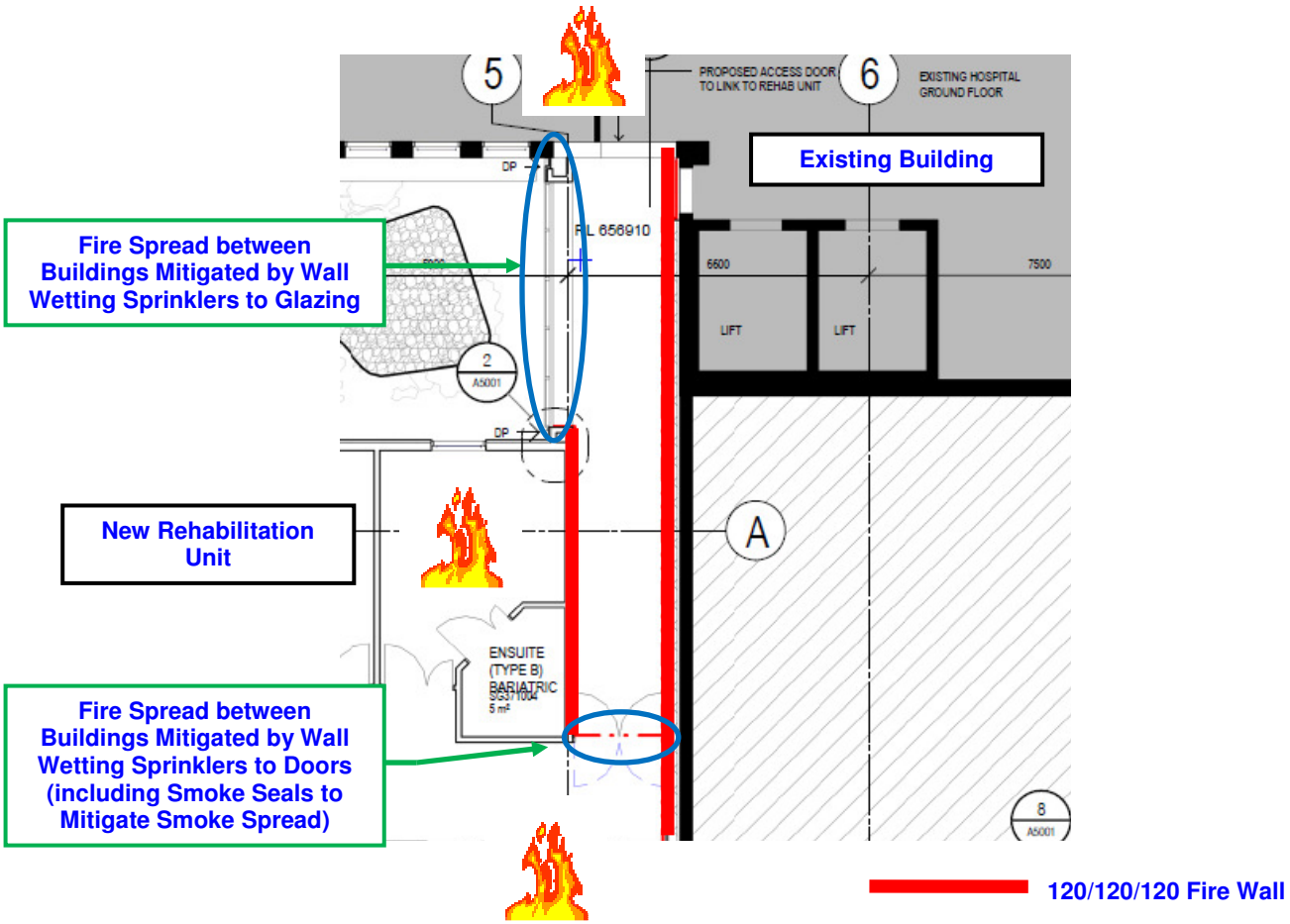


Figure 18: Part Ground Floor Plan

Meeting Room

- In the event of fire within the new Rehabilitation Unit (refer Figure 19 below), the glazed wall of the meeting room is likely to crack and eventually "blow out" under flashover conditions, resulting in flames and hot gases venting through the opening.

  As the wall to the adjacent building will have an FRL of at least 120/120/120, fire spread from the new Rehabilitation Unit to the existing building is expected to be mitigated.

  Furthermore, heat from the hot gases venting through the openings are expected to dissipate to the atmosphere, with little or no impact on the adjacent building where the exposed wall achieves an FRL of at least 120/120/120.

- In the event of fire within the existing building (refer Figure 20 below), fire spread to the new Rehabilitation Unit is expected to be mitigated due to the wall of the existing building achieving an FRL of at least 120/120/120.

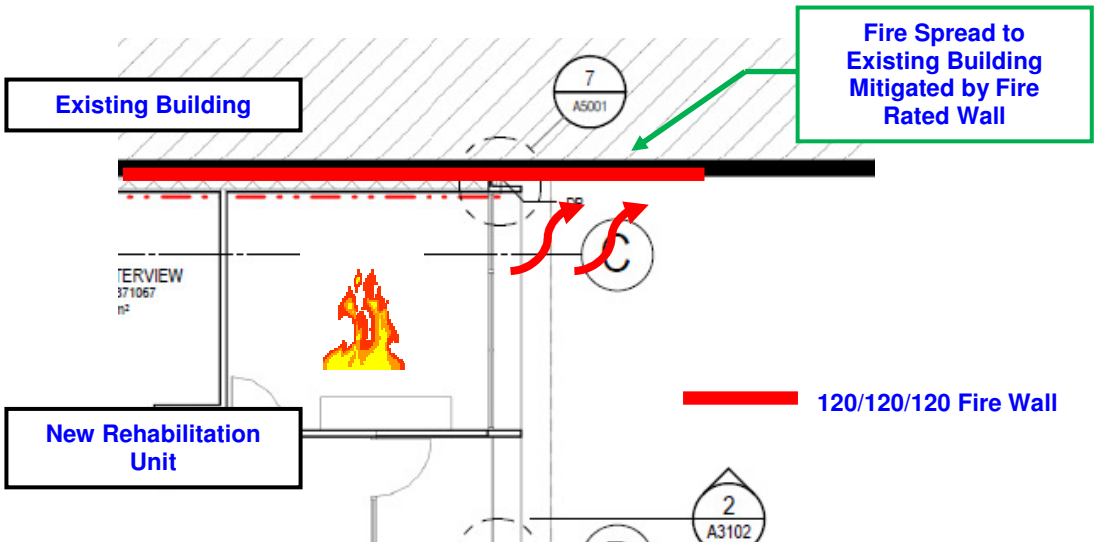


Figure 19: Part Ground Floor Plan

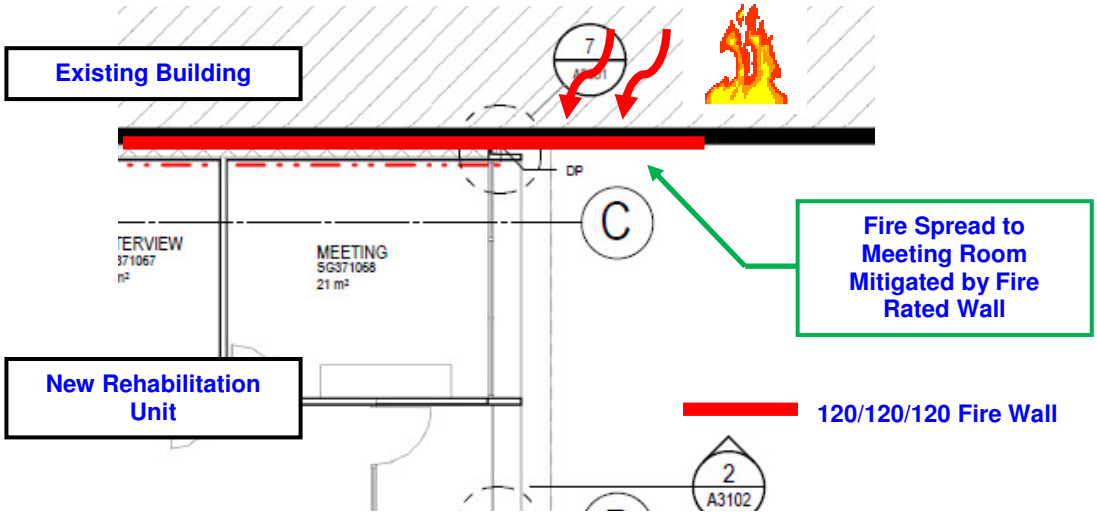


Figure 20: Part Ground Floor Plan

Ward Area

- In the event of fire adjacent the glazed walls bounding the courtyard, forming part of or located adjacent to the fire wall (refer Figure 21 below), fire spread between compartments via the glazing is expected to be mitigated due to the provision of internal wall wetting sprinklers to the glazed walls.

  The provisions of wall wetting sprinklers is expected to maintain the integrity of the glazing panels in the event of fire, thereby mitigating the spread of fire between compartments to the degree necessary.

  The effect of wall wetting sprinklers is to provide a curtain of water over the glazing panels. The curtain of water serves 2 purposes; it cools the glazing to maintain its integrity in the event of fire, and provides attenuation to received radiation from a fire.

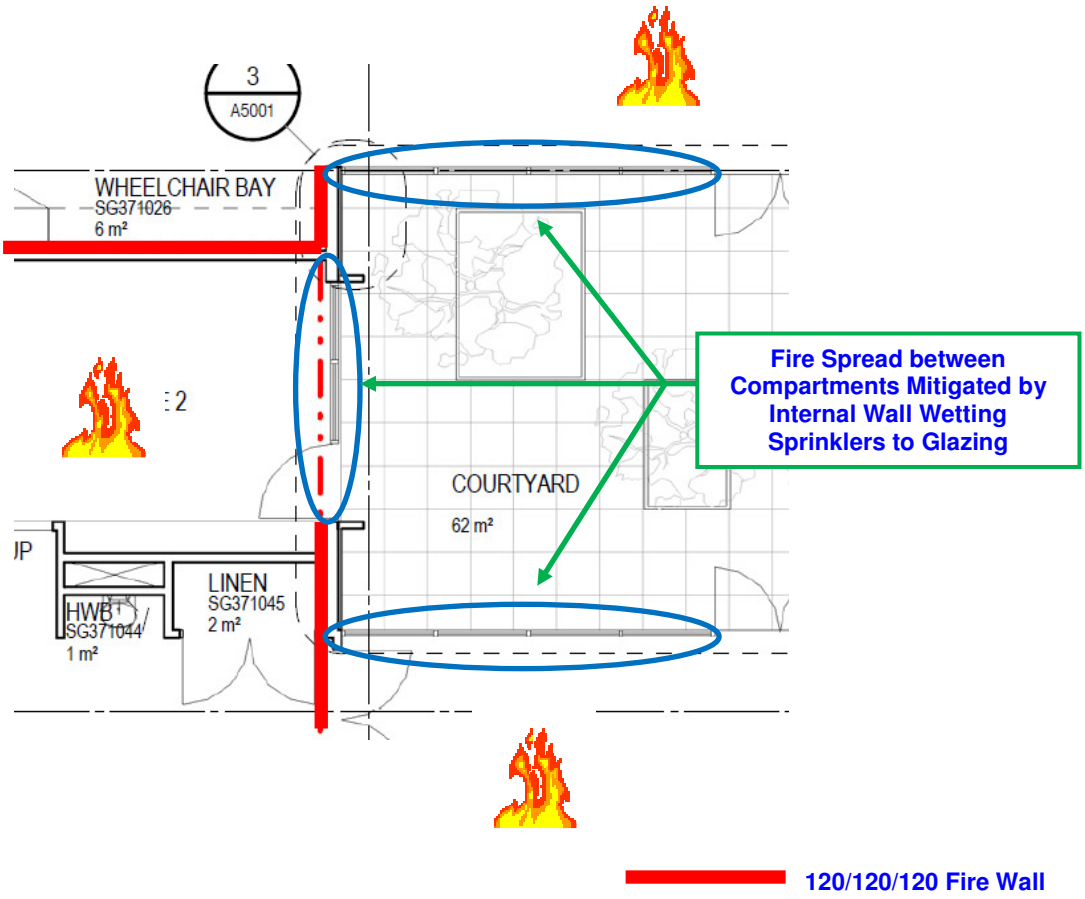


Figure 21: Part Ground Floor Plan

13.5 SATISFYING BCA PERFORMANCE REQUIREMENT

The proposed Alternative Solution has been assessed against BCA Performance Requirement CP2, as shown in Table 9 below.

Table 9: Assessment of Compliance with the BCA Performance Requirement CP2

Performance Requirement CP2	Discussion
(a) A building must have elements which will, to the degree necessary, avoid the spread of fire -	
(i) to exits; and	N/A
(ii) to sole-occupancy units and public corridors; and	N/A
(iii) between buildings; and	N/A
(iv) in a building.	As discussed in Section 13.4.
(b) Avoidance of the spread of fire referred to in (a) must be appropriate to -	
(i) the function or use of the building; and	As discussed in Section 13.4.
(ii) the fire load; and	Considered at least equivalent to the DTS provisions of the BCA.
(iii) the potential fire intensity; and	As discussed in Section 13.4.
(iv) the fire hazard; and	Considered at least equivalent to the DTS provisions of the BCA.
(v) the number of storeys in the building; and	Considered at least equivalent to the DTS provisions of the BCA.
(vi) its proximity to other property; and	N/A
(vii) any active fire safety systems installed in the building; and	As discussed in Section 13.4.
(viii) the size of any fire compartment; and	Considered at least equivalent to the DTS provisions of the BCA.
(ix) fire brigade intervention; and	Considered at least equivalent to the DTS provisions of the BCA.
(x) other elements they support; and	N/A
(xi) the evacuation time.	Considered at least equivalent to the DTS provisions of the BCA.

14.0 FIRE ENGINEERING ANALYSIS (ALTERNATIVE SOLUTION 4)

14.1 GENERAL

This Fire Engineering Analysis will consider whether the proposed Alternative Solution will achieve compliance with Performance Requirement DP5 of the BCA.

14.2 BCA DTS PROVISIONS

In relation to the subject development, Clause D1.3 of the BCA states that a stairway serving as a required exit within a patient care area must be constructed as a fire-isolated exit.

14.3 BASIS OF BCA DTS PROVISIONS

The Guide to the BCA states that the intent of BCA Clause D1.3 is "***To indicate when fire-isolated stairways and ramps are required to enable safe egress in case of a fire***".

The Guide to the BCA states that the purpose of fire-isolated exits in multi-storey buildings is to enable people to evacuate past a storey on fire.

14.4 PROPOSED VARIATION TO BCA DTS PROVISIONS

As detailed in Section 6, it is not proposed to construct the egress stair on the southern side of the new Rehabilitation Unit as a fire-isolated exit

14.5 ASSESSMENT OF ALTERNATIVE SOLUTION

The assessment of the Alternative Solution considers the following:

- The egress stair on the southern side of the Rehabilitation Unit, although discharging to the undercroft level, only serves a single level being ground floor. That is, the egress stair does not serve as a required exit from the undercroft level.

- The discharge point from the egress stair on the undercroft level is located more than 6m from the building containing openings. Therefore, the exposure of evacuating occupants to a fire within the undercroft level will be at least equivalent to the DTS provisions of the BCA.

  Therefore occupants will not be evacuating through or past a storey on fire, which satisfies the intent of the BCA as outlined above.

- An alternative exit will be provided from the ward area on ground floor, on the northern side into the existing building. This exit, although not required under the DTS provisions of the BCA, will serve as an alternative exit.

  Therefore if the southern egress stair becomes untenable, occupants can evacuate through the additional alternative exit.

In consideration of the above, it is not considered necessary to construct the egress stair on the southern side of the Rehabilitation Unit as a fire-isolated exit.

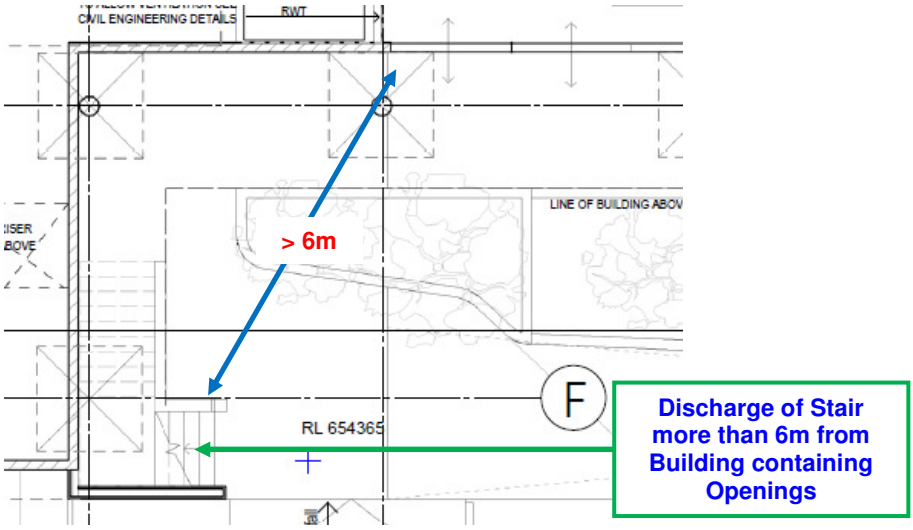


Figure 22: Part Undercroft Level

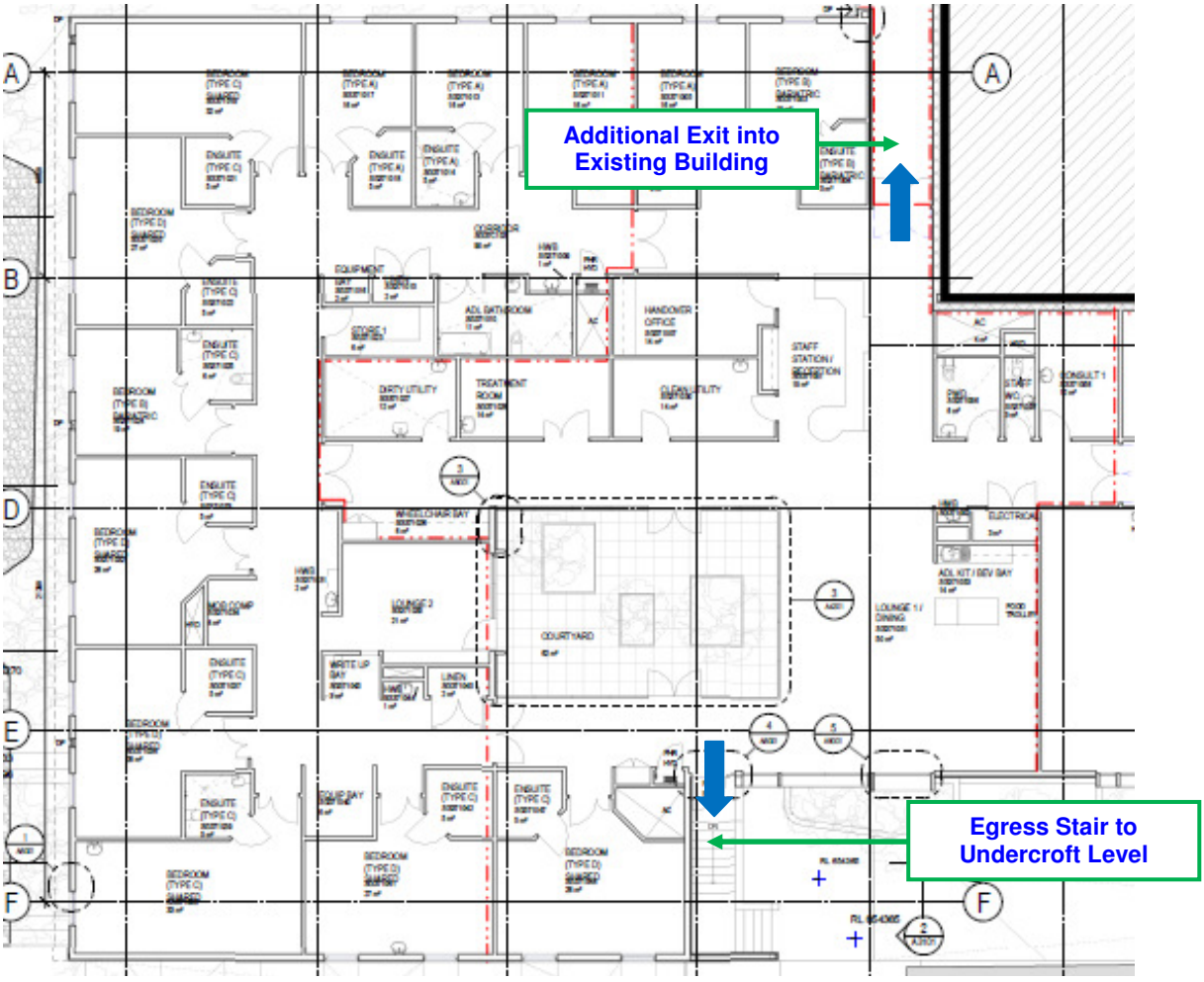


Figure 23: Part Ground Floor Plan

14.6 SATISFYING BCA PERFORMANCE REQUIREMENT

The proposed Alternative Solution has been assessed against BCA Performance Requirement DP5, as shown in Table 10 below.

Table 10: Assessment of Compliance with the BCA Performance Requirement DP5

Performance Requirement DP5	Discussion
To protect evacuating occupants from a fire in the building exits must be fire-isolated, to the degree necessary, appropriate to -	
(a) the number of storeys connected by the exits; and	As discussed in Section 14.5.
(b) the fire safety system installed in the building; and	Considered at least equivalent to the DTS provisions of the BCA.
(c) the function or use of the building; and	As discussed in Section 14.5.
(d) the number of storeys passed through by the exits; and	As discussed in Section 14.5.
(e) fire brigade intervention.	Considered at least equivalent to the DTS provisions of the BCA.

15.0 MANAGEMENT AND USE

15.1 CERTIFICATION OF FIRE ENGINEERING DESIGN

This Fire Engineering Report shall form part of the Fire Safety Schedule for the subject building, and shall be certified annually as part of the Annual Fire Safety Statement (AFSS).

15.2 BUILDING CHANGES AND MODIFICATIONS

Should the subject building undergo a change in use or classification, or be modified internally, the Fire Engineering Designs for the building are to be re-evaluated.

15.3 MAINTENANCE AND SERVICING

All fire safety measures installed throughout the subject building are to be maintained and serviced in accordance with the relevant Australian Standards and manufacturers guidelines, and be included in an AFSS.

16.0 CONCLUSION

A Fire Engineering Analysis has been undertaken for the construction of a new Rehabilitation Unit at Goulburn Hospital.

The Fire Engineering Analysis relates to:

- Fire resisting construction.
- Separation by fire walls.
- Separation of external walls and associated openings in different fire compartments.
- Doorways in fire walls.
- When fire-isolated stairways and ramps are required.

Based on the Fire Engineering Analysis presented in this report, it is the opinion of Impact Fire Pty Ltd that the proposed Alternative Solutions will satisfy BCA Performance Requirements CP1, CP2 and DP5, subject to the implementation of the Fire Engineering Scope of Works presented in the Executive Summary.

APPENDIX A - LIST OF REFERENCED DRAWINGS

Table 11: List of Referenced Architectural Drawings

Drawing No.	Issue	Title	Revision Date
A2200	F	General Arrangement Plan - Undercroft	24-01-2012
A2201	H	General Arrangement Plan - Ground Floor	25-01-2012
A2700	D	Fire Compartments	14-11-2011