Department of Building and Housing
Te Tari Kaupapa Whare

Determination 2011/002

The compliance of a 26 storey apartment building with no emergency electrical power supply system for the lifts at 70 to 74 Albert Street, Auckland City

1 The matter to be determined

1.1 This is a Determination under Part 3 Subpart 1 of the Building Act 2004[1] ("the Act") made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing ("the Department"), for and on behalf of the Chief Executive of that Department.

1.2 The parties to this determination are:

- the owner of the building, Greenstone Barclay Trustees ("the applicant") acting through an agent ("the agent")
- the Auckland City Council[2] carrying out its duties and functions as a territorial authority and a building consent authority ("the authority").

1.3 I have also forwarded the determination documentation to the New Zealand Fire Service Commission ("the NZFS Commission") by way of consultation under section 170.

1.4 The dispute arises from a decision of the authority to refuse to issue a building consent for a proposed change of use to an existing building from use SR Sleeping Residential to use SA Sleeping Accommodation. The authority is of the view that the change of use proposal must include an emergency electrical power supply system for the lifts and has rejected a proposed alternative solution that does not include a type 17 emergency electrical power supply system for the lifts.

1.5 I take the view that the matter for determination[3] is whether the proposed alternative solution complies with the Building Code.

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[1] The Building Act, Building Code, Compliance documents, past determinations and guidance documents issued by the Department are all available at www.dbh.govt.nz or by contacting the Department on 0800 242 243.
[2] After the application was made, and before the determination was completed, Auckland City Council was transitioned into the new Auckland Council. The term authority is used for both.
[3] In terms of section 177(a) of the Act

1.6 It is my understanding that the only outstanding matter of dispute between the parties is the compliance of the proposed alternative solution, with respect to the provision of an emergency electrical power supply system for the lifts.

1.7 In making my decision, I have considered the submissions of the parties, the report of an independent expert commissioned by the Department ("the expert") to advise on this dispute, and the other evidence in this matter. I have not considered any other aspects of the Building Act or Building Code.

1.8 I have set out the relevant sections of the Act and the Acceptable Solution C/AS1 ("C/AS1") in Appendix A. In this determination, I also refer to the International Fire Engineering Guidelines ("IFEG")[4].

2 The building

2.1 The building is a 26 storey, single tower. The ground level contains plant and retail space, the first level contains retail spaces and a building manager's apartment, and the remaining 24 levels contain apartments, each consisting of four or five units.

2.2 The ground level and level one spaces exit directly to a safe place outside the building. The building is served by two lifts and two separate internal fire separated stairs. The building has sprinklers, smoke detectors, and a charged hydrant riser mains in one stair.

2.3 The highest escape height is 78 metres. The dead end open path travel distance is 10 metres.

2.4 The proposed change of use is from a use SR Sleeping Residential to a SA Sleeping Accommodation.

3 Background

3.1 Code compliance certificates were issued by the authority for five stages of the construction of the tower in August 2008. The building had a use SR Sleeping Residential assigned.

3.2 An application for a building consent for a proposed change of use, from use SR Sleeping Residential to use SA Sleeping Accommodation, was received by the authority on 17 September 2008. This followed investigations by the authority into the use of the building. Issues relating to the use of the building were first raised by the authority over a year beforehand.

3.3 In respect of the application for a building consent for the proposed change of use, the authority took the view that full Building Code compliance was required to be demonstrated, because the building was a brand new building. The authority was of the view that the fire design did not satisfy the requirements of Clause C3 because the proposed alternative solution did not include an emergency electrical power supply system for the lifts as required by C/AS1 for the building.

3.4 The application for a determination was received by the Department on 24 September 2009. However, following a request on behalf of the applicant, the determination process was put on hold.

[4] International Fire Engineering Guidelines – Australian Building Codes Board, 2005

3.5 Discussions between the parties about the proposed change of use and proposed alternative solution continued and further and revised supporting information was provided to the authority. The authority provided a copy of the building consent application to the NZFS in accordance with section 46 of the Act, and the NZFS subsequently provided a 'Building Memorandum' dated 25 January 2010 (refer to paragraph 4.6).

3.6 The applicant requested the determination be reactivated in a letter dated 20 February 2010.

4 The submissions

4.1 In a letter dated 22 September 2009 accompanying the application, the agent explained that the applicant wished to change the use for the building to use SA Sleeping Accommodation. The agent explained that:

> … all requirements with respect to the change in use have been agreed, with the exception of the provision of a C/AS1 compliant type 17 emergency electrical power supply system for the lifts. An alternative solution has been proposed for this item due to the difficulties involved with retro fitting an emergency generator into an existing building on a restricted inner city site… .

4.2 The application included copies of:

- drawings for the proposed change of use
- a report dated 16 September 2009 prepared by the applicant's fire engineer about the design for fire safety and the proposed alternative solution
- an assessment dated 3 September 2009 of the change of use and sacrifices and benefits of providing an emergency electrical power supply system for the lifts
- a scope of works (feasibility study) dated August 2009 setting out the design options for providing an emergency electrical power supply system for the lifts.

4.3 On 24 February 2010, the agent subsequently provided additional information to support the application for determination, included a letter setting out that the positions of the parties had not changed. The agent included:

- revised drawings for the proposed change of use
- an updated report dated 21 December 2009 prepared by the applicant's fire engineer about the design for fire safety and the proposed alternative solution
- a fire safety report prepared by the applicant's fire engineer for the proposed change of use for the building, dated 6 October 2009
- an updated assessment of the change of use and sacrifices and benefits of providing an emergency electrical power supply system for the lifts, dated 17 October 2010
- the memorandum provided by the NZFS to the authority in respect of the building consent application, dated 25 January 2010.

4.4 The authority made a submission dated 26 April 2010. The authority set out the background to the dispute and noted the following:

- in accordance with the principles set out in Determination 2005/109, the applicant cannot change the use of this brand new building and then '… reduce the extent of Building Code compliance to be demonstrated, as if the change was unintended and/or unforeseen at the time, or had arisen merely in the natural course of the building's service life'
- 'the time which has transpired since the completion and occupation of the building and the current application for determination is directly attributable to the owner's reluctance to address matters relating to the change of use in a satisfactory manner'
- the refusal to issue the building consent arose as a consequence of the applicant's unwillingness to provide an alternative cost/benefit analysis to provide a comparison with the installation of [an emergency electrical power supply system for the lifts] that was weighted heavily in the applicant's interests.

4.5 The authority provided copies of:

- the code compliance certificates
- the NZFS Building Memorandum dated 17 October 2008 and 25 January 2010
- correspondence between the parties
- documents relating to the current use of the building.

4.6 The NZFS, in accordance with section 47 of the Act, provided a memorandum that set out its views of the Building Code compliance of the proposal. The NZFS noted:

> The design report indicates that the deletion of the emergency power supply to the fireman's lift is the main deviation from the acceptable solution. …
>
> To clarify the need for this fire safety feature the [NZFS] manager of operational standards was asked what standard operating procedures would apply in a building of this height and use. I quote from his reply:
>
> > *"Since the publication of NZS 4332:1997 (Non-domestic passenger and goods lifts), the operation of the Emergency fire recall switch on lifts provides a procedure for the Fire Service to transport firefighters and resources to a safe floor, usually 2 floors below the fire floor. The ability to use such a resource will allow fire crews to commence a fire attack considerably earlier than if they were required to transport all resources up stairways, often against the flow of occupants evacuating the building.*
> >
> > *In response to your question then, a lift with an Emergency fire recall switch does form an essential part of our procedure. Should a lift fitted with such a switch not be connected to emergency power, this introduces an additional risk factor into firefighting tactics, that is, can we risk a power failure trapping firefighters and possible urgent resources in a lift? The risk will depend on the assessment of the incident and it is possible that the decision may be taken to carry resources up the stairs, with added delay in fire attack, however this would be countered by the fact that the building is sprinklered and that the sprinkler may control the fire for the 30-40 minutes needed to assemble resource."*

> The NZFS consider that the exclusion of an emergency power supply to the fireman's lift will result in a lower standard than that required by the acceptable solutions. As a consequence the design should be viewed as a performance based design and where any design proposed to remove or delete such a system the NZFS consider that it should be provided with an appropriate level of analysis and based on fact.

4.7 On 13 May 2010, I made a request to the NZFS for information about firefighters' use of such lifts to the NZFS, noting that the functional purpose of an emergency electrical power supply system for the lifts is to provide a backup power supply in the case that the local distribution is not available. It does not provide any back up for failure of the building's internal distribution network. It is used for the operation of the passenger lift. No other fire safety system relies on this emergency electrical power supply system for the lifts as a back up for loss of the primary power supply. I asked for the view of the NZFS on:

1) the value attributed to access a lift to transport firefighters and equipment within a building

2) the implications on firefighting if such a lift is not available.

4.8 The NZFS responded to my questions in an email dated 29 June 2010. The NZFS answered the questions with the same points as in the NZFS memorandum described in paragraph 4.6 and noted the extent of the risk increases significantly with building height. Additionally in response to question 1 noted 'a lift may also be used by firefighters to assist in the rescue of [people with disabilities] and waiting for assistance, or people injured in the fire'. In response to question 2, the NZFS also noted 'firefighters would possibly be unaware that the lift was not connected to emergency power' and 'There would be challenges to the rescue of [people with disabilities] or injured people in the absence of a lift'.

The draft determination

4.9 Copies of a draft determination were forwarded to the parties and the NZFS on 22 November 2010.

4.10 The applicant accepted the draft determination in a response dated 25 November 2010, and submitted minor clarifications of fact and detail.

4.11 The authority accepted the draft determination without comment in a response dated 7 December 2010.

4.12 In a response dated 24 December 2010, the NZFS submitted the following points:

- Where one fire safety system is removed, this needs to be compensated for by the addition of other safety systems to achieve an equivalent level of safety. This compensation … relies on a qualitative discussion of the compensating features not quantitative engineering analysis.
- Determination 2010/105 recognised the need for quantitative analysis. That determination noted (at paragraph 8.2) that the fire design supporting a building consent should (amongst other requirements) 'have sufficient documentation and references supporting any engineering assumptions and judgment, and demonstrate best practice design has been followed.'
- In NZFS' view, there has been insufficient documentation and references to support the engineering assumptions and judgement in the case of the building…'.

- There are a number of fire safety systems noted in [the draft determination (refer to paragraph 5.2)] as providing a range of fire safety systems and therefore mitigating factors. However in NZFS' view, all the fire safety systems specified would be required even if the building continued its previous use as an apartment block. Therefore, those systems do not contribute an *additional* level of safety to off-set the lack of emergency power supply. In [NZFS'] view, the emergency power supply is a life safety system, and if it is not provided, must be compensated by the addition of another fire safety system.
- … the impact of the lack of emergency power supply on the NZFS' operations in high rise buildings for fire fighting and for rescues has not been considered in the draft determination. Although fire fighting operations would be carried out whether or not the lifts were working, the absence of their use to assist in the rescue of (disabled) persons and the transport of equipment, would impact on the time required to access higher levels, that is above the ladder and aerial appliance height.
- One of the compensating features that is considered relevant is the voice messaging system to support a phased evacuation system. Previous determinations have given no weight to these systems … In addition, the voice messaging system is required by the acceptable solutions for a building of this height and type of building use, and therefore cannot be considered to be an additional compensating factor.
- The other compensating features listed in the draft determination, such as lower occupant numbers, lower travel distances, and more robust fire separations have been considered acceptable in terms of offering an equivalent level of fire safety, but without any engineering analysis.

5 The fire safety report by the applicant's fire engineer

5.1 In the fire safety report dated 6 October 2009, the applicant's fire engineer ("the fire engineer") made the following points:

- … a fire safety system design in accordance with [C/AS1] is deemed to comply with the Building Code. But that is not to say that the compliance document necessarily prescribes a minimum solution for that compliance.
- An alternative solution is proposed which compares the cost of C/AS1 compliance, the fire safety benefits of C/AS1 compliance and the fire safety benefits of the alternative solution (including the benefit of the additional fire safety features provided in the building). …
- It is arguable whether the only requirement prescribed by C/AS1 that is not provided for this particular building provides any more than a theoretical improvement to the level of compliance with the fire safety performance requirements of the Building Code.
- In our opinion the lack of a feature proposed by C/AS1 which does not appear to offer at least a minimum actual level of improvement in [firefighter] operations does not diminish extent of compliance with the performance requirements of the Building Code to an extent which justifies the cost and sacrifice associated with retrofit of [an emergency electrical power supply system for the lifts] into the existing structure.

5.2 With respect to the proposed alternative solution, and the basis for its design, compared with the C/AS1 requirements, the fire engineer noted the following points:

- the building has the important features to facilitate firefighter operations

  > For the [building] it is relevant to note that the building is provided with an automatic sprinkler system, charged hydrant riser system, two fire isolated stairways enclosed predominantly in masonry construction and pressurisation of the safe path corridor to control smoke spread. …

- the building has a phased evacuation system so firefighters can control the evacuation process, and there will be improved signage to identify the individual stairs and levels, and specific instructions to occupants on the evacuation procedure

  > Another enhancement to the [building] is configuration of the fire evacuation system to provide phased evacuation, which minimises the number of civilian occupants using the corridors and stairs and allows the Fire Service to control the route and rate of occupant's evacuation. This is beneficial to [firefighters] because they can more fully utilise one of the stairs for [firefighter] access, with less concern about delaying civilian egress as they climb the stairs against the direction of civilian's descent. This means that [firefighters] can get to the staging floor sooner and start their search and rescue and [firefighting] operations sooner. …

- the building has more robust fire separations with higher fire resistance ratings enclosing the vertical escape paths and more robust fire separations between safe paths corridors and the apartments

  > The [building] is provided with masonry or concrete walls as fire separations enclosing both safe path stairways, and masonry walls between the corridor and the apartments on all levels. This exceeds the minimum robustness of construction (light framed walls with plasterboard lining) which could have been provided for compliance with C/AS1. The actual fire resistance rating of these concrete and masonry walls (minimum 90 [minutes] and 120 [minutes] for FRR for masonry and concrete walls) is greater than the minimum fire resistance level required by C/AS1. Therefore the building is already provided with a higher level of control against internal fire spread than a design constructed to meet the requirements of C/AS1.
  >
  > These passive fire separation barriers are able to be effective all the time (not just when there is loss of power to the building) and they provide a direct barrier to control fire spread.
  >
  > This is an improvement over the provision of an emergency power supply to the lifts, which offers a benefit for only a very limited time (i.e. in the event of fire and simultaneous loss of external power to the building) and the benefit is indirect because it provides an improvement to part of a system – fire fighting operations – which is co-dependent on actions of people to be effective.

- the building has its power supply located in a remote location to the building, and the emergency systems, including the lifts are routed through an emergency services switchboard, and the design includes an electrical schematic and physical location map for isolation points in the building so firefighters know where and how to isolate electrical power to a specific apartment, floor or floors, or the whole building as is necessary

  > The transformer that supplies this building is located in the next door building (i.e. in a separate firecell). This means that if there is a fire in the [building], the power supply is protected because of its remote location in another building. It also means that if there is a fire in the transformer then the fire can be confined to the building next door which is fire separated from the [building], so the occupants in the [building] will not be under threat from fire and will not be required to evacuate. This arrangement in the [building] is uncommon … - usually the transformer is located in the same building that it serves, increasing the likelihood that a fire associated with the transformer could have the combined effect of spreading fire into the building and also cutting off power supply to the building.

> As part of the [proposed building work] for the change to a SA purpose group, the main incoming power supply is separated at entry to the building, so that emergency systems are powered through a separate emergency services switchboard. This allows isolation of the power to the building (or loss of power to the main power supply switchboard) without affecting power to emergency systems. The lifts are provided with power supply via this emergency services switchboard. This is consistent with the intended performance of NZS 6104[5] with respect to separation of supply to emergency service control panels.
>
> The [supply and exhaust fans for the exitway pressurisation system and the lift that would be used by [firefighters] in a fire emergency] are to be served by a separate power supply for the essential services switchboard. This is independent from the main power supply and switchboard for the building, so that power supply to the building can be isolated by [firefighters] if necessary without interrupting power supply to essential fire safety systems.

6 The expert's report

6.1 As stated in paragraph 1.7, I commissioned a fire safety engineer ("the expert"), who is a chartered professional engineer and a registered fire safety engineer, to assess the Building Code compliance of the proposed alternative solution. The expert provided me with a report dated 14 April 2010.

General

6.2 The expert was of the view that a cost benefit analysis is a reasonable means to assist in evaluating the as nearly as is reasonably practicable test.

6.3 The expert noted that the Fire Advisory Task Force[6] recommends '… the IFEG be supported as the basis for all fire engineering design work' and the IFEG states in paragraph 1.2.9.2 'In the majority of cases the complexity of the non-compliance issues will require a quantitative approach'.

6.4 The expert stated:

> The cost benefit analysis as presented in incomplete as only a subjective description of the benefit is presented. The significance of the departure is such that I believe a quantitative justification is necessary. To that end, I do not think that Building Code compliance has been demonstrated. Having said this, the [Department] is better placed to judge when a quantitative approach is required or where a qualitative argument would suffice.

Potential quantitative approach for a cost benefit analysis

6.5 The expert explained a quantitative approach could be undertaken as follows:

> 1. The first step is to have a cost and benefit expressed in the same units of measurement. This necessitates a method for translating nonmonetary consequences – notably deaths and injury – into monetary equivalents for the purpose of analysis.
> 2. Assigning a monetary value to life or injury is a highly controversial subject. A robust argument would have to be presented with references to published work of high credibility. …
> 3. I would also caution against reliance on such values from, for example, the transportation sector. The tolerance of risk of injury or death from a high-rise accommodation building fire is different than the tolerance of risk from a traffic accident. The monetary values are not comparable. …

[5] NZS 6104: Specification for emergency electricity supply in buildings
[6] IPENZ "Hot Topics – Fire Engineering Advisory Taskforce Report and Recommendations" 2007

4. Having established and agreed on an estimate of monetary value for the benefit per life (or injury) an estimate can be made of the frequency of death or injury over the life of the building due to the differences in systems.

5. The above approach could become quite involved and given the uncertainty of input data may yield a solution with wide (poor) confidence intervals. A simpler approach may be to reverse the problem. Presented with the cost of the 'additional' work and a monetary value for life or injury 'saved' apply a safety factor and calculate a critical frequency and structure an argument as to whether the 'addition' of emergency power would yield the critical frequency.

Conclusions

6.6 The expert concluded that it was his view that Building Code compliance has not been adequately demonstrated as the cost benefit analysis presented in the building consent application is incomplete. The expert noted this conclusion was based on his view that the departure from C/AS1 was highly significant and therefore a quantitative justification to support the cost benefit analysis was the most appropriate method of demonstrating Building Code compliance.

The applicant's response to the expert's report

6.7 In response to the expert's report, the applicant, by way of the fire engineer noted the following:

- the report approaches the issue from the point of view that the building requires an emergency electrical power supply system for the lifts
- the report does not acknowledge that the building is compliant without this feature for both the current use and proposed use to all but the top six storeys
- the report places significant emphasis on assessing life safety and associated risk, however, the lift is not used by civilians as they are actively discouraged from using the lift in the event of fire, so there is no obvious connection between providing a emergency electrical power supply system
- the report does not acknowledge the compensating features provided in the building, for improving both life safety and fire fighting operations.

7 The alternative solution framework

7.1 The relevant provisions of C/AS1 amount to a means of compliance with the performance requirements of Clauses C of the Building Code.

7.2 One way of evaluating compliance with the Building Code is to compare the design against the Acceptable Solution. In comparing a proposed alternative solution with an Acceptable Solution, it is useful to bear in mind the objectives of the relevant Building Code clauses. The approach in determining whether the design complies with Clauses C2 and C3 of the Building Code is to examine the design features that are intended to facilitate firefighter operations.

7.3 I note that in Determination 2004/5, the antecedent of the Department, the Building Industry Authority ("the Authority") said:

> As for the proposed alternative solutions, the Authority's task is to determine whether they comply with the performance-based Building Code. In doing so, [the BIA] may use the Acceptable Solution as a guideline or benchmark.[7]

[7] Auckland City Council v NZ Fire Service [1996] 1 NZLR 330

The Authority sees the Acceptable Solution C/AS1 as an example of the level of fire safety required by the Building Code. Any departure from the Acceptable Solution must achieve the same level of safety if it is to be accepted as an alternative solution complying with the Building Code.

As it has in several previous determinations, the Authority makes the following general observations about Acceptable Solutions and alternative solutions:

(a) Some Acceptable Solutions cover the worst case so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the Building Code.

(b) Usually, however, when there is non-compliance with one provision of an Acceptable Solution it will be necessary to add some other provision to compensate for that in order to comply with the Building Code.

The process by which an Acceptable Solution is changed is set out in section 49 of the Building Act [1991] and involves widespread consultation. Therefore, no matter how strong the arguments a party to a determination advances to justify an alternative solution providing a lower overall level of safety in the particular building concerned, those arguments cannot be accepted for the purposes of the determination. The Authority is mindful of the following passage from the decision in a case[8] concerning the interpretation of the expression "low probability" in Clause B1 of the Building Code:

> 'It is tempting to say that [a risk that does not have a low probability] is a risk that a reasonable and responsible contractor or engineer would not take having regard to the object of protecting property, but that might be to re-write the Building Code. The Code is intended to set the standard for those in the building industry, not the other way round.'

7.4 With respect to this argument, in Determination 2005/109, the Department went on to say:

> In the light of those comments, I accept the Authority's reference to "the worst case" is too broadly worded in an application of this type. A better formulation would be
>
> (a) Some Acceptable Solutions cover the worst case of a building closely similar to the building concerned. If the building concerned presents a less extreme case, then some provisions of the Acceptable Solution may be waived or modified (because they are excessive for the building concerned) and the resulting alternative solution will still comply with the Building Code.
>
> (b) Usually, however, when there is non-compliance with one provision of an Acceptable Solution, it will be necessary to add some other provision or provisions in order to comply with the Building Code.

7.5 In summary, in evaluating the design as submitted I need to compare the levels of fire safety achieved in the design across the relevant provisions of the Building Code and confirm (or otherwise) whether equivalence has been achieved, giving due regard to the abovementioned guidelines.

8 Discussion

8.1 An emergency electrical power supply system for the lifts provides an emergency power supply to the building in the event of loss of the main power supply at the same time as a fire within the building.

[8] Auckland City Council v Selwyn Mews Limited and Ors 18/6/2003 DC Auckland CRN 2004067301-19

8.2 While the relationship is not clear between this particular requirement of C/AS1 and a particular performance requirement of the Building Code, I note that the Building Code requires buildings to contain a range of important protections for firefighters. The requirements of Clauses C2 and C3 relating to means of escape and spread of fire require buildings to meet certain levels of performance in respect of those matters so firefighters can undertake firefighting activities.

8.3 The performance criteria in Clause C2 require buildings to have means of escape from fire that allow fire service personnel adequate time to undertake rescue operations (Clause C2.2(b)). The objective is to facilitate fire rescue operations (Clause C2.1(b)). Clause C2 is limited to the role of fire service personnel undertaking rescue operations and does not include firefighters protecting property.

8.4 The performance criteria in Clause C3 require buildings to have safeguards against fire spread so firefighters may undertake rescue operations and protect property (Clause C3.2(b)). The objective is to provide protection to fire service personnel during firefighting operations (Clause C3.1(b)). In particular, the performance criteria in Clause C3.3.9 require fire safety systems to facilitate the specific needs of fire service personnel to carry out rescue operations and control the spread of fire.

8.5 There are also some more general provisions in the Act that are relevant to the Building Code requirements for the protection of firefighters. Section 16 of the Act requires all buildings to comply with the functional requirements and performance criteria in the Building Code in their intended use. That term "intended use" is defined in section 7 and includes "activities undertaken in response to fire". Thus, buildings must comply with the functional requirements and performance criteria in relation to activities in response to fire.

8.6 While I have considered the analysis of the expert, I also note his view that 'It could be argued that whilst the detail is complex, the overall issue is not and is therefore possible to justify qualitatively.' I am of the view that a qualitative approach is appropriate in this case although this needs to be informed by a relative quantification where possible. I have therefore compared the levels of fire safety achieved in the design across the relevant provisions of the Building Code, and overlaid on this some informed views I have formed as to the significance of each in terms of benefits.

8.7 In order to comply with the Acceptable Solution C/AS1, a multi-unit SR Sleeping Residential purpose group building with escape height over 58 metres requires the following fire safety systems:

- Type 7e – an automatic fire sprinkler system with smoke detectors and manual call points
- Type 13 – pressurisation of safe paths
- Type 15 – Fire Service lift control
- Type 16 – visibility in escape routes
- Type 18 – fire hydrant system
- Type 20 – fire systems centre.

8.8 In order to comply with the Acceptable Solution C/AS1, a SA Sleeping Accommodation purpose group building with escape height over 58 metres requires the fire safety systems listed in paragraph 8.7 for the SR Sleeping Residential purpose group building, and in addition:

- Type 8 – a voice communication system
- Type 9 – a smoke control in air handling system
- Type 17 – an emergency electrical power supply.

8.9 The proposed alternative solution differs from one complying with C/AS1 in that it whilst it includes a voice communication system (type 8) and a smoke control in air handling system (type 9), it does not have an emergency electrical power supply system (type 17) for the lifts, although the other emergency systems are provided with emergency electrical power supply systems.

8.10 The fire safety report describes the fire safety features in detail and the basis of the design of the building as a part of the proposed alternative solution. From the fire safety report, I have identified the following types of fire safety features:

- features that contribute to the conservatism of the design
- compensating features, or enhancements in addition to the requirements of C/AS1 that can be considered as compensating features.

8.11 I have rated the fire safety features that I have identified as contributing to the conservatism of the design, and the fire safety features that I consider as compensating features as 'very significant', 'significant', and 'somewhat significant' in terms of their approximate contribution in providing benefits for fire fighting operations in the building (refer to paragraphs 8.10 to 8.14).

8.12 The proposed alternative solution is conservative in that:

- it is sprinkler protected (very significant)
- it has two stairs providing means of escape (significant).

8.13 The proposed alternative solution also has the compensating features of:

- a relatively low occupant load (12 to 14 people per floor) (somewhat significant)
- low dead end open path travel distances (somewhat significant).

8.14 The proposed alternative solution also includes the following enhancements in addition to the requirements of C/AS1, which may be considered as compensating features:

- more robust fire separations with higher fire resistance ratings than required by C/AS1 to the vertical escape paths and between safe path corridors and the apartments (significant)
- a phased evacuation system, so firefighters can control the evacuation process, which allows the selection of the egress route, and specific instructions to occupants on the evacuation procedure and improved signage to identify the individual stairs and levels (somewhat significant)
- the main power supply located in a location remote to the building (somewhat significant)

- the emergency fire safety systems, including the lifts, routed through an emergency services switchboard (somewhat significant)
- an electrical schematic and physical location map so isolation points in the building can be easily identified (somewhat significant).

8.15 I note that there are other fire safety features called up by C/AS1 that are included in the design for this building that provide for fire fighting operations in the building.

8.16 I consider that the fire safety features with a significant rating (two stairs providing means of escape, more robust fire separations with higher fire resistance ratings than required by C/AS1 to the vertical escape paths and between safe path corridors and the apartments) will provide a degree of enhanced benefits of an order of magnitude of at least two when compared to the somewhat significant fire safety features.

8.17 I also believe that the fire safety feature with a very significant rating (sprinklers) will provide a degree of enhanced benefits of an order of magnitude of at least three when compared to the somewhat significant fire safety features.

8.18 Further, I am of the view that it is necessary to view the proposed alternative solution, which it does not have an emergency electrical power supply system for the lifts, in the context of the very low probability of a loss of power supply occurring simultaneously with a fire of a size and location which would compel the firefighters to consider using the lift.

8.19 Therefore, taking into account:

- the overall magnitude of the compensating features and enhancements
- the conservative nature of C/AS1 in this instance
- the very low probability of a power supply failure

I am of the view that that the proposed alternative solution will result in the building having sufficient features in terms of protecting fire fighters and providing benefits for fire fighting operations that comply with the performance requirements of the Building Code.

9 The decision

9.1 In accordance with section 188 of the Act, I determine the proposed alternative solution complies with the Building Code, in that the design provides an adequate compensation for the lack of a type 17 emergency electrical power supply system for the lifts.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 11 January 2011.

John Gardiner
Manager Determinations

Appendix A: The relevant legislation and the Acceptable Solution

A1 The relevant section of the Building Act is:

Clause C2 – Means of escape

C2.1 The objective of this provision is to:
(a) Safeguard people from injury or illness from a fire while escaping to a safe place
(b) Facilitate fire rescue operations.
C2.2 Buildings shall be provided with means of escape from fire which:
(a) Give people adequate time to reach a safe place without being overcome by the effects of fire, and
(b) Give fire service personnel adequate time to undertake rescue operations.
C2.3.1 The number of open paths available to each person escaping to an exitway or final exit shall be appropriate to:
(c) The travel distance,
(d) The number of occupants,
(e) The fire hazard, and
(f) The fire safety systems installed in the firecell.
C2.3.2 The number of exitways or final exits available to each person shall be appropriate to:
(a) The open path travel distance,
(b) The building height,
(c) The number of occupants,
(d) The fire hazard, and
(e) The fire safety systems installed in the building.
C2.3.3 Escape routes shall be:
(a) Of adequate size for the number of occupants,
(b) Free of obstruction in the direction of escape,
(c) Of length appropriate to the mobility of the people using them,
(d) Resistant to the spread of fire as required by Clause C3 “Spread of Fire”,
(e) Easy to find as required by Clause F8 “Signs”,
(f) Provided with systems for visibility during failure of the main lighting, as required by Clause F6 “Visibility in escape routes”, and
(g) Easy and safe to use as required by Clause D1.3.3 “Access Routes”.

Clause C3 – Spread of fire

C3.1 The objective of this provision is to:
(a) Safeguard people from injury or illness when evacuating a building during fire.
(b) Provide protection to fire service personnel during firefighting operations.
…
C3.2 Buildings shall be provided with safeguards against spread of fire so that:
(a) Occupants have time to escape to a safe place, without being overcome by the effects of fire,
(b) Firefighters may undertake rescue operations and protect property,
…
C3.3.9 The fire safety systems installed shall facilitate the specific needs of fire service personnel to:
(a) Carry out rescue operations, and
(b) Control the spread of fire.

A2 The relevant sections of the Acceptable Solution C/AS1 are:

Table 4.1

Table 4.1: Fire Safety Precautions
Key to table references

Part 3	Paragraphs 3.1.5, 3.13.1 and 3.19.2
Part 4	Paragraphs 4.3, 4.3.1, 4.3.3, 4.4.1, 4.5.2, 4.5.3, 4.5.4, 4.5.7, 4.5.8, 4.5.9, 4.5.10, 4.5.13, 4.5.14, 4.5.15, 4.5.19
Part 5	Paragraphs 5.5.1, 5.6.6, 5.6.8, 5.9.4 (c)
Part 6	Paragraphs 6.2.1, 6.4.1, 6.7.1, 6.8.1, 6.8.5, 6.8.6, 6.10.1, 6.11.1, 6.15.1, 6.19.9, 6.21.2, 6.23.1 (d), 6.23.2, 6.23.3
Part 8	Paragraphs 8.2.1, 8.2.2, 8.2.3
Appendix A	Paragraphs A1.1.1 and A1.1.2

Fire safety precautions

Type	Description
1	Domestic smoke alarm system.
2	Manual fire alarm system.
3	Automatic fire alarm system with heat detectors and manual call points.
4	Automatic fire alarm system with smoke detectors and manual call points.
5	Automatic fire alarm system with modified smoke/heat detection and manual call points.
6	Automatic fire sprinkler system with manual call points.
7	Automatic fire sprinkler system with smoke detectors and manual call points.
8	Voice communication system.
9	Smoke control in air handling system.
10	Natural smoke venting.
11	Mechanical smoke extract.
12	No Type 12 currently specified.
13	Pressurisation of safe paths.
14	Fire hose reels.
15	Fire Service lift control.
16	Visibility in escape routes.
17	Emergency electrical power supply.
18	Fire hydrant system.
19	Refuge areas.
20.	Fire systems centre.

Special applications

a Not required where:
- i) the *escape routes* serve an *occupant load* of no more than 50 in *purpose groups* CS (excluding *early childhood centres*), CM, WL, WM, WH and WF, or
- ii) the *escape routes* are for *purpose group* SA and serve no more than 10 beds, (or 20 beds for trampers huts, see Paragraph 6.20.6), or
- iii) exit doors from *purpose group* SA and SR *firecells* open directly onto a *safe place* or an external *safe path* (see Paragraph 3.14).

b Where only a single *escape route* is available, no less than a Type 4 alarm is required. See Paragraph 3.15.3 for situations where sprinklers are required.

c Required where Fire Service hose run distance, from the Fire Service vehicular access (see Paragraph 8.1.1) to any point on any floor, is greater than 75 m.

e The smoke detection element is Type 5 within *firecells* containing sleeping accommodation. (See Appendix A for description of Type 5.)

f A direct connection to the Fire Service is not required provided a telephone is installed and freely available at all times to enable 111 calls to be made.

Note:
The numbered references are more fully explained in Appendix A. Throughout Table 4.1 dark shading identifies where sprinklers are required.

Table 4.1/5

Table 4.1/5: Fire safety precautions for sleeping purpose group firecells
Occupant load 40 maximum

Purpose Group	FHC	Escape height: 0 m (or single floor)	<4 m (or two floors)	4 m to <10 m	10 m to <25 m	25 m to <34 m	34 m to <46 m	46 m to <58 m	over 58 m
SC	1	F0	F30	F30	F30	F30	F45	F45	F60
SD		7 16 18c	7 16 18c	7 16 18c	7 9 15 16 18	7 8 9 13 15 16 18 20	7 8 9 13 15 16 18 20	7 8 9 13 15 16 18 20	7 8 9 13 15 16 17 18 19 20
SA (Note 5)	1	F0	F45	F45	F45	F30	F45	F45	F60
		5af 16 18c	5f 16 18c	5 14 16 18c	5 14 15 16 18	7e 8 9 15 16 18	7e 8 9 13 15 16 18 20	7e 8 9 13 15 16 18 20	7e 8 9 13 15 16 17 18 20
SR (Note 7)	1	F0	F45	F45	F45	F30	F45	F45	F60
		1 16	1 2af 16	1 2f 16	5 14 16 18	7e 15 16 18	7e 15 16 18	7e 15 16 18 20	7e 13 15 16 18 20
Column		1	2	3	4	5	6	7	8

Notes:

1. **Use of table:** Refer to Paragraph 4.4 for instructions on using this table to determine the *fire safety precautions* in *firecells*.
2. **Adjoining firecells having a F0 rating:** Paragraph 6.2.1 requires adjoining *firecells* to be separated by *fire separations* with *FRR* no less than 30/30/30.
3. **Intermediate floors:** Where a *firecell* contains *intermediate floors* a *FRR* shall apply to the *intermediate floors* and supporting elements, and smoke control systems Type 9 and either Type 10 or Type 11, are required (see Paragraphs 4.5.16 to 4.5.18, 6.14.3 and 6.21.5 to 6.22.14).
4. **Car parking:** Refer to paragraphs 6.10.3 to 6.10.6 for car parking provisions within *buildings*.
5. **Sprinklers:** *Purpose group* SA may have an *occupant load* up to 160 beds in *firecells* with a Type 7 alarm (see Paragraph 6.7.2).
6. **Occupant load in SC and SD firecells:** The *occupant load* in a *group sleeping area firecell* is limited to 12 or 20 beds and in a *suite* to six beds (see Paragraphs 6.6.3 to 6.6.5). For *firecells* (such as an operating theatre) required to remain occupied during a *fire*, see Paragraphs 5.6.8 and 5.6.9.
7. **SR household units:** See Paragraph 6.8.6 which describes where *household units* containing upper floors may be treated as single floor *firecells*.
8. **Visibility in escape routes:** is specified in NZBC Clause F6.