



New Zealand Historic Places Trust Pouhere Taonga
Sustainable Management of Historic Heritage Guidance Series

Fire Safety and Heritage Places



25 June 2012



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Fire safety and heritage places

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Status: New guide.

This document is a new guide proposed for inclusion within the *Sustainable Management of Historic Heritage Guidance Series* (the guidance series) published by the NZHPT. The series aims to assist local authorities, owners of heritage places, iwi and hapū and other stakeholders in the protection and conservation of historic heritage under the *Resource Management Act 1991* (RMA) and other related resource management and planning legislation.

This guide is an update on the 2000 NZHPT publication *Guidelines for Fire Safety* (authored by Carol Caldwell and Hamish MacLennan). This guide differs from the earlier 2000 guide by focusing on giving links to other guidance sources, updated legislative provisions and providing objectives and policies for fire safety work relating to heritage places. While some of the legislative and building code information in the earlier 2000 guide has been superseded, that version remains a valuable source of information about fire safety and heritage buildings.

Comments and feedback can be provided to the NZHPT about this guide. Please send comments to:

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Cover photos left to right:

Fire at former Southdown Meatworks. Photo, NZFS Auckland Operational Support Unit

Former Mercy Convent, Reefton (registered Category II historic place). At the time of this photo (2006), the Convent had been damaged by fire. Another fire, on 11 September 2007, completely destroyed the building. Photo, NZHPT

Designed by Richard Roberts, Touch Design Ltd, Wellington

1. Introduction

Damage caused by fire is the greatest worldwide threat to heritage places. Many heritage places are destroyed every year as a result of fires.¹ Fire safety² aims to protect both people and property from fire.

Fire safety ensures heritage places are safeguarded from fire and remain useful for present and future generations. Maintaining continuity of use or new uses ensures places retain liveability and utility. The process of change is called adaptation which means to modify a place to suit it to a compatible use, involving the least possible loss of cultural heritage value.³

The term 'building' in this document has the same meaning as the definition of building under the *Building Act* 2004 which includes a range of temporary and fixed structures

While recognising the diversity of heritage places, from a farm hut to a major commercial building, the NZHPT considers all of them should have some basic fire safety measures. These will include:

- ▶ Evacuation and escape plans.
- ▶ Smoke detectors and alarm systems.
- ▶ Sprinkler systems.
- ▶ Fire extinguishers.

In addition, heritage places should have adequate insurance, security measures to protect against break-in and arson, and should be smoke-free properties.

In rural, parkland and forested areas, heritage places should be protected against wildfire.

Marae require special attention to ensure that fire safety measures are culturally appropriate and designed to respect the heritage and cultural values of the place.

This guide outlines objectives and policies for fire safety and heritage places in relation to:

1. Planning for fire safety.
2. Achieving fire safety.
3. Protection from wildfire.
4. Conservation of heritage places.

Maximising fire safety in a historic place will involve the evaluation of a range of options and the adoption of a fire engineering design to achieve the most appropriate solution. In this way, fire safety can be achieved with the least impact on historic fabric.

This guidance is non-statutory and is not intended to be a substitute for any of the mandatory fire safety legislative or the NZ Building Code (the Building Code) requirements. This document will, however, assist in setting fire safety design objectives

1 NZ Fire Service and NZHPT, *Protecting and Preserving what we Value*, February 2005.

2 For the purpose of this guide, 'fire safety' means design documentation, measures and building work to improve fire safety.

3 ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value, 2010.

for heritage places which may also help in demonstrating compliance with Building Code requirements.

This guidance aims to provide links to other available sources of information and help, especially publications prepared by the NZ Fire Service, the Institution of Professional Engineers (IPENZ), Standards NZ, the US National Fire Protection Association (NFPA) and the Australian heritage agencies.

2. Fire heritage issues

2.1. Background

Archaeological authority process under the Historic Places Act 1993

All pre-1900 archaeological sites are protected under the *Historic Places Act 1993*. An archaeological authority is required from the NZHPT to destroy, damage or modify an archaeological site

If fire safety work requires excavations around the foundations of a pre-1900 building, an archaeological authority may be required from the NZHPT

Further information about the archaeological authorities can be obtained by contacting the NZHPT:
www.historic.org.nz

Fire may be caused by natural events, arson, electrical faults, repair works (for example, hot work), poor house-keeping or carelessness. The damage caused by fire can be substantial, resulting in partial or complete demolition.⁴

Fire safety is essential for all places in New Zealand, especially heritage places. For most buildings, fire safety will involve evacuation and escape plans, smoke detectors, sprinkler systems and fire extinguishers. Commercial and public buildings will have a greater level of fire safety design, such as the use of fire safety plans, fire alarms, signage, training and other measures.

The NZHPT's advocacy advisory service receives public inquiries on a daily basis about fire safety issues and heritage buildings. Evidence suggests that heritage building owners are taking a greater interest in ensuring fire safety with large numbers of proposals for smoke detectors and sprinklers.

While most heritage places are well maintained, occupied and in good condition, some have been abandoned and are subject to 'demolition by neglect'. These places are most at risk from vandalism and fire damage.⁵ Ensuring a place is adapted for continued use and occupation is critical to reduce the risk of fire.

Heritage information maintained by emergency services is an important aspect of fire safety management. In the United Kingdom, the Fire Research Database has been developed to provide improved information for fire fighting operations at heritage places and better reporting and statistics on heritage-related fires. This means that data about heritage properties is readily available to fire brigades in call-out situations.⁶

It is recommended that fire safety advice be sought from the NZ Fire Service when undertaking a historic building project. The local NZ Fire Service should be notified of the

⁴ NZ Fire Service and NZHPT, *Protecting and Preserving what we Value*, February 2005

⁵ See, NZHPT, *Sustainable Management of Historic Heritage Guidance Series*, Discussion Paper No. 6, 'Heritage at risk: Demolition by neglect of historic heritage in New Zealand', August 2007

⁶ Mike Coull, 'Data Projection', *Fire Risk Management*, February 2008, pp 26–29; www.english-heritage.org.uk/professional/research/buildings/fire-research-database/background/



Lake Kohangapiripiri, East Harbour Regional Park, Lower Hutt

Photo, DOC

Many heritage places are vulnerable to the threat of wildfire

At Lake Kohangapiripiri, there are ancient dendroglyphs (tree carvings) recorded as archaeological sites that could be lost forever by wildfire

Langford's Store, Bainham

Photo, Helen Evens

location and particular features of historic heritage in their area, and special features of these places such as artefact collections and fire safety measures such as sprinklers.

The threat of wildfire is an important issue in both urban and rural environments. In Australia and the USA, wildfires have posed a particular threat to heritage places. In New Zealand, many heritage properties, especially in the rural environment, contain physical historic structures in a setting often occupied by both formal gardens and indigenous/exotic forests. The bush and garden setting is often a particularly important value associated with rural heritage places.



Fire, Building Codes and Heritage Buildings

The threat of fire has had a substantial influence on building design for centuries. Following the fire of Rome of A.D.64, Emperor Nero introduced one of the earliest building codes for fire with a requirement for construction in brick and concrete. Also in Roman Britain some of the earliest planned towns were constructed to mitigate fire risk as at Verulamium in A.D.155 where stone houses were built spaced further apart to prevent fire damage.⁷ In New Zealand, building codes to safeguard against fire were developed from the early 1840s and during the 1860s fire-safety related building codes ensured the construction of buildings with external masonry walls (i.e. brick or stone) in the centre of the major towns and cities.⁸ A large number of New Zealand's unreinforced masonry buildings (URM) were constructed between 1870 and 1931 as influenced by these building codes. Despite, the dominance of masonry construction in the town centres, New Zealand has retained many significant timber buildings. In the Tasman District, for example, it is estimated that 75% of the non-residential listed heritage buildings are timber-framed. The protection of these buildings from fire is of high importance.

⁷ Patricia Southern, *Roman Britain, A New History 55BC–AD 450*, Amberley Publishing, 2011, p156.

⁸ Nigel Isaacs, 'Early New Zealand Building Codes', *CHS Magazine*, December 2011.

Heritage places can present special challenges for the development of fire safety provisions. There are two main challenges:

1. Fabric and materials that are integral to the construction of a heritage building may be highly combustible material or without sufficient fire-resistant barriers.
2. The design and installation of fire safety-related work that may adversely impact upon heritage values.



Fire destroys Kaikoura Courthouse (registered Category II historic place)
24 August 2010

Photo,
www.google.com/images

With regard to the impact of fire safety-related work on heritage values, the most common issues involve:

- ▶ Damage as a result of means of escape requirements, including egress requirements for people with disabilities. This is often a particular issue for historic marae.
- ▶ The installation of handrails and other items required for means of escape that may be inappropriate for significant heritage fabric and spaces.
- ▶ Potential damage to the surroundings associated with a heritage building as a result of paths and refuge areas for means of escape or requirements to achieve NZ Fire Service vehicular access.
- ▶ The removal and/or installation of doors (or upgrading of door panels) in relation to escape route provisions and fire resistance ratings (FRR).⁹
- ▶ The installation of lighting for emergencies which may be inappropriate with regard to significant heritage fabric or spaces.¹⁰
- ▶ Poor fire resistance rating in relation to primary building elements, material (including interior surface finishes and collections) and insulation requiring the removal of significant heritage fabric.¹¹
- ▶ Risks associated with open fires and the removal of open fires of heritage value.
- ▶ Appropriate design and installation of fire suppression systems, including automatic fire sprinkler systems.

While these issues present formidable challenges for fire safety and heritage places, the NZHPT considers that these challenges can be overcome by the development of appropriately designed fire safety that takes into account the heritage values of the place. This strategic approach is outlined in detail in guidelines prepared by Opus International for the NZ Fire Service Commission – *Guidelines for Identifying and Preventing Fire Risks to Heritage Buildings and Collections*.¹² These guidelines highlight the need for informed planning for fire safety with the use of risk management processes, a fire safety plan as part of a conservation plan, fire response plan and recovery planning. The value of the strategic approach is outlined by Richard Forrest:

As part of the development of a fire plan strategy for any historic or listed building, the definition of risk, occupiers' priorities and conservation issues are paramount.

⁹ English Heritage, *The use of intumescent products in historic buildings*, Guidance Note, May 1997.

¹⁰ Robin Wright, *Emergency Lighting*, The Building Conservation Directory, Cathedral Communications, 2002.

¹¹ NSW Heritage Council, *The Fire Resistance of Ceiling/Floor Systems Commonly Found in Heritage Buildings*, Technical Information Sheet, 2002.

¹² Opus Consulting Ltd, *Guidelines for Identifying and Preventing Fire Risks to Heritage Buildings and Collections*, NZ Fire Service Commission Research Report, November 2004: <http://www.fire.org.nz/Research/Publishsed-Reports/Pages/Guidelines-for-Identifying-and-Preventing-Fire-Risks-to-Heritage-Buildings-and-collections.aspx>

The fire strategy consists of various contributory elements including the natural or existing building features and the degree to which more onerous passive upgrading can be offset by the introduction of active protection measures ... any alterations to the original fabric which are unavoidable should be reversible, allowing the element affected to be returned to its original condition.¹³

Not all building owners will be able to afford a comprehensive fire safety plan or be in a position to prepare a conservation plan which includes a fire risk assessment. For these places, fire safety work should be guided by the principles outlined in this document and advice from the NZ Fire Service, local authorities, the NZHPT or a specialist fire engineer.

3. Legislative framework

3.1. Building Act 2004

The *Building Act 2004* (the Building Act) regulates all building work in New Zealand. Building work involving alterations for fire safety would be classified as ‘building work’ under this Act.

The Building Act contains a number of provisions related to fire safety. Importantly, the purpose of the Building Act means that, in exercising functions under the Building Act, building consent authorities need to ensure that buildings are safe and “people who use a building can escape from the building if it is on fire.”¹⁴ Further, buildings are to be designed, constructed and able to be used in ways that promote sustainable development.¹⁵

Fire safety and sustainable development are critical principles for the design, maintenance and management of heritage places.

Section 4 of the Building Act also contains a number of principles to be applied in performing functions or duties, or exercising powers, under it. These principles, which must be taken into account, apply to the Minister and Chief Executive responsible for the administration of the Building Act¹⁶ and territorial and regional authorities.¹⁷ The principles cover matters relating to household units, preventing harmful effects, durability, building costs, standards, innovation, protection of other property, efficient use of energy and water, and waste reduction. Of particular relevance to fire safety and heritage are:

Always seek advice from the appropriate building consent authority before starting any fire safety-related work on a heritage building

¹³ Richard Forrest, ‘Strategic Fire Protection in Historic Buildings’ *The Building Conservation Directory*, 1996, p 5.

¹⁴ Section 3(c), *Building Act 2004*.

¹⁵ Section 3(d), *Building Act 2004*.

¹⁶ From 1 July 2012, responsibility for the *Building Act 2004* will be under the new Ministry of Business, Innovation and Employment (MBIE).

¹⁷ The principles only apply to territorial and regional authorities when they are performing functions or duties, or exercising powers, in relation to the grant of waivers or modifications of the building code and the adoption and review of policy on dangerous, earthquake-prone, and insanitary buildings or, as the case may be, dangerous dams (section 4(1), *Building Act 2004*).

(d) the importance of recognising any special traditional and cultural aspects of the intended use of a building.

(h) the reasonable expectations of a person who is authorised by law to enter a building to undertake rescue operations or fire fighting to be protected from injury or illness when doing so.

(i) the need to provide protection to limit the extent and effects of the spread of fire, particularly with regard to: (i) household units (whether on the same land or on other property); and (ii) other property.

(l) the need to facilitate the preservation of buildings of significant cultural, historical, or heritage value.

(n) the need to facilitate the efficient and sustainable use in buildings of: (i) materials (including materials that promote or support human health); and (ii) material conservation.

3.1.1 New Zealand Building Code

All new building work in New Zealand must comply with the Building Code prepared under the Building Act.

The Building Code is a performance-based code, which means it states how a building and its components must perform as opposed to describing how the building must be designed, constructed or altered.

Compliance documents contain details of acceptable solutions and verification methods that, if followed, mean that the part of the building that relates to the Compliance Document will comply with the Building Code. New Building Code clauses for protection from fire (C1-C6) have been issued by the Government (see text box on page 9).

Depending on the nature of the work, other Building Code Clauses may be relevant such as F4 Safety from Falling, F6 Visibility in Escape Routes (previously titled Emergency Lighting) and F8 Signs.

What must be remembered is that the Building Code describes the minimum provision that must be made for new building work. When planning the extent of the new building work associated with alterations all conceivable provisions should be considered before deciding on what is appropriate and possible.



Fire at No. 389 Princes Street, Dunedin.

Fire damaged the listed heritage building at No 389 Princes Street on 17 August 2011.

The *Otago Daily Times* reported that the fire gutted an apartment above the second-hand bookstore, Raven Books. It was also reported that alterations for the apartment had not been consented and there had been no record of any major work on the building since 1919

Source, *Otago Daily Times*, 18 August 2011 (including photo)

New Building Code provisions for protection from fire

On 10 April 2012, the Government announced changes to a number of fire safety provisions of the Building Code. The changes are intended to simplify and clarify fire design while maintaining current standards of fire safety and make the consent and inspection process more straightforward.

The changes involve: protection from fire (Clause C); warning systems (Clause F7) and signs (Clause F8).

There are now six Building Code clauses for protection from fire (C1-C6) which aim to protect people in buildings, limit fire spreading to other buildings and help fire fighting and rescue. Compliance with the Building Code can be demonstrated using seven new acceptable solutions (C/AS1-C/AS7) or a new verification method (C/VM2). The seven acceptable solutions are for simple buildings without complex features or systems and are intended for use by building professionals who do not necessarily have specific fire engineering qualifications. The verification method can be used instead of the acceptable solutions or where the particular building is outside of the scope of the acceptable solutions. It provides for designs that are potentially creative or flexible by applying test or calculation procedures which must be used by design professionals with fire engineering expertise such as Chartered Professional Engineers.

The acceptable solutions are relevant for alterations and change of use to existing buildings, including heritage buildings. For example, C/AS1 the Acceptable Solution for Buildings with Sleeping (residential, Risk Group SH) states that Parts 2, 3, 4 and 6 of the acceptable solution shall be considered to the extent necessary for compliance with the *Building Act 2004* with regards to alterations. In terms of change of use, all parts of the acceptable solution shall be considered to the extent necessary for compliance with the *Building Act 2004*.

Where compliance with the Building Act for alterations and changes of use is not fully demonstrated through an acceptable solution, verification method C/VM2 shall be used.

A specific fire engineering design (other than C/VM2) is a design proposal (of all or part of a building) that complies with one or more of the requirements for protection from fire in the Building Code. Such a verification method may be proposed for a number of reasons, such as a new building that has unusual design features. This design constitutes an alternative solution and needs to be justified to, and approved, by the building consent authority as part of the normal building consent process.

The new Building Code clauses (C1-C6) are effective from 10 April 2012. Transitional arrangements allow the former Building Code Clauses C1-C4 to be used until 10 April 2013. Further information about the changes is available from the Ministry of Business, Innovation and Employment website.

As noted above, the NZHPT has published a separate guide to the Building Act as part of the *Sustainable Management of Historic Heritage Guidance Series*. This guide provides an explanation of matters such as heritage-related terms, project information memoranda and notification, building consents and general guidance for making changes to heritage places.¹⁸

3.1.2 Fire safety under the Building Act

Under section 46, copies of certain types of building consent applications must be provided to the NZ Fire Service Commission. These types of consent applications are listed in the New Zealand Gazette, Issue 49 1377, 3 May 2012. They are buildings (or parts of buildings) used for gatherings together of 100 or more people, employment for 10 or more people and accommodation for six or more people (other than in three or fewer household units). Other types of building consents include early childhood facilities, nursing, care and detention facilities. For these buildings, the consent application must also involve:

- ▶ Designs for new buildings using alternative solutions (not using an Acceptable Solution or Verification Method) to comply with any of the following Building Code clauses:
 - C1-C6 Protection from Fire (or C1-C4 Fire Safety, until 9 April 2013)
 - D1 Access routes
 - F6 Visibility in escape routes
 - F8 Signs.
- ▶ When waivers or modifications to any of the above Building Code clauses are required.
- ▶ Alterations, change of use or subdivisions that have a more than minor effect on fire safety systems.

There is some exclusion for internal fit-outs, single household units and outbuildings and the full list of consent applications can be obtained from the *New Zealand Gazette* website.¹⁹

The NZ Fire Service Commission may, within 10 working days after receiving a copy of the consent application, provide the building consent authority with a memorandum that sets out advice in terms of means of escape from fire and the needs of persons to enter the building to undertake fire fighting. These provisions are currently under review by the Government.²⁰

¹⁸ NZHPT, *Sustainable Management of Historic Heritage Guidance Series*, Guide No.6, 'Building Act 2004', August 2007

¹⁹ [http://www.dia.govt.nz/Pubforms.nsf/NZGZT/NZGazette49May12.pdf/\\$file/NZGazette49May12.pdf](http://www.dia.govt.nz/Pubforms.nsf/NZGZT/NZGazette49May12.pdf/$file/NZGazette49May12.pdf)

²⁰ Department of Building and Housing, *Cost-effective Quality: Next Generation Building Control in New Zealand*, Building Act Review Discussion Document, February 2010.

3.1.3 Alterations

Building work on existing buildings relating to fire safety will constitute an ‘alteration’ under the *Building Act 2004*. Under section 112(1) of the *Building Act 2004*, a building consent authority must not grant a building consent for the alteration of an existing building, or part of an existing building, unless the building consent authority is satisfied that, after the alteration, the building will—

- a. comply, as nearly as is reasonably practicable, with the provisions of the building code that relate to—
 - i) means of escape from fire; and
 - ii) access and facilities for persons with disabilities (if this is a requirement in terms of section 118); and
- b. continue to comply with the other provisions of the building code to at least the same extent as before the alteration

even if no other significant building work is being undertaken at the same time. All alterations to existing buildings must comply as nearly as is reasonably practicable with specific provisions of the Building Code.

Despite this requirement, there is some flexibility as a territorial authority, may allow the alteration of an existing building, or part of an existing building, without the building complying with provisions of the building code specified by the territorial authority. The territorial authority, however, must be satisfied that,—(a) if the building were required to comply with the relevant provisions of the building code, the alteration would not take place; and (b) the alteration will result in improvements to attributes of the building that relate to—(i) means of escape from fire; or (ii) access and facilities for persons with disabilities. For this provision to apply, the territorial authority needs to be convinced that the fire escape and access improvements outweigh any detriment that is likely to arise as a result of the building not complying with the relevant provisions of the building code.

3.1.4 Change of use

In addition to alterations, the Building Act regulates changes of uses of buildings. Change of use is described in Clause 5 of the *Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005* as meaning:

means to change the use (determined in accordance with regulation 6) of all or a part of the building from one use (the old use) to another (the new use) and with the result that the requirements for compliance with the building code in relation to the new use are additional to, or more onerous than, the requirements for compliance with the building code in relation to the old use.

Under section 114, in cases of change of use that involves the creation of new 1 or more household units, the territorial authority must be satisfied, on reasonable grounds, that the building, in its new use, will comply, as nearly as is reasonably practicable, with the building code in all respects.

For all other change of use cases, the territorial authority must be satisfied, on reasonable grounds, that the building, in its new use, will— (i) comply, as nearly as is reasonably practicable, with every provision of the building code that relates to either or both of the following matters:

A) means of escape from fire, protection of other property, sanitary facilities, structural performance, and fire-rating performance:

B) access and facilities for people with disabilities (if this is a requirement under section 118); and

ii) continue to comply with the other provisions of the building code to at least the same extent as before the change of use

It is noted that the provisions of the Building Act for waivers and alternative solutions only apply to new building work and Building Code compliance. For alterations and change of use, waivers and alternative solutions do not apply since the work does not require Building Code compliance. Instead, alterations or change of use must comply to a level that is as nearly as is reasonably practicable.

‘As nearly as is reasonably practicable’ – fire safety and heritage buildings

The Building Act requires an assessment of what is “nearly as is reasonably practicable” in terms of alterations and change of use of existing buildings, including heritage buildings. In 1996, the High Court has commented that a weighting exercise is involved and the “weight of the considerations will vary according to the circumstances and it is generally accepted that where considerations of human safety are involved, factors which impinge upon those considerations must be given an appropriate weight.”²¹ Factors such as the time, cost and practicability of fire safety measures are often called the ‘sacrifice’ necessary to eliminate the risk.

It is noted that the 1996 High Court judgement was made under the prior to the *Building Act 2004* and the recent changes in the Building Code for protection from fire.

Since all existing buildings are unique and constructed at different times and according to historic building requirements, an assessment is required on a ‘case by case’ basis after considering all the relevant matters. To the NZHPT’s knowledge most issues relating to heritage buildings and Building Code compliance are resolved at a local authority level and very few heritage-related issues have been subject to determinations under Part 3 (Subpart 1) of the Building Act.

Sennan House and Antrim House provide two examples of resolution of fire safety and heritage values in relation to change of use and alterations.

²¹ *Auckland City Council v NZ Fire Service* [1996] 1 NZLR 330.



Sennan House
Photo, Simon Ward

Sennan House in Picton is a two-storey Italianate styled villa built in the late 1880s. It is a registered Category II historic place under the *Historic Places Act 1993* and is constructed of native timbers with extensive balconies and veranda. The interior has elaborate panelling with a large staircase and ornate pressed tin metal ceilings at ground floor level. Sennan House has had a number of changes with alterations for both private housing and accommodation since the 1950s. In 2002 the upper storey was converted into three separate accommodation apartments with the ground floor retained as a private living area.²²

During the consent process for the new accommodation spaces in 2002, the territorial authority considered that the upper level floor and associated fabric would require fire rating. At the time, the owners were concerned about the potential impact of this requirement on the pressed tin metal ceilings. Following discussions with the NZHPT and the territorial authority, design proposals involving the installation of a hardwired type 2 fire alarm system, means of escapes, and upgrading the fire resistance of timber-panelled doors were accepted. This package of fire safety work meant that Sennan House complied with the Building Act as “nearly as is reasonably practicable.”



Antrim House
Photo, Grant Sheehan

Antrim House was built in 1904 as the home of the Hannah family. After the death of Hannah and Robert Hannah, it was converted into a hotel. On 18 July 1940, the building was damaged by fire as a result of a guest who stored hot ashes from a fireplace in an upstairs cupboard. The building was repaired following the fire and was purchased by the Government in 1949 for use as a hostel for young men in the public service. After the closure of the hostel in 1977, Antrim House was given to the NZHPT for its national headquarters and the building was renovated in 1981.²³

In association with the 1981 renovations for NZHPT offices, Antrim House was installed with a monitored fire sprinkler system in the main house and with a separate monitored fire warning (evacuation) system with manual call points only in the main house (and call points and smoke detectors but with no sprinklers in ancillary buildings) smoke detectors, manual alarm, along with fire hose reels and fire extinguishers. The building also had an external fire escape and stairs from the hostel era.

While alterations to Antrim House have been rare since 1981, in 2007 the NZHPT applied for building consent to remove the external fire escape and stairs. These were considered a falling risk due to inadequate barriers and as providing a potential route for intruders and possible arson attempts. A fire report was

²² <http://www.sennenhouse.co.nz/>

²³ <http://www.historicplaces.org.nz/placesToVisit/lowerNorthIsland/AntrimHouse.aspx>

prepared by an architect and this was reviewed by a specialist fire engineer. The fire report and associated review found a number of aspects of Antrim House that did not meet the requirements of Acceptable Solution C/AS1 and therefore the Building Code. These aspects included that the building does not have separated fire cells for each floor with a protected stairway and access to the exterior, and both exit doors open by swinging to the inside.

Both the architectural and fire engineering reports agreed that the installation of a fire cell and changes to the doors would adversely impact upon the heritage values of Antrim House. Further, the reports found that the aspects of non-compliance relating to the fire cells and exterior doors were compensated by the sprinklers, smoke detectors and manual alarm systems which were all in excess of the requirements of Acceptable Solution C/AS1. Therefore, it was found that the primary requirement of the Building Code of life protection was satisfied and that Antrim House, as a heritage building, was protected to a reasonably practicable level.

3.2. Fire Service Act 1975

The *Fire Service Act 1975* requires owners of certain types of buildings to provide and maintain fire evacuation schemes. The scheme must be designed to enable safe evacuation from the scene of a fire and in a reasonable time. The types of buildings, subject to this provision, are outlined in section 21A of the *Fire Service Act 1975*. These buildings include those that provide for a gathering of 100 or more persons, buildings for employment of 10 or more persons and buildings that provide accommodation for more than five persons (other than in three or fewer household units). Buildings required to have fire evacuation schemes must be provided with a manual fire alarm system as a minimum requirement.

For further information about the fire evacuation requirements of the *Fire Service Act 1975*, see www.evaconline.fire.org.nz

3.3. Resource Management Act 1991

The RMA governs the use of all land, air and water in New Zealand. The purpose of the RMA is to promote the sustainable management of natural and physical resources. The protection of historic heritage from inappropriate subdivision, use and development is a matter of national importance under section 6(f) of the RMA.

The use of any structure, including alterations and removals is regulated under section 9 of the RMA. This means that the use of a building may be regulated by a rule in a regional or district plan.

All district plans contain 'heritage schedules' that are lists of significant heritage places. If a building is listed in a district plan heritage schedule, then it is likely that certain

It is important that at the earliest stages of planning for fire safety, to make contact with the relevant local authority and gain an understanding of the relevant RMA-related rules that may apply to the building

activities will be regulated such as demolition, relocation, alterations and additions. A building can be individually listed or as part of a wider precinct or historic area.

Nearly all district plans, prepared by territorial authorities, regulate alterations to listed heritage places. Alterations are normally treated as controlled, restricted discretionary or discretionary resource consent. In many cases, the rule relating to alterations only applies to the exterior of the building and that interior works are a permitted activity.

Works to improve fire safety of a listed heritage building may or may not require resource consent under the RMA. Generally, consent will not be required if the work is minor and classified as repair and maintenance, and the work is limited to a part of the building that is not regulated by the district plan. This often applies to interior work.

If resource consent is required, it is often the case that the applicant will need to consult any affected parties, including the NZHPT if the building is registered under the *Historic Places Act 1993*.

The NZHPT considers that the district plan should facilitate the improvement of fire safety of heritage places in a manner that is compatible with heritage values.

Ideally, the district plan should include explicit rules, including terms and standards, for fire safety work to heritage buildings. This would mean that there is improved clarity for owners and the public about rules governing fire safety to listed heritage buildings.

For further guidance about historic heritage under the RMA, see NZHPT, *Sustainable Management of Historic Heritage Guidance Series*.

3.4. Historic Places Act 1993

The *Historic Places Act 1993* promotes the identification, protection, preservation and conservation of the historical and cultural heritage of New Zealand. The Act provides for the establishment and maintenance of a Register of historic places, historic areas, wahi tapu and wahi tapu areas. The purposes of the Register are:

- a. To inform members of the public about historic places, historic areas, wahi tapu, and wahi tapu areas:
- b. To notify owners of historic places, historic areas, wahi tapu and wahi tapu areas where necessary for the purposes of this Act:
- c. To assist historic places, historic areas, wahi tapu, and wahi tapu areas to be protected under the RMA.²⁴

It is advised to contact the NZHPT at the earliest stages of planning for fire safety if the building is registered under the *Historic Places Act 1993* or it is a property relating to pre-1900 human activity and potentially an archaeological site

²⁴ Sec 22(2) *Historic Places Act 1993*.

The Register is maintained by the NZHPT and is made available to the public from the regional and area offices of the NZHPT. Information about the Register is available from the NZHPT website: www.historic.org.nz.

While the Register provides no statutory protection, the status has a number of statutory implications including:

- ▶ The classification of ‘sensitive land’ in relation to the *Overseas Investment Act 2005*.
- ▶ The provision of Project Information Memoranda or building consent to the NZHPT under the *Building Act 2004*.
- ▶ The inclusion in Land Information Memoranda under the *Historic Places Act 1993*.

A building that has been constructed before 1900 may also be an archaeological site under the *Historic Places Act 1993*. Under section 2 an archaeological site is defined as any place in New Zealand that either: was associated with human activity that occurred before 1900; or is the site of the wreck of any vessel where that wreck occurred before 1900; and is (or may be able) through investigation by archaeological methods to provide evidence relating to the history of New Zealand. Under section 9(2) of the *Historic Places Act 1993*, the NZHPT may declare any post-1900 site to be covered by the archaeological site definition in section 2 by notice in the *New Zealand Gazette*.

Section 10 of the *Historic Places Act 1993* directs that an authority is required from the NZHPT if there is “reasonable cause” to suspect an archaeological site (recorded or unrecorded) may be modified, damaged or destroyed in the course of any activity. An authority is required for such work, whether or not the land on which an archaeological site may be present is designated or a resource or building consent has been granted.

4. Fire safety and heritage places – guidance objectives and policies

4.1. Planning for fire safety

Careful planning is an important first step to create or improve fire safety for heritage places. Planning will involve the preparation of heritage assessments, conservation plans, fire safety audits and a fire safety policy.

A heritage assessment is a review of the significance of the place and identifies valuable heritage fabric. The preparation of an inventory of historic fabric is an important aspect for the management of heritage.

Accurate records of building fabric, including measured drawings and photographs, should be prepared, duplicated and safely stored as computer-based archives. Digital scanning cataloguing is an important emerging method of storing building data using electronic formats. Digital scanning can apply to both external and interior fabric and

features. These records will assist in conservation planning and repair and restoration in the event of a fire.

A conservation plan is a document that provides a statement of significance and outlines a number of policies to manage a place in accordance with its significance. Accessibility work involving a heritage building should be informed by a conservation plan. Guidance on preparing a conservation plan is available by contacting the NZHPT.

While the conservation plan should provide improved fire safety measures commensurate with the likely public interest in the place, the aim should be to enable everyone (including people with disabilities) to use the building with the same convenience and safety. Planning for fire safety should also integrate matters relating to the compliance schedule (if relevant) and the annual building warrant of fitness. It is important that the annual building warrant of fitness process is carried out according to best industry practice by a competent person with the full understanding of the building owner.

The primary steps in fire safety planning and management for heritage places are outlined in the codes NFPA 909 and NFPA 914. This guidance has been adapted for the New Zealand context in detail in Opus Consulting Ltd, *Guidelines for Identifying and Preventing Fire Risks to Heritage Buildings and Collections*, 2004.²⁵ These guidelines provide guidance for the five main steps in planning and management:

1. Management Strategy.
2. Prevention.
3. Preparation.
4. Response.
5. Recovery.

Within these five main steps, the primary fire-related planning documents are the fire safety plan, response plan and recovery plan.

This approach aligns closely to the planning methodology promoted by the Australian heritage agencies which involves six primary actions:

- Step 1. Understand what is significant about the place.
- Step 2. Undertake an audit of existing fire safety conditions and identify fire safety requirements.
- Step 3. Prepare a fire safety policy.
- Step 4. Evaluate the options.
- Step 5. Prepare an action plan.
- Step 6. Seek approval for the selected option.

²⁵ Opus Consulting Ltd, *Guidelines for Identifying and Preventing Fire Risks to Heritage Buildings and Collections*, 2004: <http://www.fire.org.nz/Research/Publishsed-Reports/Pages/Guidelines-for-Identifying-and-Preventing-Fire-Risks-to-Heritage-Buildings-and-collections.aspx>

For detailed information about each step, see: Queensland Department of Environment and Resource Management, *Fire Safety, A Guideline for Owners of Registered Places*, (last updated 2 May 2006).²⁶

Fire safety planning documents for heritage places

Fire safety plan

A fire safety plan is a comprehensive document that covers all matters relating to fire safety, including understanding the risk of fire, methods to alleviate fire risk and methods to prepare for a potential fire. A fire safety plan can be prepared for an individual building, a collection of buildings or an organisation.²⁷ The plan will include developing an organisational risk management philosophy and awareness, fire risk policy, risk management programme, and monitoring and effectiveness review.

Fire safety audit (or fire risk assessment)

A fire safety audit is a detailed fire risk assessment in relation to the requirements of the NZ Building Code. This risk assessment is also known as fire safety design by the NZ Fire Service.²⁸ A fire risk assessment should be prepared by a qualified fire engineer, and should form part of a conservation plan.

Fire safety policy

A fire safety policy should be incorporated into a conservation plan or as part of a fire risk assessment. A fire safety policy establishes objectives and a time-frame for the implementation of fire safety measures. It should be based on an understanding of the cultural significance of the place and long-term conservation goals.

Fire safety action plan

An action plan is an outline of the method or process for achieving the fire safety objectives based on the fire risk assessment. It should be specific to the individual circumstances of each place, including the type of place, needs of the owner and their resources and any statutory requirements. It can include a fire risk training programme, fire response strategy and recovery strategy.²⁹

²⁶ Department of Environment and Resource Management, *Fire Safety, A Guideline for Owners of Registered Places*, (last updated 2 May 2006)

²⁷ Opus Consulting Ltd, *Guidelines for Identifying and Preventing Fire Risks to Heritage Buildings and Collections*, 2004, p 5: <http://www.fire.org.nz/Research/Publishsed-Reports/Pages/Guidelines-for-Identifying-and-Preventing-Fire-Risks-to-Heritage-Buildings-and-collections.aspx>,

²⁸ <http://www.fire.org.nz/Business-Fire-Safety/Building-Design/Pages/Fire-safety-design.aspx>

²⁹ Opus Consulting Ltd, *Guidelines for Identifying and Preventing Fire Risks to Heritage Buildings and Collections*, 2004, p 15–16: www.fire.org.nz/Research/Publishsed-Reports/Pages/Guidelines-for-Identifying-and-Preventing-Fire-Risks-to-Heritage-Buildings-and-collections.aspx

4.1.1 Objective – Planning for fire safety

Undertake sufficient planning to improve fire safety and conserve heritage values.

4.1.2 Policies – Planning for fire safety

- a. Record building fabric and features using photographic, architectural or digital scanning methods.
- b. Prepare a conservation plan for the heritage place that includes policies for improving fire safety.
- c. Ensure heritage assessments are undertaken that review the significance of the place and identify significant heritage fabric.
- d. Prepare a fire safety plan as part of conservation planning and undertake a fire safety audit involving a detailed fire risk assessment.
- e. Prepare and implement the fire safety plan, including fire safety policies, as part of a fire safety action plan.
- f. Plan for, and undertake, training and education to ensure occupants of the building understand the risk of fire, preventative actions to take to stop fire occurring and actions to take if a fire occurs.
- g. Ensure that the compliance schedule (if relevant) and annual building warrant of fitness are undertaken according to legislative requirements, best industry practice and by a competent building professional.
- h. With regard to the design and placement of sprinkler systems, measures should be undertaken to safeguard against the risk of accidental sprinkler head release such as the use of concealed heads or upright pendants.
- i. Monitor the implementation of the fire safety plan on a regular basis and review and update as necessary

4.2. Achieving fire safety



Gear Homestead, Porirua
(registered Category II historic place)

In 2010, the Porirua City Council (as owners of the homestead) installed a fire protection system including a sprinkler system designed to be compatible with the heritage values of the building

Photo, NZHPT

Any place can be destroyed by fire at any time. For heritage places, however, greater attention and surveillance is required to prevent and prepare for fires. Achieving fire safety requires a range of fire safety measures that are adapted for the unique characteristics of heritage places – commercial, residential, public, industrial and recreational.

Minimum fire safety measures will include an evacuation and escape plan, smoke detectors and alarm systems and fire extinguishers. The NZHPT also promotes the installation of sprinkler systems. With regard to the design and placement of sprinkler systems, measures should be undertaken to safeguard against the risk of accidental sprinkler head release such as the use of concealed heads or upright pendants.

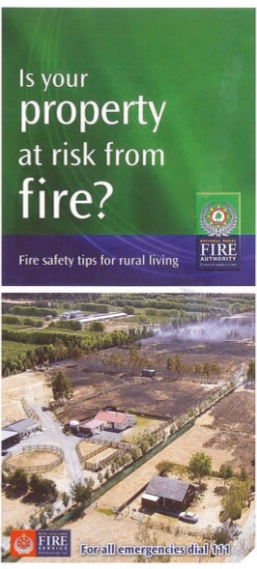
In addition, heritage places should have adequate insurance, security measures to protect against break-in and arson, and should be smoke-free properties.

Marae require special attention to ensure that fire safety measures are culturally appropriate and designed to respect the heritage and cultural values of the place.

4.2.1 Objective – Achieving fire safety

Improve fire safety by promoting, wherever possible, a range of fire safety measures for heritage places.

4.2.2 Policies – Achieving fire safety



Cover page. *Is Your Property at Risk from Fire? Fire Safety Tips for Rural Living*, NZ Fire Service

- a. Ensure there are security measures in place to protect against the risk of arson.
- b. Identify means of escape and ensure corridors, doors and openings are designated as escape routes. These areas must be kept free of obstructions.
- c. Identify fire safety systems including fire alarms, fire detection systems, emergency lighting and signs, communications, lightning protection, testing and maintenance of fire safety systems and emergency shut-off controls.
- d. Protect heritage places by smoke detectors and water sprinkler systems.
- e. Ensure there are sufficient fire fighting supplies available, including water supplies, hose reels and portable fire extinguishers. Ensure that the portable fire extinguishers are the correct type.
- f. Provide for sufficient access for the NZ Fire Service in the event of an emergency.
- g. Ensure that there are good housekeeping practices in place, especially involving the storage of combustible material. Avoid leaving papers and documents spread out on floors around desks and office workstations.
- h. Avoid open flames, and there should be safety precautions for 'hot work' when maintaining or renovating heritage places.
- i. Ensure temporary or decorative materials for special events are non-combustible or treated with an approved fire-resistant coating.
- j. Make sure that electrical wiring, lighting, cabling and appliances are well maintained.
- k. Maintain chimneys serving active fireplaces by annual cleaning and inspection.
- l. Promote heritage places (including buildings and setting) as smoke-free areas.

4.3. Protection from wild fire

Wildfire has the potential to destroy large areas of natural and cultural value. These areas can include rural historic homesteads, parks and reserves, other heritage buildings, archaeological sites and significant heritage trees.

Creating a defensible space around rural buildings will assist in mitigating the damage of a wildfire.

Advice should be obtained from the NZ Fire Service or a fire engineer on the appropriate size of the safety zone.

If heritage trees or other objects are within the safety zone, advice should be obtained from a heritage landscape architect about options to provide an adequate safety zone while also providing for heritage values.

4.3.1 Objective – Protection from wild fire

Achieve sufficient protection to heritage places from wild fire.

4.3.2 Policies – Protection from wild fire

- a. Create a safety zone around buildings of at least 10 metres by clearing any dead or dry material and replacing flammable plants and trees with low flammable species.
- b. Keep the grass green and mown around buildings.
- c. Expert advice from a heritage landscape architect should be sought if measures to create a safety zone may adversely impact upon heritage values.
- d. Control all fires on the property (for example, campfires, braziers, rubbish fires).
- e. Special measures should be adopted to protect significant trees of heritage value.
- f. Access roads need to be maintained and kept fully accessible at all times.
- g. Sufficient water should be available for fire fighting purposes.
- h. Store firewood and other flammable material away from buildings.

4.4. Conservation of heritage places

The principles governing the conservation of heritage places are provided by the ICOMOS *New Zealand Charter for the Conservation of Places of Cultural Heritage Value* (2010). In relation to making changes to heritage places, these principles promote understanding of the cultural heritage values of connected communities.

Following the identification of heritage values, a heritage assessment needs to consider a range of principles, including indigenous cultural heritage, planning for conservation, respect for surviving evidence and knowledge, use, and respect for fixtures, fittings, contents, curtilage and setting. These principles are adopted internationally to guide works involving heritage buildings. As indicated above, these principles should be detailed in a heritage assessment and conservation plan.

For places of significance to Māori, their heritage values will be an important consideration. For these places, the assessment will need to recognise and provide for the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu and other taonga following the spirit and intent of the Treaty of Waitangi (Te Tiriti o Waitangi).

The NZHPT supports improved fire safety to ensure heritage remains useful for present and future generations. Maintaining continuity of use or adapting places for new uses ensures heritage retains liveability and utility. The process of change is called adaptation which means to modify a place to suit it to a compatible use, involving the least possible loss of cultural heritage value.³⁰

Improving fire safety often requires alterations. The careful design of alterations is of paramount importance. Ensuring the least possible loss of cultural heritage value will

³⁰ ICOMOS *New Zealand Charter for the Conservation of Places of Cultural Heritage Value*, 2010.

involve retaining surviving heritage fabric, respecting the historic design of the building, avoiding work that compromises or obscures heritage fabric, and appropriately recording new work.

The compatibility of design of new fire safety work is an important consideration. A compatible fire safety system is one that is not visually obtrusive and has well-matched materials and proportions with regard to the existing historic building. Achieving compatibility requires a carefully designed concept plan specific to the heritage values and requirements of the building and early consultation with the NZHPT.

4.4.1 Objective – Conservation of heritage places

Conserve heritage places by promoting appropriate alterations and other changes to improve fire safety.

4.4.2 Policies – Conservation of heritage places

- a. Provide that all fire safety-related work is appropriate with regard to the principles and policies of the NZ ICOMOS Charter 2010 in particular, that work should involve the least possible loss of heritage significance, including the least loss of fabric or evidence of cultural heritage value.
- b. Recognise and provide for indigenous cultural heritage of tangata whenua relating to Māori communities, especially whānau, hapū and iwi.
- c. Ensure that proposed fire safety work does not alter, obscure or remove significant heritage fabric and features. Permanent damage to significant fabric and settings must be avoided.
- d. Make sure any new fire safety work is compatible (able to co-exist) with the heritage values of the building in terms of materials, scale, size, proportion, location and surface configuration.
- e. Safeguard significant interior finishes such as original or early wallpaper, paint, panelling, plastering and pressed tin metal ceilings.
- f. Retain historic patterns of access and movement (ie entrances, hallways, stairways and passageways).
- g. Preserve historic doors and linings, especially when the doors are integral to the heritage values of the building.
- h. Use concealed installation methods for smoke detectors, alarm system wiring, sprinkler pipes and sprinkler heads. For unobtrusive retrofitting of sprinkler systems, pipes should be concealed above ceilings fitted externally or above roofs where possible. Concealed sprinkler heads may be used and pipes may be painted to match the décor. Also sprinkler heads may be installed in specific locations to blend in with decorative features of ceilings such as in the centre of rose patterns.
- i. Provide education for building owners and managers on the benefits of sprinklers for limiting fire damage and the operation of sprinkler systems with only sprinklers directly exposed to the fire operating.



St Alban's, Pauatahanui
Photo, NZHPT

St Alban's, Pauatahanui

For many years the Anglican Parish of Pauatahanui was concerned about the fire risk to St Alban's. The parish contacted the NZHPT in 1997 and it advised that the parish should first prepare a Conservation and Cyclical Maintenance Report for the church. For this purpose, the NZHPT supported an application to the NZ Lotteries Board for funding assistance. Following the preparation of the report by Ian Bowman, Conservation Architect, the parish carried out a number of urgent repairs and started campaigning for a sprinkler system. The problem was not only the absence of sprinklers, but also the lack of a water supply to fight a fire.

The water supply issue was resolved when the Porirua City Council committed funding towards bringing mains water supply to Pauatahanui in 2000, and in 2002 the parish submitted an application for funding assistance to the NZ Lotteries Board with the support of the NZHPT for funding assistance for a fire protection system using mains water supply. With the financial assistance of the NZ Lotteries Board, the new fire protection system involving sprinklers was installed into the church in 2005.

On 5 June 2011, there was an arson attack with a fire being lighted within the porch of the church. Heat triggered the sprinklers at 2 am and the sprinklers had completely extinguished the blaze before fire fighters arrived resulting in only minor damage (*Kapi Mana News*, 21 June 2011).

5. Methods to achieve fire safety for heritage places

The NZHPT published guidance for fire safety in 2000.³¹ This publication remains a relevant guide for achieving fire safety for heritage places (except for references to outdated legislation and standards). The guide includes a number of ideas and examples for achieving fire safety including the planning of sprinkler layout (Arts Centre, Christchurch) design of sprinkler systems in decorative ceilings, use of glass fire separation doors and the design of inlet values and fire alarm panels (former BNZ buildings, Wellington).

The US National Fire Protection Association (NFPA) is responsible for some of the most widely adopted standards and guidelines in relation to fire safety and heritage places. The two principle standards relating to heritage places are codes NFPA 909 and NFPA 914.

NFPA 909 is a code for the protection of cultural resources properties – museums, libraries and places of worship.³² The code provides guidance for a wide range of fire safety

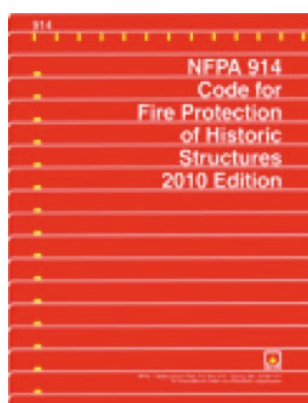
³¹ Carol Caldwell and Hamish MacLennan, *Guidelines for Fire Safety*, NZHPT, 2000

³² NFPA 909, *Code for the Protection of Cultural Resources Properties – Museums, Libraries and Places of Worship*, US National Fire Protection Association, 2010.
<http://www.nfpa.org/aboutthecodes/AboutTheCodes.asp?DocNum=909&cookie%5Ftest=1>

measures for historic buildings, museums and historic collections. Key sections of the code include:

- ▶ Fire safety management planning.
- ▶ Security.
- ▶ Audit and appraisal processes.
- ▶ Management plans.
- ▶ Fire prevention measures.
- ▶ Fire safety for new construction, additions, alterations and renovations.
- ▶ Fire precautions during construction, repair and alterations.
- ▶ Inspections, testing and maintenance.
- ▶ Special events.
- ▶ Museums, libraries and collections.
- ▶ Places of worship.

The last update of this code was in 2010.



Cover page. *NFPA 914, Code for Fire Protection of Historic Structures*, 2010 Edition

NFPA 914 is the code for fire protection of historic structures. The code is the primary source of international guidance for principles and practices of fire safety and historic buildings. The code prescribes minimum requirements for the protection of historic buildings from fire by promoting a comprehensive fire protection program while protecting heritage values.³³ The primary sections of the code include:

- ▶ Fire safety management planning.
- ▶ Security.
- ▶ Audit and appraisal processes.
- ▶ Management plans.
- ▶ Fire prevention measures.
- ▶ Fire safety for new construction, additions, alterations and renovations.
- ▶ Fire precautions during construction, repairs and alterations.
- ▶ Inspections, testing and maintenance.
- ▶ Special events.

In 2010, NFPA 914 was updated to include a number of matters such as wildfire protection criteria, historic building fire case studies, protection of historic districts and security system provisions.

The European Centre for Cooperation in the field of Scientific and Technical Research (COST) has published a considerable body of research, information and guidance relating to fire safety and heritage places.³⁴ This project was organised under Action C17, 'fire loss to built heritage' (the C17 project). The project has established the European Heritage Fire

³³ NFPA 914, *Code for Fire Protection of Historic Structures*, US National Fire Protection Association, 2010.

³⁴ COST website: http://www.cost.esf.org/about_cost



Cover page. *Fire Risk Management*, February 2008

Network.³⁵ The C17 project reports, available on the website,³⁶ are mostly in draft form and constitute the reports of four working groups made up of experts in heritage and fire safety from throughout Europe. The reports cover a range of themes, especially with regard to:

- ▶ European heritage and fire regulation.
- ▶ Risk assessment for heritage places.
- ▶ Post-fire decision-making.
- ▶ Reconstruction costs and replacement issues.
- ▶ Insurance of heritage places.
- ▶ Economic impact of fire loss.

A summary of the draft reports is available on the European Heritage Fire Network website.³⁷

In the United Kingdom, English Heritage published guidance in 1991 which examined issues relating to fire and heritage buildings.³⁸ The awareness of fire risk to heritage buildings was heightened in 1992 as a result of the Windsor Castle fire. Following this fire, the Government commissioned a report to examine fire protection measures at Royal Palaces (the Bailey Report). As a result of this report, the Historic Buildings Fire Research Coordinating Committee (HBFRC) was established to start a network of agencies involved in fire safety and heritage buildings. This Committee includes the National Trust, English Heritage, the Fire Protection Association and the Royal Household.³⁹ As part of this project, English Heritage set up the Fire Research Database (FRd) on behalf of the HBFRC. This database is a framework for the collection of basic information about fire damage to heritage buildings in the United Kingdom.

In addition to the HBFRC and the FRd, the UK-based Institution of Fire Engineers (IFE) has established a special interest group for heritage buildings. This group aims to promote fire safety in the historic environment.⁴⁰ In February 2008 the IFE journal, *International Journal for Fire Professionals*, published a special issue on protection of historic buildings from fire.⁴¹ Members of the IFE special interest group for heritage buildings also provided a number of guidance articles for the March 2010 issue of the journal of the UK Institute of Historic Building Conservation, *Context*.⁴²

In Australia, the Queensland Department of Environment and Resource Management and the New South Wales heritage Office have published guidance for fire safety and heritage

35 European Heritage Fire Network website: <http://heritagefire.net/>

36 European Heritage Fire Network website: <http://heritagefire.net/>

37 http://heritagefire.net/heritage_fire_wg_papers/wg3/wg3_report_3_mm.pdf

38 English Heritage, *Fire and its Aftermath*, Conservation Bulletin No.13, <http://www.english-heritage.org.uk/publications/conservation-bulletin-13/>

39 <http://www.english-heritage.org.uk/professional/research/buildings/fire-research-database/background/>

40 UK IFE Special Interest Group, Historic Buildings website: <http://www.ife.org.uk/members/hertbuildsig>

41 *International Journal for Fire Professionals* website: <http://www.frmjournal.com/>

42 *Context* Journal website: http://www.ihbc.org.uk/context_archive.htm

places.⁴³ These documents provide detailed guidance for a range of fire safety-related matters involving heritage buildings which includes such issues such as:

- ▶ Occupancy.
- ▶ Exits and paths of travel.
- ▶ Fire isolation exists or external stairs.
- ▶ Exit travel distances and configuration.
- ▶ Dimensions of exits and paths of travel.
- ▶ Doors along path of travel to and from exit.
- ▶ Door hardware.
- ▶ Fire and smoke resistance.
- ▶ Smoke hazard management.
- ▶ Fire compartments.
- ▶ Fire fighting equipment.
- ▶ Sprinklers.
- ▶ Stair pressurisation, exit signs, emergency lights.
- ▶ Fire warning systems.
- ▶ Inspection and maintenance.
- ▶ Good housekeeping.
- ▶ Fire safety during building works.



Interior of Old Saint Paul's Cathedral, Wellington

Old St Paul's Church (registered Category I historic place), Wellington, is fitted with a fire sprinkler system which has been installed in an unobtrusive way and in sympathy with the historic values of the building. The sprinkler installation is not obvious when the public view the ceiling from ground level

Photo, Grant Sheehan

In New South Wales, the Government established an expert panel to provide advice on heritage-related fire safety, access, services and occupational health issues (FASAP). With the support of the NSW Heritage Office, the FASAP has published guidance involving the upgrading of fire resistance of timber-panelled doors and the fire resistance of ceiling/floor systems in heritage buildings.⁴⁴

Other relevant guidance was developed in September 1998 by the Australian Council of National Trusts, *Principles and Guidelines, Fire Risk Management for Natural and Cultural Heritage Properties*.

Dealing with some types of heritage fabric requires specific guidance and advice from a conservation architect or fire designer experienced in heritage buildings. As an example, doors require careful consideration in the design of fire safety work in heritage buildings. Interior doors should be kept closed when the building is not occupied. "When doors are required to remain open ... careful and professional analysis shall be performed and documented and documented alternative methods to control fire spread shall be implemented."⁴⁵ Measures to improve the fire resistance of historic doors can include:

⁴³ Fire safety, a guideline for owners of registered places, (last updated 2 May 2006) http://www.derm.qld.gov.au/heritage/owning_a_heritage_place/guidelines/fire_safety_guidelines/index.html; New South Wales Heritage Office, Fire and Heritage, Information Sheet 8.1; http://www.heritage.nsw.gov.au/docs/maintenance8-1_fire_heritage.pdf

⁴⁴ NSW Heritage Office, website: www.heritage.nsw.gov.au

⁴⁵ NFPA 914, *Code for Fire Protection of Historic Structures*, US National Fire Protection Association, 2010, 11.3.2

- ▶ Facing the door with non-combustible boards, which can be removed at a later date with minimum damage.
- ▶ Sealing all cracks and gaps with fire-rated intumescent mastic and applying intumescent coatings.
- ▶ Fitting proprietary intumescent strips and flexible cold smoke seals, to seal gaps between the door and frame.⁴⁶

Extract from Technical Note, Upgrading the Fire Resistance of Timber Panelled Doors – Heritage Council of New South Wales, Australia

Trafalgar Building Products (formerly Tyco Building Products) acted as consultants to the Heritage Council of NSW and assisted in developing the method which has been tested in accordance with Australian Standard AS 1530 Part 4.

The method will overcome one of the most detrimental effects on older buildings of orders given under the *Environmental Planning and Assessment Act 1979*, commonly known as ‘fire orders’. Fire orders, in the past, often required the replacement of all timber panelled doors with solid core doors.

The substitution of original panelled doors with these flush-face doors diminishes the significance of the building and destroys the qualities of entrance lobbies, staircases and hallways which commonly have several doors leading from them.

While the timber panelled door treated with this upgrading method achieved a fire resistance of 28 minutes, a standard solid core door (previously seen as safer) achieved only 14 minutes in the same test. The system does not alter the external (corridor side) appearance of the door. Implementation of the upgrading should be carried out by experienced trades people. A list of recommended trades people is available from Trafalgar.

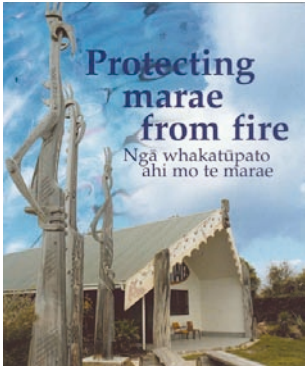
www.heritage.nsw.gov.au/13_subnav_02.htm#notes

In addition to guidelines prepared by government agencies and heritage organisations, there are a range of publications and books available relating to fire safety and heritage. The Building Conservation website is a particularly good source of information.⁴⁷ Articles available include:

- ▶ David Forrest, ‘Strategic Fire Protection in Historic Buildings’ originally published in *The Building Conservation Directory*, 1996.
- ▶ Jonathan Taylor, ‘Fire Fire’, originally published in *Historic Churches*, 2003.
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⁴⁶ Adapted from Mike Coull, ‘Performance of traditional timber doors in fires’, *Context*, No.113, March 2010, p18.

⁴⁷ The Building Conservation website: www.buildingconservation.com



Cover page, *Protecting Marae from Fire, Ngā Whakatūpato Ahi Mo te Marae*, NZHPT and NZ Fire Service, 2003

Marae

Marae are special buildings of cultural heritage value and are unique to New Zealand Aotearoa. Marae may be both historic and contemporary. Marae are part of a wide range of Māori built heritage that include not only wharenuī (meeting house), but also wharekai (dining hall), pātaka (storehouse) and pouhaki (flagpole). Wharenuī and wharekai are often located in a marae setting. Marae may also be associated with wharekarakia (church), urupā and papakāinga (residential village).

In 2004, BRANZ with the NZHPT and the NZ Fire Service conducted a major research project on fire protection of New Zealand's traditional Māori buildings.⁴⁸ The results of this research found that there is a high incidence of marae fires, with an average of "five reported fires a year."⁴⁹ Marae fires can be particularly severe because of the flammable characteristics of surface linings in comparison to standard domestic or public buildings. The research report recommended improving fire safety measures at marae with the installation of a second exit (where there is only one exit), adequate exit signage, the preparation of a fire safety action plan, and the installation of automatic fire alarms, such as smoke detectors, in areas used as sleeping accommodation.⁵⁰ These measures are also recommended in the NZ Fire Service and NZHPT guidance for marae.⁵¹ This guidance includes a useful marae fire safety checklist:

- ▶ Install a sprinkler system and smoke alarms.
- ▶ Have an escape plan and a safe place for manuhiri (visitors) to evacuate.
- ▶ Let manuhiri know your marae evacuation plan and exits to evacuate.
- ▶ Educate everyone about good fire safety behaviour.
- ▶ Check hose reels and fire extinguishers.
- ▶ Adhere to non-smoking in the wharenuī.
- ▶ Don't stack mattresses near heat or light sources.
- ▶ Keep things that can burn away from cooking facilities.
- ▶ Remember to use gas and electricity safely: install safely, maintain regularly and ventilate well.
- ▶ Protect and limit the energy sources around your property.
- ▶ Reduce outside litter and clutter.
- ▶ Secure taonga in a fire-proof safe.
- ▶ Photocopy important documents and store copies in another location.
- ▶ Think about security and outside lighting for your property.⁵²

48 Duncan, C. R., Whiting, P., Wade, C.A., Whiting, D., Henderson, A, *Fire Protection of New Zealand's Traditional Māori Buildings*, BRANZ Study Report, No.SR128, 2004.

49 *ibid*, p 11.

50 *ibid*, p 4.

51 NZ Fire Service and NZHPT, *Protecting Marae from Fire, Nga Whakatupato Ahi Mo Te Marae*, 2003.

52 *ibid*.

Further guidance is also available in the booklet – *Fire Safety, Owners of Marae Buildings*, NZ Fire Service and Opus International Consultants.

The NZHPT Māori Heritage Advisers should be contacted for advice in relation to any proposed work involving Māori built heritage.

Cover page. *Fire Safety, Owners of Marae Buildings*, Opus International Consultants and the NZ Fire Service



5.1. Funding assistance

Fire safety work on heritage places can involve significant costs for an owner or developer. There are a range of sources of funding assistance available with the main ones being:

- ▶ Local authority heritage or community grant schemes.
- ▶ NZ Lotteries Board.
- ▶ National Heritage Preservation Incentive Fund (NZHPT).

It is also advisable to explore sources of non-government funding such as corporate funding programmes (i.e. FM Global Fire Prevention Grant Programme).⁵³

The NZHPT has developed an incentives toolkit for heritage places which identifies potential sources of regulatory and non-regulatory incentives.⁵⁴ The toolkit provides guidance on funding assistance, especially the NZHPT's National Heritage Preservation Incentive Fund and heritage funds provided by local authorities. For further information, contact the NZHPT or visit its website.⁵⁵

Additional information about incentives and funding sources generally can be obtained by contacting the Department of Internal Affairs, Funding Information Service⁵⁶ or the Ministry for Culture and Heritage, *Cultural Funding Guide*.⁵⁷



Cultural Funding Guide,
Ministry of Culture and Heritage

[http://www.mch.govt.nz/
funding-guide/
search?fcats=Heritage](http://www.mch.govt.nz/funding-guide/search?fcats=Heritage)



Te Rātonga Whakamārama Putēa
Funding Information Service

<http://www.fis.org.nz/>

⁵³ <http://www.fmglobal.com/page.aspx?id=01060200>

⁵⁴ NZHPT, 'Heritage Incentives Toolkit', draft for consultation, August 2010.

⁵⁵ <http://www.historic.org.nz/ProtectingOurHeritage/FundingProtection.aspx>

⁵⁶ <http://www.fis.org.nz/>

⁵⁷ <http://www.mch.govt.nz/funding-guide/search?fcats=Heritage>

6. Sources of information and guidance

6.1.1 NZ Fire Commission and the NZ Fire Service



Cover page. *Fire Safety Private Owners of Historic Buildings*
NZ Fire Service and Opus International Consultants

The NZ Fire Commission is the overseeing authority controlling the NZ Fire Service and the NZ National Rural Fire Authority. It is established under the *New Zealand Fire Service Act 1975*. The NZ Fire Commission establishes policy, standards and guidelines for fire management and has a major role in promoting fire safety, including reducing continually the incidence of fire and the attendant risk to life and property and achieving unity and completeness of fire safety law and practice.⁵⁸ The functions of the NZ Fire Commission, in terms of promotion of fire safety, include:

- a. Establishing close and harmonious working relations with industry, commerce, government departments, territorial authorities, and other bodies and organisations.
- b. Seeking to ensure that knowledge affecting fire safety gained by the Commission is applied throughout the community.
- c. Stimulating and maintaining interest in fire safety by means of education and publicity through all communications media.
- d. Publishing and disseminating fire safety literature.
- e. Sponsoring, assisting and conducting fire safety campaigns and fire safety courses (whether general or particular).
- f. Research into methods and practices of fire safety, and making arrangements with any person, government department, or body having appropriate facilities for the conduct of any such research.
- g. Seeking continuously for new ways to reduce the incidence of fire and the risk to life from fire.⁵⁹

The NZ Fire Service Commission, with the NZHPT and Opus International Consultants, has published a range of publications concerning fire safety and heritage. The primary guidance publications are as follows:

- ▶ NZ Fire Service and NZHPT, *Protecting and Preserving What We Value*, 2005.
- ▶ NZ Fire Service and NZHPT, *Protecting Marae from Fire, Nga Whakaturato Ahi Mo Te Marae*, 2003.
- ▶ NZ Fire Service and Opus International Consultants, *Fire Safety, Private Owners of Historic Buildings*.
- ▶ NZ Fire Service and Opus International Consultants, *Fire Safety, Owners of Marae Buildings*.
- ▶ NZ Fire Service and Opus International Consultants, *Fire Safety, Owners of Small Museums*.

⁵⁸ Section 20, *Fire Service Act 1975*.

⁵⁹ Section 21(2), *Fire Service Act 1975*.

- ▶ NZ Fire Service Commission Research Report, *Guidelines for Identifying and Preventing Fire Risks to Heritage Buildings and Collections*, Opus Consulting Ltd, November 2004.⁶⁰

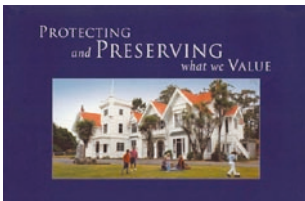
6.1.2 New Zealand Standards

There are a range of standards (NZS), established by Standards New Zealand, applicable to fire safety.⁶¹ Some of these standards are referred to in fire safety Building Code compliance documents. For a list of the NZ Building Code Fire Safety standards, see the compliance document on the Ministry for Business, Innovation and Employment website.

With regard to sprinklers, there are three standards in New Zealand that apply to three different types of buildings:

- NZS 4515 Fire sprinkler systems for life safety in sleeping occupancies. Applicable for sleeping occupancy buildings, with floor areas less than 2000 square metres and three storeys or less (rest homes, accommodation, small apartment buildings, etc).
- NZS 4517 Fire sprinkler systems for houses. Applicable for domestic residential dwellings.⁶²
- NZS 4541 Automatic fire sprinkler systems. Applicable to all types of buildings and mandatory for larger buildings.

As illustrated in the St Mary’s Church case study below, the nature and type of the heritage building needs to be considered when identifying the most appropriate sprinkler system standard.



Cover Page. *Protecting and Preserving what we Value*, NZ Fire Service and NZHPT, 2005

⁶⁰ Opus Consulting Ltd, *Guidelines for Identifying and Preventing Fire Risks to Heritage Buildings and Collections*, NZ Fire Service Commission Research Report, November 2004: <http://www.fire.org.nz/Research/Publishsed-Reports/Pages/Guidelines-for-Identifying-and-Preventing-Fire-Risks-to-Heritage-Buildings-and-collections.aspx>

⁶¹ Standards New Zealand website: www.standards.co.nz/default.htm

⁶² Opus Consulting Ltd, *Guidelines for Identifying and Preventing Fire Risks to Heritage Buildings and Collections*, NZ Fire Service Commission Research Report, November 2004, pp 25–26.

Sprinklers and Heritage Buildings

St Mary's Church at Upokongaro faces fire safety issues that confront many heritage buildings (including whareniui) in the rural environment.⁶³ St Mary's is registered as a category I historic place and a conservation report for the building has been prepared to assist in the long-term management and preservation of the church.⁶⁴ The conservation report included provision for fire safety measures including fire suppression and warning systems.



St Mary's Church
Registered Category I historic
place, Upokongaro, Whanganui
River

Photo, Wendy Pettigrew

During the restoration project, the parish investigated the installation of water sprinklers as a primary method of fire suppression. However, due to the isolated position of St Mary's and problems of obtaining sufficient water supply, there are additional costs to comply with NZS 4512: 2003 and 4541:2003. These costs would include the need to install two large tanks, diesel pump and pump house. In 2004, the cost of this system was estimated around \$100,000 with an additional \$3000 annual monitoring, testing and maintenance fees. This cost is beyond the capacity of St Mary's parish.

St Mary's highlights issues surrounding the installation of water sprinklers into historic buildings and whareniui in isolated rural environments. Alternative and cost-effective means of fire protection need to be provided for compliance with the Building Code and property protection. One suggestion is that the standard for residential fire sprinkler standards (NZS 4515: 2003) could be adapted for small rural heritage buildings that do not have high public usage. However, limitations of sprinkler protection to the domestic sprinkler standard NZS 4515 must be recognised along with the benefits of the lower installation and maintenance costs on a case-by-case basis.

BRANZ has recently carried out research examining issues relating to the design of sprinklers for community buildings and heritage buildings.⁶⁵ The research has examined fire and heritage statistics, international literature, New Zealand's sprinkler standards and the costs and benefits of sprinkler options for community and heritage buildings. For example, the research provides a summary of sprinkler system costs for a range of buildings – churches, marae, community halls and small historic houses. It was found that some of the largest cost factors relate to the water supply and pumps, tanks and control value arrangements with tanks and pumps in particular making up a significant percentage of the cost of a sprinkler system.⁶⁶ The research report recommends changes to NZS 4541 or the development of a new

⁶³ For background history about St Mary's see: Wendy Pettigrew, *The Church by the River, St Mary's Upokongaro*, Parish of Eastern Wanganui, 2005.

⁶⁴ Chris Cochran, *St Mary's, Upokongaro Conservation Report*, August 2003.

⁶⁵ Ed Soja, *Sprinklers for Community Buildings and Places of Special or Historical Interest, BRANZ Study Report*, SR 252, 2011.

⁶⁶ *ibid*, p 38.

standard for sprinklers for community and heritage buildings. This finding may result in more cost-effective sprinklers for heritage buildings while also providing for a basic level of fire repression.

Heritage places are diverse and it is often the case that 'one size does not fit all'. For this reason, heritage property owners should seek the advice of a qualified fire engineer with regard to the selection of the most appropriate sprinkler system.

6.1.3 Building Research Association New Zealand (BRANZ)

BRANZ has published an extensive range of research and guidance relating to fire safety issues. Some of this research and guidance is relevant to heritage buildings. For example, in the BRANZ magazine, *Build* (February/March 2010), the design of a home sprinkler system for a 1891 villa was discussed in detail.⁶⁷

In 2004, BRANZ published a detailed report on the fire protection of New Zealand's traditional Māori buildings with the contributions of the NZHPT and the NZ Fire Service.

As noted above, BRANZ has recently undertaken research into the design of sprinklers for community and heritage buildings.⁶⁸

6.1.4 Canterbury University, Civil Engineering, Fire Engineering Department

Canterbury University offers fire engineering courses and performs fire engineering research under the auspices of the Civil Engineering Department. They also undertake a wide range of fire engineering research including building fire safety issues relating to heritage buildings.⁶⁹

6.1.5 Fire Engineering professional organisations

Primary professional organisations in New Zealand with an interest in fire safety and property protection are the Society of Fire Protection Engineers (NZ Chapter),⁷⁰ Institution of Fire Engineers (IFENZ, New Zealand Branch),⁷¹ the Fire Protection Association of New Zealand (FPANZ)⁷² and the Institution of Professional Engineers (IPENZ).⁷³ All groups provide professional-training related events and publications for their respective membership and are a source of advice and information for engaging specialist fire professionals.

67 James Firstone, 'Retrofitting a Home Sprinkler System' *Build*, Vol 116, February/March 2010, pp 42–43.

68 Ed Soja, *Sprinklers for Community Buildings and Places of Special or Historical Interest*, BRANZ Study Report, SR 252, 2011.

69 University of Canterbury, Fire Engineering Department:
<http://www.civil.canterbury.ac.nz/fire/firepubs.shtml>

70 SFPE NZ Charter website: www.sfpe.org.nz

71 IFANZ website: www.ife.org.nz

72 FPANZ website: www.fireprotection.org.nz

73 IPENZ website: www.ipenz.org.nz

In September 2011, IPENZ and the Department of Building and Housing published guidelines for documenting fire safety designs (including specific fire engineering design). The guidelines provide a template for documenting fire designs other Building Act considerations and they are available from the IPENZ website.

6.1.6 Insurance

Insurance does not provide protection from fire-related damage. Instead, insurance is a system that provides recompense to owners in the event of loss or damage. Adequate insurance cover is an essential aspect for heritage buildings to assist with the cost of recovery. Separate guidance about insurance and heritage buildings is available from the NZHPT.⁷⁴

⁷⁴ http://www.historic.org.nz/publications/SustMgt_guidance_series.html

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<http://www.ife.org.uk/members/hertbuildsig>