



# Ministry of Education

## Weathertightness Remediation and Regulatory Strategy

Version 1.0, July 2018



# Document History

The table below is a record of the changes that have been made to this document:

Version	Revision Date	Summary of changes
Version 1.0	July 2018	First version for general issue.

# Foreword

This *Weathertightness Remediation and Regulatory Strategy* sets out the Ministry of Education's strategy for all remedial work related to weathertightness failure and associated damage. It also provides guidance on the processes to be followed to achieve compliance with the Building Act 2004 and the Building Code.

The objective of this strategy is to ensure that the cause of the weathertightness failure is understood, and that remedial work is appropriately scoped, documented and carried out to a code compliant standard. The strategy covers work carried out to specifically address weathertightness failure alone or weathertightness failure in conjunction with other works to school buildings.

## Background

The Ministry has been undertaking weathertightness remediation work for nearly ten years. This work has focused on buildings built or modified after 1994.

Our initial remediation approach was based on destructive testing inspection reports prepared by building surveyors, and focused on weathertightness failures and consequential damage. It also mitigated risk by including design factors that had the potential to lead to weathertightness failure at some time in the future.

Over the last two years we have looked at our approach to see how we can improve the effectiveness and efficiency of this work. A significant finding from the completed remediation work to date was that a high proportion of the building work and associated expenditure was directed towards building elements that had not actually failed. Under this conservative approach, the number of school buildings that could be remediated in a single year was limited.

Learning from this experience, the Ministry has revised the focus of the remedial work to addressing actual and proven weathertightness failure. By focusing on weathertightness failure, we can address weathertightness remediation throughout the country at a faster rate and with less disruption to many schools.

## Acknowledgement

The Ministry's Weathertightness Strategy Group was established in late 2015 to provide technical and regulatory leadership on weathertightness issues in existing school buildings. This group comprises experienced external experts with architectural, building surveying, and engineering backgrounds, and currently include Ron Pynenburg (Pynenburg & Collins Architects Ltd), Peter Leslie (PDL Consultants Ltd) and Dave Brunson (Kestrel Group).

## Feedback and updates

We are seeking to constantly improve the content and usability of our guidelines. If anything in this guideline requires clarification please contact the Ministry through [Property.Help@education.govt.nz](mailto:Property.Help@education.govt.nz). Your feedback will help us to ensure this document is maintained as a valuable resource for all of those involved in the design of our schools as effective learning environments.



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July 2018

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# 1 Introduction

## 1.1 Purpose

This *Weathertightness Remediation and Regulatory Strategy* (the Remediation Strategy) is a technically focussed document. It provides regulatory and process guidance for persons involved in achieving Building Act 2004 (the Act) and *Building Code* compliance for *remedial work* associated with Ministry of Education (the Ministry) buildings. This includes consultants, contractors, Building Consent Authority (BCA) and Territorial Authority (TA) staff, and Ministry staff.

The objective of this Remediation Strategy is to ensure that *remedial work* is appropriately documented and carried out to a code compliant standard.

This Remediation Strategy covers the situations of work carried out solely to address *weathertightness failure* or to address *weathertightness failure* in conjunction with other building work to school buildings.

## 1.2 Terminology

It is important that terminology associated with weathertightness remediation is used with clarity and consistency. With this in mind, this document utilises terminology with specifically defined terms. These terms are shown in italics and defined in the Glossary in Appendix A, which readers are encouraged to refer to as they read this document.

Where reference is made in this document to 'consultant', this can refer to both building surveyors and architects (or designers), depending on the context. Generally, it is envisaged that remediation inspections will be undertaken by building surveyors, and repair specification and documentation will be undertaken by architects or designers. Any consultant involved in weathertightness work for the Ministry is required to have expertise in *remedial work* and a comprehensive understanding of this Remediation Strategy. Selection of consultants by the Ministry for particular projects will focus on competency appropriate to the scope and nature of the likely *remedial work*. The Ministry will provide suitable briefing for its consultants.

## 1.3 Context

The Ministry is responsible for protecting the Crown's ownership interest in land and buildings occupied by schools. The Ministry's property portfolio comprises more than 30,000 buildings across approximately 2,100 school sites. With the population's changing demographics and needs over time, this property portfolio includes a mix of permanent and relocatable buildings comprising simple and complex designs.

One of the Ministry's priority work areas is to ensure that schools are safe and in good physical condition. Compliance with the Building Act and other statutory requirements is a core objective of the Ministry's asset management processes. In some areas, the Ministry exceeds the requirements of the *Building Code*. Compared with many other building owners, the Ministry is a long-term building owner. This has implications for its asset management policies which include minimising life cycle costs over the life of its buildings.

In response to significant weathertightness issues the Ministry established a national Building Improvement Programme in 2012. A number of larger building surveying companies were engaged to undertake comprehensive building investigations of identified buildings. One of the key outcomes was a destructive testing (DT) report for each building investigated.

The Ministry included an estimated 2,450 buildings in the Building Improvement Programme. By the end of June 2016 in the order of 517 buildings had remediation works completed at an estimated cost of \$421 million. As of January 2018, approximately 1,300 buildings are yet to be further assessed or remediated for *weathertightness failures*.

The remediation works undertaken by the Building Improvement Programme were based on *DT reports*. These *DT reports* identified factors that were perceived as high risk that might lead to *weathertightness failure* of *building elements* at some stage, as well as identifying actual *weathertightness failures*.

The most significant finding from the completed remediation work was that the majority of the building work and associated expenditure was directed towards *building elements* that had not failed, rather than actual *weathertightness failure* and *consequential damage*. In most cases there was a specific and localised *weathertightness failure* but the building work carried out was often based on a full 're-roof' and/or 're-clad' approach.

Learning from this experience and in order to ensure that the available funds are better utilised to carry out *remedial work* at a faster rate of progress, the Ministry has revised the focus of *remedial work* to address actual and proven *weathertightness failures*.

The Ministry has decided that factors that might lead to future *weathertightness failure* of *building elements* will not be included in the scope of *remedial work*, unless the factor is considered likely to cause *imminent failure* of a *building element* and supporting observational and photographic evidence is provided.

The revised focus of *remedial work* for actual and proven *weathertightness failure* will be implemented while meeting three aims:

1. All Health & Safety issues are addressed as a priority.
2. *Weathertightness failures* and *consequential damage* are repaired.
3. All *remedial work* complies with the *Building Code*.

The composition and content of *DT reports* have evolved over time. This means not all *DT reports* adequately differentiate between actual and potential *weathertightness failures* when providing their repair proposals. As a consequence, some *DT reports* are not suitable to be used to establish the necessary and often reduced scope of *remedial works* for actual *weathertightness failure* alone.

In addition, most *DT report* recommendations were designed to be in accordance with *Acceptable Solution E2/AS1* to comply with Clause E2 External Moisture of the *Building Code*. E2/AS1 is only one method of compliance. For existing buildings there are often much more cost effective options that still comply with the *Building Code*.

The Ministry has therefore instituted a remediation inspection regime, utilising a *remediation inspection report* template, to identify the actual *weathertightness failures*, the *consequential damage* and the necessary *remedial work* (refer Section 2 of this document).

The scope of the actual building work undertaken will sometimes be more than, or different to, the scope of the *remedial work* recommended in the *remediation inspection report*. This could be due to such factors as roll projections, the building's suitability for current learning environments, and addressing compliance, functional and operational issues identified in other reports. After considering the *remediation inspection report* alongside these other reports and factors, the Ministry is able to make an informed decision on an intended scope of *remedial work*, the most appropriate regulatory pathway and the priority accorded to any *remedial work* project.

The *remediation inspection report* is part of the briefing information for the parties that will undertake the design and documentation for the *remedial work* that the Ministry decides to carry out.

## 1.4 Overview of Remediation Strategy

### 1.4.1 Experience to Date

The completed remediation work carried out since 2012 provides the Ministry with knowledge and experience of the *weathertightness failures*, *consequential damage* and *remedial works* that are likely to be encountered in school buildings. Contributing factors for *weathertightness failure* have included:

1. Design concepts and/or material selections that were not fit for purpose.
2. Insufficient design detail for construction purposes.
3. Poor workmanship, where materials and systems were not installed to good trade practice, and/or the manufacturer's requirements, and/or the construction documentation.

4. Materials and systems substitution that were not fit for purpose.

A significant factor contributing to *consequential damage* was having untreated or unsuitably treated timber-based products specified and/or installed.

Common *weathertightness failures* encountered are:

1. Inadequate roof and apron flashings, especially those reliant on sealant for weathertightness.
2. Inadequate window and door head flashings.
3. Inadequate horizontal 'z' flashings for sheet cladding systems.
4. Wall and roof cladding penetrations poorly formed, lacking flashings and/or inappropriate use of sealants.
5. Inadequate clearance between base of cladding and adjacent gardens, ground or paving.
6. Debonding of laps and terminations/edges of single layer membrane roofs.
7. Failure of junction of rainwater head and membrane for membrane roofs and gutters.
8. Low roof falls (less than 1:100), and/or single layer membrane gutters not coping with heavy rain water volumes.
9. Lack of overflows and proper scuppers in guttering systems, especially for membrane roofs.
10. Poor building wrap installation and/or performance.

#### 1.4.2 Remediation Policies

To ensure that *weathertightness failures* will not arise from current and future remediation work, the Ministry will apply the following policies:

1. All consultants and others engaged will be chosen on the basis of competency appropriate to the scope and complexity of the *remedial work*.
2. Site investigations, in the form of *remediation inspection reports*, will be undertaken to provide evidence that the *weathertightness failures* identified to be remedied are those responsible for the *observed damage*.
3. Documentation shall include sufficient specification, construction detailing and referencing of manufacturer's technical literature to provide contractors with clear and adequate guidance on construction requirements for code compliant construction.
4. Documentation will be subject to review. This will typically occur at two stages, being preliminary and detailed design, depending on the scale and complexity of the *remedial work*.
5. Contractors are to be selected on the basis of competency and experience in the materials and construction techniques specified and designed.
6. The consultants engaged to document the works will also be engaged to undertake construction observation services.
7. Quality Assurance processes will be implemented so that the proposed and completed remedial work will be code compliant and appropriate to the weathertightness failures and consequential damage identified.
8. Completion documentation will be obtained and added to the property file.

#### 1.4.3 Regulatory Compliance

The Building Act permits low-risk building work that will not affect the building's structure or fire safety and does not pose a risk to public safety to be carried out without a building consent. This applies in situations where the costs of obtaining a consent are likely to outweigh any benefit that a consent may offer. Section 41 of the Act exempts certain types of building work, including the range of exemptions described in Schedule 1, while section 42A imposes some conditions on such building work.



Exemption 1 of Schedule 1 of the Act covers general repair, maintenance and replacement of building components to enable building owners to maintain their buildings without having to get a building consent.

Exemption 2 of Schedule 1 allows TAs to use their discretion to exempt any building work from the requirement for a building consent if the TA believes that a consent is not necessary because the building work is likely to comply with the *Building Code* or people or buildings are unlikely to be endangered if the building work did not comply.

Section 49 of the Act provides for the issuing of a building consent, with section 112 being applied where the building work is being carried out to an existing building.

The Ministry therefore has three regulatory pathways available for the building work and *remedial work*. In addition to the usual building consent pathway, the Ministry will be able to choose to utilise the provisions of either Exemption 1 or 2 of Schedule 1 of the Act. By assessing the intended building work against the following regulatory pathways the Ministry can determine whether either Exemption 1 or Exemption 2 is appropriate instead of applying for a building consent:

#### Regulatory Pathway 1: Schedule 1, Exemption 1 Use

Where intended building work meets all the requirements of Exemption 1, it is not considered *remedial work* as it is not a consequence of *weathertightness failure*. It is more likely to be routine or deferred repairs and maintenance. Such building work may be carried out as of right utilising this exemption from a building consent and no BCA or TA approval is required. However, the Ministry may decide not to use Exemption 1 where the intended building work is part of a larger body of building work that includes *remedial work* and/or it is impracticable to carry it out separately from the *remedial work*.

Section 4 of this document provides guidance for determining if building work can be carried out under Exemption 1.

#### Regulatory Pathway 2: Schedule 1, Exemption 2 Application

*Remedial work*, because it is due to *weathertightness failure*, cannot be carried out under Exemption 1. Where Exemption 1 does not apply or is not used, an application for Exemption 2 may be made to the TA for the work to be carried out without a building consent. TA approval is required before the Ministry can carry out such work.

Section 5 of this document provides guidance for an Exemption 2 application to a TA. If the Ministry decides, for whatever reason, that an Exemption 2 application is not appropriate, then the *remedial work* must be carried out under a building consent.

#### Regulatory Pathway 3: Building Consent Application

When the Ministry chooses not to make an Exemption 2 application, or a TA declines an Exemption 2 application, the *remedial work* must be carried out under a building consent.

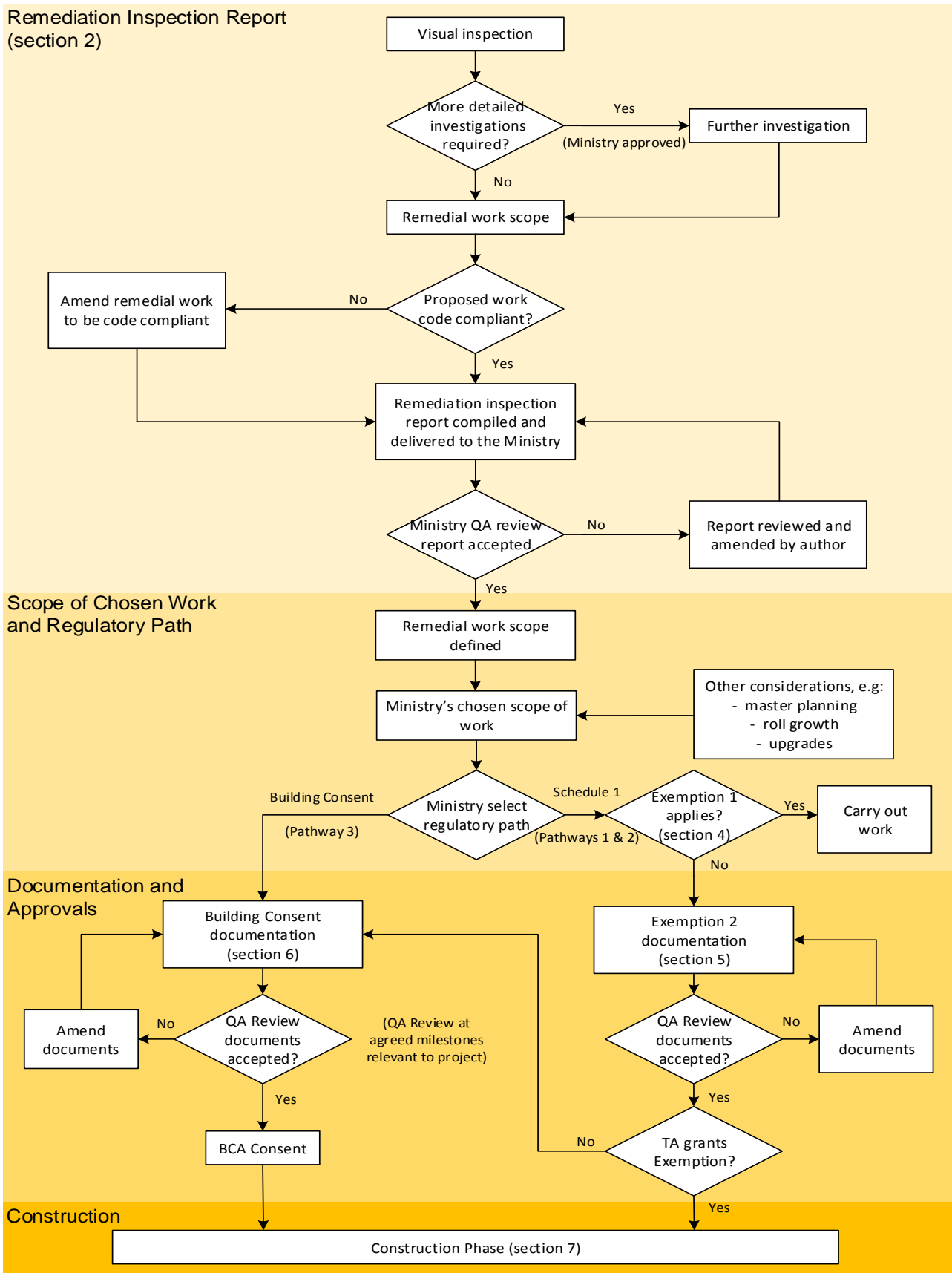
Section 6 of this document provides guidance for a building consent application. For *remedial work* carried out subsequent to obtaining either an Exemption 2 approval or a building consent, section 7 of this document provides guidance for the construction phase.

The Ministry will choose what it considers to be the most appropriate regulatory pathway for each project with guidance from its consultants as necessary. In some cases, especially when the *remedial work* is combined with other works, it may choose to carry out the building work under a building consent even though the *remedial work* could be carried out under Schedule 1 of the Act.

Section 3 of this document provides guidance for the regulatory compliance for all building work, regardless of the pathway chosen.

## 1.5 Flowchart of the Remediation Strategy

This flowchart shows the process followed for the implementation of the Remediation Strategy.



## 2 Remediation Inspection Regime

### Summary

#### Remediation Inspection Report:

Consultants will use the Ministry's *remediation inspection report* template to carry out:

1. Pre-inspection analysis involving:
  - a. *DT report* review
  - b. School staff advice and information gathering about weathertightness issues.
2. On-site investigations to identify:
  - a. the *weathertightness failures* wherever possible
  - b. the *consequential damage* that has occurred due to each *weathertightness failure*
  - c. a likely scope of *remedial works* required to attend to damage repair, *weathertightness repair* and adjacent work to return building elements to the condition and detail '*as when it was new*'
  - d. additional or alternative *remedial work* to achieve code compliance if any '*as when it was new*' *remedial work* would not be code compliant today.
  - e. a rough order of cost for the suggested *remedial works*.

Factors that might lead to *weathertightness failure* of *building elements* will not be included in the *remediation inspection report*, unless it is likely to cause *imminent failure* of a *building element*. The final draft of each report is QA reviewed by the Ministry.

#### Scope of Chosen Building Work:

1. Ministry representative considers other factors and reports to determine chosen scope of *remedial work* and whether it is part of a larger scope of building work.
2. Ministry to select which regulatory pathway is to be followed.
3. *Remedial work* scope assessed for regulatory compliance following guidance in section 3 of this document, and amended as and if required.

#### Non-remedial Work:

1. If non-remedial work is to be carried out in conjunction with other building work, the regulatory pathway followed is that chosen for the other building work (on the assumption that a consent is required).
2. Non-remedial work scope assessed for regulatory compliance following guidance in section 3, and amended as and if required.

### 2.1 Remediation Inspection Report

The purpose of the *remediation inspection report* is to:

- Identify the *weathertightness failures* that have caused the observed *consequential damage*,
- Suggest a likely scope of code compliant *remedial works* that is sufficient to enable the Ministry to engage a consultant to undertake the design and documentation required, and
- Provide a rough order of cost.

The suggested scope of *remedial works* is not a limiting instruction to the consultant; instead it provides, in conjunction with the description of the *weathertightness failure* and *consequential damage*, reasonable guidance as to a possible solution to the weathertightness problems of the building. The consultant then

takes responsibility for the design and documentation of code compliant *remedial work*. There will be occasions when, for valid and documented reasons, the implemented *remedial work* differs from that scoped within the *remediation inspection report*.

The success of the *remedial work* is reliant on the *weathertightness failures* that caused the *consequential damage* being correctly identified. For consistency across all remediation inspections, the template requires firstly the identification of the *remedial work* necessary to return the *building element* to the condition and detail 'as when it was new', i.e. to a condition that replicates how it was built. That work is then assessed for code compliance (refer Example 1).

### Example 1

*A school building was built with direct-fixed fibre cement cladding, which complied with E2/AS1 (refer to section 3.2 of this document) and the trade literature at the time. The current version of E2/AS1 would require this cladding to be on a cavity. This cladding has suffered consequential damage due to weathertightness failure in a rainwater head – a completely different building element. The remedial work proposed will be to replace the damaged sections of cladding with direct-fixed cladding. Assessment of this proposed work for building code compliance will then determine whether direct-fixed cladding will be the eventual remedial work carried out.*

Compliance with the *Building Code* is then assessed following the guidance in section 3 of this document. If the consultant determines that returning the *building element* to its condition 'as when it was new' is not code compliant then the consultant records within the *remediation inspection report* the additional or alternative *remedial work* required for code compliance. This is most likely to be the case when some as-built aspect of the *building element* is the *weathertightness failure* requiring *remedial work*. This two-step approach to identify code compliant *remedial work* provides the Ministry with a robust audit trail for the identification of the necessary scope of the implemented *remedial work* (refer Example 2).

### Example 2

*A school building was built with a butyl rubber membrane roof over a ply substrate to a 1:50 fall. The ply substrate has proven to be structurally inadequate for the span between roof framing members. The ply substrate has sagged over time leading to ponding of water. This has caused the membrane laps to delaminate and water has seeped into the roof cavity.*

*The weathertightness failure is the delamination of the membrane laps combined with the inadequate rigidity of the ply substrate. The as-built roof has failed to comply with Clauses E2.3.1 and E2.3.2 of the Building Code.*

*The relevant part of Clause E2.3.1 of the Building Code is "Roofs must shed precipitated moisture."*

*Clause E2.3.2 states "Roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to building elements or both."*

*Therefore to repair or replace the butyl rubber membrane and ply substrate to its 'as when it was new' condition will not be code compliant.*

*The identified remedial work will involve a broader scope of building work to the roof that, depending on the circumstances, may include any of the following –*

- *re-pitching the roof to a greater fall*
- *adding framing members to reduce ply substrate spans*
- *replacing ply substrate to provide an adequately rigid substrate*
- *selecting a different membrane.*

*The identified remedial work must then be assessed for code compliance.*

The *remediation inspection report* template requires a comprehensive visual inspection that starts with, but is not limited to, the damage observed, *weathertightness failures* identified and the repair recommendations provided in the *DT report*. At the beginning of the site visit, discussions are held with school staff that have knowledge and experience of the weathertightness problems to further inform the required scope of the visual inspection.

The resultant *remediation inspection report* seeks to identify the *weathertightness failures* that are causing *observed damage* and provides *remedial work* proposals for *weathertightness repair* and *damage repair* together with any *adjacent work*. To support the *weathertightness failure* conclusions, photos and observations, including *observed damage*, are included.

During the first site visit and visual inspection, the consultant may identify aspects of the building where further investigations, usually including invasive or destructive investigations or testing, may be required before the *weathertightness failures* that have caused the observed *consequential damage* can be established and/or a likely scope of code compliant *remedial works* can be produced. Such further investigations and the rationale for them are included in the first draft of the *remediation inspection report*. After discussions and agreement with the Ministry, the consultant may carry out a second site visit to undertake these further investigations, leading to the finalising of the report. This two-step approach to carrying out further investigations provides the Ministry with a robust audit trail for the identification of the necessary scope of the implemented *remedial work*.

Based on the remediation works to date, it is likely in most cases that the remediation inspection will show that the *weathertightness failure* causing the *observed damage* usually arose from the contributing factors listed in section 1.4.1 of this document.

Upon completion, the consultant forwards the *remediation inspection report* to the Ministry's representative. A Quality Assurance review is then undertaken to confirm that the report identifies the *weathertightness failures* that have caused the observed *consequential damage*, contains a likely scope of code compliant *remedial works* that is sufficient to enable the Ministry to engage a consultant to undertake the design and documentation of *remedial works*, and includes a rough order of cost.

The *remediation inspection report* becomes part of the briefing information for the parties that will undertake the design and documentation for the *remedial work* that the Ministry decides to carry out.

## 2.2 Scope of Chosen Building Work

The scope of the actual building work undertaken will sometimes be much more than, or different to, the scope of the *remedial work* outlined in the *remediation inspection report*. This could be due to such factors as roll projections, the general condition of the building, the building's suitability for current learning environments, and/or the extent of *adjacent work* required. After considering the *remediation inspection report* alongside these other reports and factors, the Ministry is able to make an informed decision on the final scope of building work along with the most appropriate regulatory pathway.

Sections 3, 5 and 6 of this document provide guidance for the regulatory compliance and application process for *remedial work* that would be carried out under either a Building Act Exemption 2 application or a building consent.

## 2.3 Non-remedial Work

Some *remediation inspection reports* will identify factors that might lead to *imminent failure* of *building elements*. The Ministry may choose to carry out building work to avoid that *imminent failure*. This building work is not considered *remedial work*, as there is not yet a *weathertightness failure*. It is most likely that such building work can be considered repairs and maintenance, or replacement, and therefore able to be carried out as of right under Exemption 1 of Schedule 1. Sections 3 and 4 of this document provide guidance for the regulatory compliance of building work intended to be carried out under Exemption 1.

## 3 Regulatory Compliance

### 3.1 Building Act Requirements

This section describes the relevant Building Act sections as these relate to this Remediation Strategy and the undertaking of *remedial work* for buildings with weathertightness issues.

#### 3.1.1 Building Work and the Building

*Remedial work* will be carried out on existing school buildings. The Building Act has different requirements for the existing buildings (the 'building') and the *remedial work* (the 'building work'). Understanding the difference between the 'building' and the 'building work' will enable the successful implementation of the requirements of the Act and achieving the required level of compliance with the *Building Code*.

The 'building work' is the work intended to be carried out. Building work carried out without a building consent under Schedule 1 must meet specific conditions noted in s42A(2)(a) and s42A(2)(c) of the Act, whereas building work carried out under a building consent must meet the requirements noted in s49(1) of the Act.

The 'building' is the structure within which or to which the 'building work' is to be carried out. For building work carried out under Schedule 1 of the Act, the requirements for the building are noted in s42A(2)(b) and s42A(2)(d) of the Act, whereas when the building work is to be carried out under a building consent, the requirements for the building are noted under s112(1) of the Act.

#### 3.1.2 Schedule 1 Requirements

Section 41 of the Act permits work contained within Schedule 1 to be carried out without a building consent. Building work carried out under Schedule 1 must comply with the four conditions included within s42A(2) of the Act, which are:

- (a) *the building work complies with the Building Code to the extent required by the Act*
- (b) *after the building work is completed, the building –*
  - (i) *if it complied with the Building Code immediately before the building work began, continues to comply with the Building Code; or*
  - (ii) *if it did not comply with the Building Code immediately before the building work began, continues to comply at least to the same extent as it did then comply*
- (c) *the building work does not breach any other enactment*
- (d) *the building to which the building work relates is not a hazardous substance location that is required to be authorised under the Health and Safety at Work Act 2015 or any regulation made under that Act.*

The Ministry will have determined a scope of intended *remedial work* or non-remedial work from that identified in the *remediation inspection report*. Given the building practices utilised at the time of original construction, many of the proposed repair strategies will incorporate construction details that are no longer in favour or in accordance with current *Acceptable Solutions* or the manufacturers' current standard recommendations and instructions.

Before that building work can be carried out under Schedule 1, both the building work and the building must be assessed against these s42A(2) conditions of the Act. An outcome of these assessments may require an increase in the scope of building work before the building work can be carried out under Schedule 1 of the Act.

#### 3.1.3 Other Building Act Requirements

Section 42A(2)(a) of the Act requires that any work carried out under Schedule 1 must comply with the *Building Code*. This is a reinforcement of section 17 of the Act, which requires all building work to comply with the *Building Code* to the extent required by the Act, whether or not a building consent is required. Section 7 of the Act defines 'building work' to include the alteration of a building, and 'alter' to include the

repair of a building. Therefore all *remedial work* clearly falls within the definition of “building work” and is covered by both s42A and s17 of the Act.

However, s18 of the Act states that when carrying out building work, no one can be required to “achieve performance criteria that are additional to, or more restrictive than, the performance criteria prescribed in the *Building Code* in relation to that building work”. It follows that, as long as it can be shown that proposed *remedial work* will comply with the performance criteria of Clause E2, even if it will not be in accordance with the current *Acceptable Solution* E2/AS1, that work can proceed. The Ministry cannot be required to carry out additional building work that may be considered by others necessary simply to make the work align with E2/AS1. Of course, the Ministry is free to choose to carry out building work that exceeds the performance criteria of the *Building Code*.

Given the age of many school buildings, the leaky building crisis and changes to accepted building practice, it is quite likely that the *remedial work* necessary to return the *building element* to the condition and detail ‘as when it was new’, will involve practices and details that were acceptable and code compliant at the time of construction but are no longer in accordance with a current *Acceptable Solution* or current manufacturers’ or suppliers’ standard details.

There will be situations where the necessary *remedial works* are quite localised, but current *Acceptable Solutions* or manufacturers’ or suppliers’ standard details impose significant scope or cost concerns because they would require significant additional building work beyond that required to fix the *weathertightness failure* and *consequential damage*.

In such circumstances it is important to note that current *Acceptable Solutions*, Standards or industry practices are non-mandatory means of compliance with the *Building Code*. Section 19 of the Act lists a number of means of establishing compliance with the *Building Code*, including *Acceptable Solutions*, Verification Methods and Determinations, that must be accepted by a BCA. However, unless an *Acceptable Solution* or Verification Method has been specified in accordance with s20 of the Act as the means of compliance, the Ministry cannot be required to carry out building work in accordance with them in order to achieve compliance with the *Building Code*. To date there are no such mandatory means of compliance with the *Building Code*. The Ministry is free to choose the means of compliance for the *remedial work*.

#### 3.1.4 Scope of Building Work

The underlying principle (supported in numerous Determinations) is that it is for the building owner to decide the scope of any new building work and for the BCA to firstly test whether that work complies with the *Building Code* and then whether, after the building work is completed, that the building as a whole complies no less than it did before under s112 of the Act.

The Act enables the Ministry to select whatever scope of *remedial work* it chooses to undertake, and it cannot be required by a BCA to undertake additional building work (including *remedial work*) if the chosen scope of *remedial work* is code compliant. This means that if, further to its review, the Ministry chooses not to undertake some of the *remedial work* identified in the *remediation inspection report*, it is free to do so as long as the chosen *remedial work* will be code compliant.

The one exception is that a TA can require building work to be carried out under s124 of the Act, if it considers the building to be dangerous, affected or insanitary under Part 2, subpart 6 of the Act.

### 3.2 Acceptable Solution E2/AS1 – A Brief History

E2/AS1 is the *Acceptable Solution* for *Building Code* Clause E2 External Moisture. Following E2/AS1 provides one way of complying with *Building Code* Clause E2, but other methods can be used to achieve *Building Code* compliance.

Although it is common practice to install cladding in accordance with *Acceptable Solution* E2/AS1 External Moisture to achieve compliance with *Building Code* there are other methods of achieving compliance without using E2/AS1. These can be particularly relevant and cost effective when remediating the Ministry’s buildings with weathertightness issues.

A brief history of the recent requirements for cladding under E2/AS1 follows.

Before 1 February 2005, claddings were deemed to be code compliant when fixed in accordance with the 2nd Edition of E2/AS1. The wall claddings included in the 2nd Edition of E2/AS1 were direct-fixed timber weatherboards (lap-jointed or bevel-back, batten jointed vertical and shiplap vertical), masonry veneer with a 40mm cavity and solid plaster (stucco) with a 20mm cavity. Reference was made to *NZS 3604, NZ Standard for light timber framed buildings*. Whereas the 1999 version of NZS 3604 also had a section covering roof and wall claddings, the 2011 version of NZS 3604 removed these requirements and referred the readers to E2/AS1. This was presumably to avoid any confusion between E2/AS1 and NZS3604.

The 3rd Edition of E2/AS1, published in June 2004 and effective from 1 February 2005, introduced:

1. the assessment of weathertightness risk factors,
2. the application of Table 1 Risk Factors and Table 3 Suitable Claddings,
3. the provision of a drained cavity for some claddings that had not previously required one, and
4. the inclusion of fibre cement and Exterior Insulation and Finish System (EIFS) cladding.

This version of E2/AS1 allowed all fibre cement sheet and EIFS cladding to be direct-fixed to framing when the risk score, calculated via the building envelope risk matrix, was at the lowest risk level of 0 – 6. However, fibre cement sheet and EIFS cladding were required to be installed over a cavity for a risk score of 7 or more (refer Example 3).

### Example 3

*Two rectangular single storey school buildings were built in 2006 in a medium wind zone. The walls were EIFS on one and flush-finished fibre cement sheet on the other. The roof was a gable roof, with the barge and fascias finished proud of the face of the cladding. Gutters were provided to the fascias. What did E2/AS1, 3rd Edition, Amendment 2 (effective 1 July 2005) require for the installation of the wall cladding?*

Table 1 Risk Factors	Table 2 Risk Severity Score	
	gable wall	side wall
Wind zone: Medium	Medium: 0	Medium: 0
Number of storeys: one	Low: 0	Low: 0
Roof/wall intersection: hip/gable, no eaves	Medium: 1	Medium: 1
Eaves width: barge: 0-100mm	Very High: 5	
Eaves: 101-450mm (gutters)		High: 2
Envelope complexity: rectangular, single cladding	Low: 0	Low: 0
Deck design: None	Low: 0	Low: 0
Score:	6	3

*Total Risk Severity Score is 6 for the gable walls and 3 for the side walls. By Table 3, Suitable Claddings, both EIFS and fibre cement cladding can be direct-fixed to the framing.*

*If the roof had been a hip roof, with guttering all round, then the total Risk Severity Score for each wall would have dropped to 3. This permits numerous risk factor permutations for direct-fixed cladding; for example a Very High wind zone carries a Risk Severity Score of 2, which would raise the total score to 5. The EIFS and fibre cement claddings could still have been direct-fixed.*

It was not until Amendment 5 to the 3rd Edition, effective 1 August 2011, that flush jointed fibre cement sheet and EIFS cladding was required to be over a cavity at the lowest risk score range. At the same time the Extra High wind zone was introduced into the Risk Factors table. The current version of E2/AS1 is the 3rd Edition,



Amendment 7, which has been effective from 1 January 2017. It has no changes to the Table 1 Risk Factors and Table 3 Suitable Claddings as contained within Amendment 5.

Prior to the inclusion of EIFS cladding systems in E2/AS1, 3rd Edition in 2004, installation was carried out in accordance with manufacturer's requirements and construction details. Through to the late 1990s these were generally for direct-fixed systems. As the nature of the leaky building crisis became apparent and information was disseminated, EIFS and fibre cement monolithic cladding systems generally transitioned to cavity-based systems and became aligned with E2/AS1.

### 3.3 Building Code Compliance

#### 3.3.1 Building Code Requirements

The previous common practice to recommend that the Ministry's buildings should be remediated in accordance with *Acceptable Solution* E2/AS1 has led to incorrect expectations of what is required for compliance with the *Building Code*. It has resulted in significant additional cost in carrying out *remedial work* although consultants are now much more accepting of non-E2/AS1 solutions.

For the external envelope of a building the proposed building work must be assessed against the performance requirements of Clauses B2 Durability and E2 External Moisture of the *Building Code*. If these are satisfied, the building work complies with the *Building Code*. The building can comply with the *Building Code* without being built in accordance with E2/AS1.

For Clause B2, Performance Criteria Clause B2.3.1(b) states that:

*Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:*

- (a) 15 years if:
  - (i) *Those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace ...*

The relevant Performance Criteria of Clause E2 that relate to roof and wall cladding are:

*E2.3.1 Roofs must shed precipitated moisture. In locations subject to snowfalls, roofs must also shed melted snow.*

*E2.3.2 Roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to building elements, or both.*

*E2.3.3 Walls, floors, and structural elements in contact with, or in close proximity to, the ground must not absorb or transmit moisture in quantities that could cause undue dampness, damage to building elements, or both.*

*E2.3.5 Concealed spaces and cavities in buildings must be constructed in a way that prevents external moisture being accumulated or transferred and causing condensation, fungal growth, or the degradation of building elements.*

*E2.3.7 Building elements must be constructed in a way that makes due allowance for the following:*

- (a) *the consequences of failure,*
- (b) *the effects of uncertainties resulting from construction tolerances or from the sequence in which different aspects of construction occur,*
- (c) *variation in the properties of materials and in the characteristics of the site.*

The performance criteria of Clause E2 do not in fact prohibit leaks, or water penetration, from occurring. For *Building Code* compliance these performance criteria require that *consequential damage* of undue dampness, damage to or degradation of *building elements*, condensation or fungal growth does not occur.

Clause E2.3.7 does not require a wall or roof *building element* to be 're-clad' or 're-roofed' rather than repaired to address any *weathertightness failure* or *consequential damage*. E2.3.7 requires the carrying out of any *remedial work* to make due allowance for the three factors (a) – (c) noted within it. For the majority of *remedial work* that is not a difficult task to complete satisfactorily, the *building element* can remain in situ and the necessary repairs carried out.

### 3.3.2 Durability

In most cases any windows and doors that have to be removed as part of the *remedial works* will be suitable for reuse. Close inspection to ascertain the condition of the exterior joinery, undertaking any repair or refurbishment work, and replacement of all rubbers and seals will usually address any concerns regarding continuing weathertightness performance.

Clause B2 Durability is interpreted by many to require the reused exterior joinery to have a further 15 years durability upon their reinstatement. That is an incorrect application of s42A of the Act for building work carried out without a building consent under Schedule 1 of the Act. It is also an incorrect interpretation of s49 and s112 of the Act for work carried out under a building consent.

The proposed building work does not include the fabrication of these doors and windows; they already exist as *building elements* of the building. The new building work that will be carried out must comply with the *Building Code*, but would typically be limited to the flashings and the like at the interface with the wall cladding when the windows and doors are reinstalled. The new flashings and related work are assessed for code compliance under either s42A(2)(a) or s49 of the Act.

Once the building work is completed and the exterior joinery reinstalled, both s42A(2)(b) and s112(1)(b) of the Act require the building to comply at least to the same extent as it did before the building work began. As the building's original exterior joinery has been used it is obvious that, with respect to the reused exterior joinery, the level of code compliance is retained and these sections are satisfied.

This application of the Act does not preclude the Ministry from choosing to upgrade retained exterior joinery (such as installation of new glazing rubbers) or to replace the exterior joinery. In both cases, the Act does not require these actions.

### 3.3.3 Alternative Solutions

The intended building work, when it is not being carried out in accordance with an *Acceptable Solution* or *Verification Methods*, can be assessed as a so-called 'Alternative Solution' for compliance with the *Building Code*.

The Ministry of Business, Innovation & Employment (MBIE), in its previous life as the Department of Building and Housing (DBH) published the guideline *Means of establishing compliance: alternative solutions* in October 2008. Although this document is now 10 years old it remains relevant to this Remediation Strategy. It includes means of establishing compliance by a number of means:

- Supported by expert judgement or opinion
- Assessment methods, including, but not limited to:
- Comparison to compliance documents such as *Acceptable Solutions* and *Verification Methods*
- Use of other documents (e.g. standards, trade literature, Determinations)
- In-service history

Also included were guidelines to BCAs when assessing alternative solutions.

The in-service history of the existing cladding is the most relevant factor to the assessment of the performance and compliance of the cladding system.

The *remediation inspection report* aims to establish the *weathertightness failure* responsible for the *consequential damage* and any non-compliance with the *Building Code*. It therefore forms the basis for the required evidence but further specific on-site investigations may be necessary to provide sufficient evidence to establish the code compliance of existing construction and the proposed new work.

In the absence of any evidence linking an as-built feature or detail to a *weathertightness failure* and *consequential damage*, the in-service history can be used to demonstrate that the as-built feature or detail has met the *Building Code* performance criteria in regard to Clause E2 External Moisture. It follows that any repairs that replicates the detailing of the as-built feature or detail will likewise meet these performance criteria. If this proves to be the case with direct-fixed cladding to a building, repairs to that cladding can therefore also be direct-fixed. The same approach can be taken with any other as-built detail or *building element* that is no longer built in accordance with current practice or expectations.

If the in-service history shows that the as-built detail or construction is not code compliant, then the same construction details cannot be used for the intended building work. Another solution that is code compliant is required. The *Acceptable Solutions* and current manufacturer's literature is a good starting point, but there are likely to be as-built features that will require bespoke detailing.

Each situation must be investigated and considered on its merits. The outcome of this first step will be the identification of the code compliant building works either the intended scope or an increased scope after the section 3 of this document assessment. These code compliant works are required to address the *weathertightness failures* and *consequential damage*, and to avoid future *weathertightness failures* (refer Example 4).

#### Example 4

*A school building has weathertightness issues. The building is single storey and the walls are clad with direct-fixed EIFS. The monoslope butyl rubber membrane roof has 300mm soffits all round. The design incorporated a hidden 300mm wide butyl gutter along the lower edge with a single rainwater head and downpipe in the centre.*

*The laps are delaminating due to ply sagging and inadequate structural support. In addition poor finishing of the butyl rubber into the rainwater head has created a second weathertightness failure at the rainwater head, allowing water to flow into the adjacent wall framing and rotting it out. The wall framing below the rainwater head has suffered consequential damage and has to be replaced. In order for this to occur, a section of the EIFS cladding has to be removed and replaced.*

*The current version of E2/AS1, 3rd Edition, Amendment 7, requires all EIFS cladding to be installed over a nominal 20mm cavity. If this Acceptable Solution, and indeed the current manufacturer's literature, was to be followed then the replacement EIFS would need to be on a cavity. This requirement creates an aesthetically unacceptable step in the cladding. Alternatively, at significant additional cost, the entire elevation would have to be re-clad to remove the step.*

*The direct-fixed EIFS cladding has no weathertightness failure attributable to it. The removal and replacement of it is adjacent work made necessary by the need to carry out damage repair to the wall framing that arose from the weathertightness failure of the butyl rubber membrane roof and rainwater head.*

*In-service history of the EIFS cladding demonstrates that the direct-fixed cladding has met and continues to comply with the performance criteria of Clause E2, even though it may not be installed in accordance with the current version of E2/AS1 or the manufacturer's trade literature. As, in this specific situation, direct-fixed EIFS cladding will comply with the Building Code, the replacement EIFS can be direct-fixed and align with the retained EIFS cladding.*

### 3.4 'Like for Like' Replacement

There is a perception that 'like for like' *remedial work* or building work can be carried out, especially under Schedule 1 of the Act. Unfortunately this is not always the case; 'like for like' replacement is not permissible where the as-built construction does not comply with the *Building Code*.

This requirement was dealt with in *Determination 2015/060 Regarding the compliance of concrete exterior stairs at Unit 9A Gunns Crescent, Cashmere, Christchurch*. In this case, the builder faithfully measured three consecutive flights of earthquake-damaged external concrete stairs, and rebuilt them to exactly the same configuration. The Determination found that the rebuilt stairs did not comply with Clause D1.3.3 of the *Building Code*. The outcome is expected to be the demolition of these stairs and reconstruction of code compliant stairs.

While these stairs are a fairly simple example to highlight the application of s17 of the Act, the real lesson is that all intended building work must be assessed on its merits regarding code compliance rather than assuming that existing or replicated works would comply.

### 3.5 Schedule 1 General Requirements

Once satisfaction is reached that the proposed building work, including any additional work identified further to the assessment under section 3.4 of this document, complies with the *Building Code*, s42A(2)(a) of the Act is satisfied. That leaves three further matters with s42A(2), as discussed in the subsections below, to be considered before the building work can be further assessed as to whether it can be carried out under Schedule 1 of the Act:

#### 3.5.1 Section 42A(2)(b)

Section 42A(2)(b) of the Act requires that if the building:

- (a) *complied with the Building Code immediately before the building work began, it continues to comply with the Building Code, or*
- (b) *did not comply with the Building Code immediately before the building work began, it continues to comply to at least the same extent as it did then comply.*

Once the scope of remedial building work has been documented, the building is to be reviewed to ascertain if there has been any effect on the level of its code compliance, with the following actions arising:

1. If any code compliance is diminished, add the necessary building work to the scope to reinstate the previous level of *Building Code* compliance
2. If code compliance has not been diminished, then proceed with the scope of intended building work (refer Example 5).

#### Example 5

*A question has been asked about the building code compliance of a school building in relation to the as-built configuration of the slab and cladding, relative to the adjacent ground levels. The building has other weathertightness failures unrelated to this issue.*

*The floor of the building is a concrete slab, with its floor level 175mm above the surrounding gardens and lawn. It has direct-fixed EIFS cladding which overlaps the slab by 40mm. This leaves 135mm clearance between the bottom of the cladding and the adjacent ground.*

*Table 18 and Figure 65 of E2/AS1, 3rd Edition, Amendment 7 (effective 1 January 2017) requires:*

*Slab to be 225mm minimum above the surrounding garden and lawn*

*Cladding to overlap the slab by 50mm minimum*

*Cladding to be 175mm minimum above the surrounding garden and lawn.*

*While the building does not comply with any of the above E2/AS1 requirements, the remediation inspection has not identified any weathertightness failures resulting in consequential damage that can be attributed to the as-built configuration of the slab and cladding, relative to the adjacent ground levels.*

*Before and after the remedial work is completed these three dimensions are the same. The level of code compliance (whatever that may be) has not been diminished and therefore the as-built configuration can remain as is.*

*There is no requirement for any building work to be carried out in respect of this as-built construction related to the concrete slab configuration with the cladding and adjacent ground levels.*

### 3.5.2 Section 42A(2)(c)

Section 42A(2)(c) of the Act requires that the building work does not breach any other enactment.

Given the nature of the building work for weathertightness remediation, it is very unlikely that this would occur. However, the requirements under other legislation, such as those in the District Plans should be checked if there is a possibility of a non-compliance arising. Compliance with the Building Act cannot be used as justification for non-compliance with other legislation, such as the Resource Management Act 1991 – and vice versa.

### 3.5.3 Section 42A(2)(d)

Section 42A(2)(d) of the Act requires that the building is not a hazardous substance location that is required to be authorised under the Health and Safety at Work Act 2015 or any regulations made under that Act.

Given the nature of the building work relating to weathertightness remediation and the buildings involved, it is very unlikely that this will be the case. However, enquiries should be made to confirm that the building is not a hazardous substance location. If this is the case, then further enquiries should be made to ascertain whether the building is one that is required to be authorised.

## 3.6 Section 41 Urgent Works

Section 41 of the Act permits building work to be carried out without a building consent if a building consent cannot be obtained in advance because the building work has to be carried out urgently for the purpose of saving or protecting life or health or preventing serious damage to property.

The 'urgent works' provisos within s41 apply whether or not the intended building work involves *weathertightness failure*. The threshold to be tested under s41 is twofold:

1. Is the building work necessary for the purposes of "saving or protecting life or health or preventing serious damage to property"?
2. If so, is there such imminent danger to life, health or property that it is impracticable to obtain a building consent in advance of carrying out the work?

It is not sufficient for there to be danger, there also has to be time constraints that make obtaining the building consent impracticable.

Section 41 of the Act is unlikely to apply to *remedial works* as such building work is likely to be for *weathertightness failures* and *consequential damage* that are obvious and not of recent origin. It is unlikely that the cause of the *remedial work* or the need for it has arisen so suddenly that it is impracticable to obtain a building consent or an Exemption 2 approval in advance of carrying out the works.

However, the true extent of *consequential damage* and the implications for the health and safety of occupants or the integrity of the building is not always obvious until after investigations are carried out. If the situation meets the threshold then the *remedial work* can be carried out without a building consent.

If urgent works are carried out, then s42 of the Act requires an application for a certificate of acceptance to be made as soon as practicable after completing the building works

# 4 Pathway 1: Schedule 1, Exemption 1 Use

## Summary

Pathway 1 typically applies to routine or deferred maintenance work that is not a consequence of *weathertightness failure*. Building works that address *weathertightness failure* cannot use Exemption 1.

### Exemption 1 exclusions:

Assess the intended building work in accordance with section 4.1 of this document to determine if the exclusions apply.

- a. If the answer is yes, Exemption 1 cannot be used. Refer to section 5 for the process for an Exemption 2 application or to section 6 for a building consent application dependent on which is the selected pathway.
- b. If the answer is no, Exemption 1 may be able to be used. Refer to Exemption 1 conditions.

### Exemption 1 conditions:

Assess the intended building work in accordance with section 4.2 of this document to determine if the conditions apply.

- a. If the answer is yes, Exemption 1 can be used.
- b. If the answer is no, Exemption 1 cannot be used. Refer to section 5 for the process for an Exemption 2 application, or to section 6 for a building consent application, dependent on which is the selected pathway.

## 4.1 Exemption 1 Exclusions

Exemption 1 of Schedule 1 of the Act covers general repair, maintenance and replacement, but has specific exclusions noted within subclause (3):

- (a) *complete or substantial replacement of a specified system; or*
- (b) *complete or substantial replacement of any component or assembly contributing to the building's structural behaviour or fire safety properties; or*
- (c) *repair or replacement (other than maintenance) of any component or assembly that has failed to satisfy the provisions of the Building Code for durability, for example, through a failure to comply with the external moisture requirements of the Building Code.*

Specified system is defined in the Act. A specified system must be contained in or attached to a building. It contributes to the proper functioning of a building. An example is an automatic fire sprinkler system.

Exclusion (c) prohibits *remedial work* from being carried out under Exemption 1. However, building work required to address factors that might lead to *imminent failure of building elements* is unlikely to be caught by this exclusion as the components or assemblies involved should not yet have failed to satisfy the provisions of the *Building Code* for durability.

Such building work can be assessed under this section to determine if it can be carried out as of right without a building consent under Exemption 1. Once the intended scope of building work has been identified the three exclusions can be considered.

### 4.1.1 Exclusion 1(3)(a)

Exclusion 1(3)(a) of the Act asks – does the building work include the complete or substantial replacement of a specified system?

Given the nature and scope of the *remediation inspection report* regime, it is unlikely that the replacement of specified systems will be included in any building work. However, if replacement is included, then the guidance for assessment of Exemption 1(3)(b) should be followed to ascertain whether the limitation of 'complete' or 'substantial' is breached.

#### 4.1.2 Exclusion 1(3)(b)

Exclusion 1(3)(b) of the Act asks – does the building work include the complete or substantial replacement of any component or assembly contributing to the building's structural behaviour or fire safety properties?

The first assessment made is whether any of the roof, wall and floor framing elements have had their structural integrity compromised, or whether any fire-rated elements have had their fire-rated performance compromised to the extent that they will require replacement. If there is no replacement required, then this question is easily settled; the answer is no, and this exclusion does not apply.

If there is replacement required, the question arises as what constitutes 'complete or substantial'. This question was dealt with in *Determination 2013/071 The compliance of proposed repairs to an earthquake-damaged foundation including partial replacement of a concrete perimeter foundation wall, at 130 St Martins Road, St Martins, Christchurch*. This Determination concerned the replacement of approximately 40% of a house's perimeter foundation wall. Relevant extracts from this Determination are:

1. The draft MBIE guidance that had been relied upon by the applicant described 'substantial' as 'of considerable importance, size or worth', but went on to provide a quantitative definition of 'a repair of more than 50% will be substantial'.
2. Paragraphs 4.7.1 and 4.7.2 of the Determination considered the entire perimeter foundation wall as a single component or assembly, and then considered the effect of replacement of two thirds of the eastern wall and half of the northern wall, which made up about 40% of the total foundation wall.
3. Paragraphs 4.7.4 and 4.7.6 comment that 'substantial' has a broad interpretation, can be measured both quantitatively and qualitatively, and that a quantitative analysis alone is inadequate. A number of qualitative measures are mentioned, including the replacement wall's contribution to the house's structural integrity.
4. Paragraph 4.7.9 notes that the house has remained in use for two years despite the damage to the foundations, while paragraph 4.7.10 notes other factors regarding the configuration and load-bearing duties of the foundation walls. It then concludes that the section of foundation wall that is to be replaced is unlikely to be substantial in relation to the structural behaviour of the building as a whole.

The guidance provided by this Determination can be summarised as:

1. The replaced component or assembly's effect on, or contribution to, the structural integrity and/or the fire safety of the whole building is to be considered.
2. The assessment is at the larger elemental level.
3. Both qualitative and quantitative analysis is necessary.

Building work required to address factors that might lead to *imminent failure* of *building elements* is at worst likely to involve limited or localised replacement of either structural or fire safety components or assemblies. It is unlikely that this exclusion will apply (refer Example 6).

## Example 6

*A rectangular school building has a mono-slope roof, so that the side walls provide the majority of the structural support to the roof. 50% of the framing to one of the end walls and 20% of the framing to a side wall is to be replaced.*

*All of the exterior walls collectively are considered as a component or assembly. The end wall is not a material contributor to the structural support of the roof, although it will contribute to the horizontal bracing. While the side wall is a main support for the roof, the amount being replaced is not substantial, and the roof support is distributed evenly along the wall.*

*On the face of it, the extent of the proposed replacement would not be considered substantial, and this exclusion is satisfied.*

### 4.1.3 Exclusion 1(3)(c)

Exclusion 1(3)(c) of the Act asks – does the work include repair or replacement (other than maintenance) of any component or assembly that has failed to satisfy the provisions of the *Building Code* for durability, for example, through a failure to comply with the external moisture requirements of the *Building Code*?

The relevant *Building Code* clause provisions for exclusion 1(3)(c) are noted in section 3.3.1 of this document and can be summarised as:

- Clause E2 External Moisture, requiring that the cladding provide adequate resistance to penetration by, and the accumulation of, moisture from the outside so that there is no undue dampness, damage to or degradation of *building elements*, or the occurrence of either condensation or fungal growth.
- Clause B2 Durability requiring that the cladding meets its Clause E2 requirements for a minimum of 15 years and the structure for a minimum of 50 years.

There may be leaking occurring, or the possibility of leaking may exist, as one of the factors that might lead to *imminent failure of building elements* but, unless there exists undue dampness, damage to or degradation of *building elements*, or the occurrence of either condensation or fungal growth, the cladding complies with the *Building Code*. It is not the leaking itself that is the non-compliance with the *Building Code*, it is the existence of the *consequential damage*.

The cladding is required to meet the performance criteria of Clause E2 for a minimum of 15 years. Where cladding has failed on buildings over 15 years old, but it is clear that it has performed for at least 15 years before failing, then it has met the durability requirements of the *Building Code* and is able to be replaced or repaired under Exemption 1. However, often, the evidence will be clear that the cladding failed early in its life and therefore this exclusion will apply.

The structural components and assemblies are required to meet the performance criteria of Clause B1 Structure for 50 years. Water staining, the presence of fungal growths, or even the presence of minor rot or decay does not of itself represent evidence that framing, as a component or assembly, is structurally compromised. Especially if these signs are found and treated in situ early and/or the cause removed, it is likely that compliance with the performance criteria of Clause B1 will remain and the exclusion does not apply. If the structural integrity has been compromised, then the structural components and assemblies have not met the 50 year durability requirement, the exclusion applies and replacement cannot occur under Exemption 1.

If there is any suggestion that the need for repair or replacement of any component or assembly arises from a *weathertightness failure* or any other non-compliance with the *Building Code* durability requirements, it should be assumed that this exclusion applies to the building work in question and Exemption 1 cannot be used.



## 4.2 Exemption 1 Conditions

If the exclusions for Exemption 1 of Schedule 1 of the Act do not apply, then the building work, in terms of any “component or assembly” and “materials”, must be assessed against the conditions included within the first two subclauses, which state:

1. *General repair, maintenance, and replacement*
  - (1) *The repair and maintenance of any component or assembly incorporated in or associated with a building, provided that comparable materials are used.*
  - (2) *Replacement of any component or assembly incorporated in or associated with a building, provided that:*
    - (a) *a comparable component or assembly is used; and*
    - (b) *the replacement is in the same position.*

If these conditions are met then Schedule 1 permits the intended building work to be carried out without a building consent. These subclauses address two separate matters, with the first being ‘repair and maintenance’ and the second ‘replacement’.

### 4.2.1 Repairs and Maintenance

Repair and maintenance is best thought of as where original construction or material remains. Condition 1(1) requires that any repair or maintenance is undertaken with ‘comparable materials’ (refer Example 7).

#### Example 7

*The laps for a single layer membrane roof have delaminated in places due to the original adhesives being poorly applied, but the body of the membrane is in sound condition apart from some areas where it has been damaged by maintenance personnel as they used the roof for access to work on the roof-mounted plant.*

*The original adhesive is no longer available, and the manufacturer has an equivalent, as well as a better, higher-bonding adhesive. The manufacturer has changed the specification of the membrane over time but advises that the current membrane is compatible with that originally installed.*

*The new adhesive and the membrane can be considered to be ‘comparable’.*

*The delaminated sections of the laps are re-adhered with the better, higher bonding adhesive. All other laps are checked, and any that are found with inadequate bonds are pulled apart and re-fixed using the new adhesive. This building work would readily fall within the definition of ‘maintenance’.*

*The damaged sections of membrane are cut out and replaced with the newer, compatible membrane to the current installation specification. That building work would readily fall within the definition of ‘repairs’.*

‘Comparable’ is generally defined as “able to be likened to another; similar” or “of equivalent quality; worthy of comparison”. The discussion under section 4.2.2 Replacement provides guidance as to what ‘comparable’ means in the context of a component or assembly, and this guidance can also be used to further determine what ‘comparable’ means with respect to a ‘material’.

### 4.2.2 Replacement

Replacement is best thought of as where original construction or material no longer exists. Condition 1(2) requires that any replacement is with “a comparable component or assembly” and that the replacement work is “in the same position”. Satisfying these conditions is a more challenging proposition. While each case is unique and must be assessed on its merits, there is useful guidance established in Determinations as well as in case law.

What 'comparable' means was dealt with in *Determination 2013/071 The compliance of proposed repairs to an earthquake-damaged foundation including partial replacement of a concrete perimeter foundation wall, at 130 St Martins Road, St Martins, Christchurch*. Relevant extracts from this Determination are:

1. Paragraph 4.6.3 of the Determination notes a number of aspects of existing and proposed building work to be considered to ascertain if they could be considered 'comparable':
  - they are located in the same position
  - they perform a similar function
  - they can be readily joined
  - there is a similar level of complexity in the construction methods used
  - the replacement component or assembly is commonly used.
2. Paragraph 4.6.6 of the Determination found that the existing and proposed building work were not comparable with respect to:
  - design parameters and function
  - size, complexity and scale.
3. Paragraph 4.6.8 of the Determination found that the existing and proposed building work were also not in the same position because of three factors:
  - The new foundation wall was significantly different in size.
  - It founded on material at a greater depth.
  - It was not located between the same elements.

The case of *Fairley v North Shore City Council* ([2009] NZHC 381), which dealt with a roof replacement, also provides guidance on the meaning of 'comparable' as well as the interpretation of 'in the same position'. Relevant extracts from this case are:

1. "the reference to 'comparable' is directed at the nature of the component or assembly, and not the materials used. The replacement component or assembly must be comparable and in the same position. The focus is properly on this to ensure that the replacement component or assembly does not alter the size, shape, layout, structure or footprint of the building".
2. Venning J found against Fairley because the new roof "was clearly not in the same position as the existing roof. The beams were at least approximately half a metre above the existing roof. In the context of the roof as a component of the building structure, within its parapet walls, the replacement roof was not in the same position as the roof it replaced".

The guidance provided by this Determination and case can be summarised as:

1. 'Comparable', especially with Venning J's reference to the 'nature' of the component or assembly, has a broad application or interpretation. Different materials can be used as long as other criteria are satisfied. The Determination mentions location, function, connection and complexity, while Venning J mentions the effect on the building. Unfortunately there is no discussion in Venning J's decision regarding the degree of differences between materials to give guidance as to whether the materials are comparable or not.
2. 'Position' includes consideration of the volumes occupied and configuration of the replacement work as well as the location.
3. The boundaries of allowable 'replacement' are yet to be discovered (refer Example 8).

### Example 8

1. *If a membrane roof is replaced with a long-run metal roof to a different pitch, the criteria are not all satisfied.*
2. *If a butyl rubber membrane roof is replaced with a torch-on membrane roof, this replacement would satisfy the 'comparable' and 'in the same position' criteria as noted within the Determination and Venning J's findings.*

The above discussion illustrates that the application of Exemption 1 provisions relating to 'replacement' are not always straight forward. The Ministry has decided that Exemption 1 will not be used if there is to be a change to the existing geometry or configuration (such as increasing falls to gutters and roofs).

# 5 Pathway 2: Schedule 1, Exemption 2 Application

## Summary

Pathway 2 is used where the Ministry decides to make an application to the TA to undertake *remedial work* without applying for a building consent as described below.

Compile the following application documentation, with the level of detail appropriate to the level of complexity of the project:

1. TA meeting:
  - a. Meet with TA to discuss and agree what documentation is required for a successful Exemption 2(a) application.
2. Construction documentation:
  - b. Drawings clearly showing extent and detail of proposed *remedial works*.
  - c. Specification written to reflect the actual and intended work, and clearly addressing the scope of proposed *remedial works*.
  - d. Specification to include remediation sections addressing the inspection, identification and verification process undertaken to address the replacement and treatment of framing. Also include remediation specification for non-framing elements, including those that cannot be quantified until onsite work commences.
  - e. Code compliance advice – means of compliance for the building work.
3. Exemption 2(a) consideration:
  - f. Prior weathertightness *remedial work* competence and experience of all parties (consultants, contractors, and others).
  - g. Prior experience of all parties of projects of at least a similar scale and complexity.
  - h. Quality assurance processes applied in the course of the works, comprising:
    - i. framing *remedial works*
    - ii. other *remedial works*.
4. Exemption 2(b) consideration (if required):
  - i. Location of the school (e.g. urban or suburban).
  - j. Location of the building work relative to property boundaries or other buildings.
  - k. How Clause F5 Construction and Demolition Hazards safety matters for people and other property will be addressed.
5. TA Exemption 2 application form to be completed.

## 5.1 Exemption 2 Conditions

Exemption 2 of the Act permits Territorial and Regional Authorities to approve discretionary exemptions for:

Any building work in respect of which the TA considers that a building consent is not necessary for the purposes of the Act because the authority considers that:

- (a) *the completed building work is likely to comply with the Building Code; or*
- (b) *if the completed building work does not comply with the Building Code, it is unlikely to endanger people or any building, whether on the same land or on other property.*

These are separate tests, and there is no limitation on the scale, nature or complexity of building work for which the TA can grant this exemption, with the criteria being set solely by the two conditions noted above. The Ministry's intention is that all building work will comply with the *Building Code* and therefore the application will always be with respect to condition (a) above.

## 5.2 Exemption 2 Compliance

While each TA will have its own processes and documentation requirements for exemption, the MBIE guidance document *Building work that does not require a building consent* (3rd edition, 2014, amended August 2017) suggests the following matters be considered by TAs:

1. When determining the likelihood of compliance – Exemption 2(a):
  - a. Any substantial previous demonstration of competence in carrying out similar work by the people who will carry out this work (e.g. a history of previous building work in the council's district)
  - b. The complexity of the building work relative to the people who will carry it out, and
  - c. Any independent quality assurance systems or checks that will be applied in the course of the work.
2. When determining the likelihood of endangerment – Exemption 2(b):
  - a. The location of the building work (e.g. whether it is high density urban or remote rural)
  - b. How close it will be to the property boundary and/or other buildings.

For Exemption 2(a) applications, the use of these three criteria noted was reinforced in *Determination 2015/021 Regarding the refusal to grant an exemption under Schedule 1(2) for plumbing and drainage work at 91A Hamilton Road, Hataitai, Wellington*. When assessing the code compliance of the proposed building work, the Determination referenced the guidance and then used these three factors (1a-1c above) to evaluate the likelihood of compliance. No other criteria or factors were used.

The test to be satisfied under Exemption 2(a) of the Act is that the building work is 'likely to comply' with the *Building Code*. This is considered a lesser test than that when a building consent is to be issued under s49 "Grant of Building Consent" of the Act. Section 49 states the BCA must grant a building consent if it is satisfied on reasonable grounds that the provisions of the *Building Code* would be met if the building work were properly completed in accordance with the plans and specifications that accompanied the application.

With the application being with respect to Exemption 2(a), it does not need to include information addressing Exemption 2(b) factors (2a-2b above). A meeting early in the project should clarify the necessary application documentation for all parties.

The *remediation inspection report* can be tabled and discussed at the meeting as it provides the TA with confidence that the *weathertightness failures* causing the *consequential damage* have been properly identified and will be addressed by the *remedial works* so that, upon completion, the *remedial work* will comply with the *Building Code*, and with Clauses E2 External Moisture and B2 Durability in particular.

The compiled documentation is likely to be as comprehensive as for a building consent application, and demonstrates that the building work is likely to comply in the following ways:

1. The construction drawings and specifications, together with the code compliance advice will demonstrate to the TA that the designer understands the scope and code compliance issues involved in the project and has addressed them.
2. The prior experience of all parties will demonstrate to the TA that the design and documentation submitted for *remedial work* represents code compliant building work, the builder will produce code compliant building work and, if *remedial work* needs to vary from that documented, the right people are involved to make appropriate decisions to achieve code compliance.
3. The QA processes demonstrate to the TA that:
  - a. the framing *remedial work* will be inspected, identified and carried out to achieve code compliant building work, and

- b. other *remedial work* will either be carried out in accordance with the plans or, if it needs to vary from that documented, it will be recorded.

The Building Act does not require the TA to be involved in any way with the construction phase of the *remedial work* when an Exemption 2 is granted. The competency and experience of the parties involved, the construction documentation and the QA process will be relied upon to ensure that the completed building work will comply with the *Building Code*.

# 6 Pathway 3: Building Consent Application

## Summary

Pathway 3 is used for a building consent application. Typically, this could involve situations where additional upgrade or improvement works are undertaken in conjunction with weathertightness *remedial works* as described below.

Compile the following documentation, with the level of detail appropriate to the level of project complexity:

1. Full building consent application documentation.
2. Section 112 report for means of escape from fire or for access and facilities for people with disabilities if required.
3. Building consent application form.

## 6.1 Building Consent Application

The building consent option is used when the Ministry chooses not to use the Exemption 2 option or the TA does not grant an Exemption. The required documentation is in accordance with the usual building consent application requirements. These are very similar to the Exemption 2 requirements.

## 6.2 Section 49

Under s49 of the Act, the BCA must grant a building consent if it is satisfied on reasonable grounds that the provisions of the *Building Code* would be met if the building work were properly carried out in accordance with the plans and specifications that accompanied the application.

The inclusion in the documentation of the QA process, and the specification section for the inspection, identification and verification process undertaken to address the extent of *hidden damage*, means that the carrying out of *remedial work* associated with the *hidden damage* works is covered by the building consent. When *remedial work* is consented; it is typically only the scale of the hidden *remedial work* that is uncertain, and this would normally be captured by the code compliance certificate application documentation at the completion of works stage. With such an approach there is no need for amendments to the consent as the remediation work progresses and the full extent of *hidden damage remedial work* becomes known.

The comprehensive inspection and reporting process by those involved in the building work satisfies the condition that the work will be “properly carried out in accordance with the plan and specifications”, as well as enabling the BCA to significantly reduce the number of site visits and inspections its officials might otherwise undertake related to the *remedial work* as it is exposed and/or completed.

The documentation prepared for the building consent application therefore provides those reasonable grounds for the intended *remedial work* and so, with s49 satisfied, the consent can be issued.

## 6.3 Section 112

Under s112 of the Act, the BCA cannot issue a building consent unless it is satisfied that after the alteration -

- a. The building will comply as nearly as is reasonably practicable with *Building Code* provisions for means of escape from fire and for people with disabilities, and
- b. the building will –
  - i. if the building complied with the other *Building Code* provisions before the building work began, it will continue to comply; or

- ii. if the building did not comply with the other *Building Code* provisions immediately before the building work began, it will continue to comply at least to the same extent.

### 6.3.1 Means of Escape from Fire

In 2012, new fire protection clauses C1 to C6 were introduced into the *Building Code* and replaced the previous clauses C1 to C4. New *Acceptable Solutions* C/AS1 – C/AS7 and a Verification Method C/VM2 took effect from 10 April 2013. In December 2013, MBIE published guidance for BCAs and TAs titled *Requesting information about means of escape from fire for existing buildings*. While this guidance is mainly for the use of BCAs and TAs, it can also be used as a guide by consultants for the provision of documentation to support a building consent application for alterations to buildings.

The guidance has a three step approach:

1. Consideration of key factors, being:
  - a. Likelihood of the building complying, based on building age and information about an existing building's compliance
  - b. Extent of the proposed building work
  - c. Potential consequences of the building not complying based on the building's importance level and the presence of sleeping facilities.
2. Complete a building scoring sheet included in Appendix 1 of the guide
3. From Table 1 in the guide decide what information is to be provided.

This guidance should be followed for the assessment of all school buildings for which *remedial work* will be carried out under a building consent. Dependent on the resultant building score, the most likely information requirements will be:

1. Score 0 – 11: A simple list of the building's existing fire safety features with a statement of what, if anything, will change as a result of the building work.
2. Score 12 – 19: A gap assessment of the existing building's means of escape from fire against the appropriate *Acceptable Solution* highlighting full compliance, where there are gaps, and for each gap assessing whether 'as nearly as is reasonably practicable' is achieved or what building work will be carried out to improve compliance to that level.

Due to the specific nature of, and need for, the *remedial work*, it is expected that for many projects the assessment will conclude that it will be unnecessary or unreasonable to undertake any upgrade works for means of escape from fire.

### 6.3.2 People with Disabilities

With many of the school buildings requiring *remedial works* being less than 20 years old, they will have been designed and built since the introduction of the Building Act 1991. While this Act was significantly amended in 2004, the *Building Code* remains the code that is in Schedule 1 of the Building Regulations 1992. Although this *Building Code* has gone through numerous amendments over the intervening years, there have been few, if any, amendments with respect to people with disabilities as they would relate to school buildings.

*NZS 4121 Design for Access and Mobility – Buildings and Associated Facilities*, which is the primary applicable standard, was published in 2001, while the relevant *Acceptable Solutions* have seen few material changes in their provisions for people with disabilities since being first issued in July 1992.

It is therefore expected that the school buildings undergoing *remedial work* will already have a high level of compliance, if not full compliance.

Regardless, a gap assessment should be carried out of the existing building's provision for people with disabilities against the applicable *Acceptable Solutions* or NZS 4121, highlighting full compliance, where there are gaps, and for each gap assessing whether 'as nearly as is reasonably practicable' is achieved or what building work will be carried out to improve compliance to that level.



Given the likely level of compliance, together with the specific nature of, and need for, the *remedial work*, it is expected that in the majority of projects it will not be necessary to undertake upgrade works for access and facilities for people with disabilities. However, the Ministry may consider such upgrade works in the wider context in order to enhance the accessibility.

### 6.3.3 Other Building Code Provisions in Section 112

These s112 requirements are the same as those contained within s42A(2)(b), and will have been addressed during the review of the building carried out in section 3.5.1.

# 7 Construction Phase

## 7.1 Policies

The following policies from section 1.4.2 apply to processes and arrangements during the construction phase of *remedial work*:

1. All consultants and others engaged will be chosen on the basis of competency appropriate to the scope and complexity of the *remedial work*.
2. Documentation shall include sufficient specification, construction detailing and referencing of manufacturer's technical literature to provide contractors with clear and adequate guidance on construction requirements for code compliant construction.
3. Contractors are to be selected on the basis of competency and experience in the materials and construction techniques specified and designed.
4. The consultants engaged to document the works will also be engaged to undertake construction observation services.
5. Quality Assurance processes will be implemented to help ensure that the proposed and completed *remedial work* will be code compliant and appropriate to the *weathertightness failures* and *consequential damage* identified.
6. Completion documentation will be obtained and added to the property file.

## 7.2 Procurement

Procurement arrangements for contractors undertaking *remedial work* and consultants providing construction observation services are to follow the principles outlined above.

## 7.3 Construction Phase

During the construction phase of the project the following will occur:

1. The contractor will carry out the *remedial work* in accordance with the construction drawings and specification.
2. Site observation will be undertaken by the consultant at frequencies appropriate to the scale and nature of the *remedial work*, with accurate records, including photographs, kept.
3. QA process for structural framing *remedial work* will be followed to ensure that the extent of this work is accurately recorded.
4. QA process for other *remedial work* will be followed to ensure that the extent of this work is accurately recorded.
5. Site meetings shall be held at frequencies appropriate to the scale and nature of the *remedial work*, attended by the Ministry's representative, consultant and contractor, and have accurate minutes taken.
6. Variations to the scope of *remedial work* will only occur further to written instructions from the consultant and in accordance with Ministry approvals.
7. The consultant will undertake an inspection and issue a Practical Completion Certificate once Practical Completion of the *remedial work* has been achieved by the contractor.

## 7.4 Completion Documentation

Upon completion of the project, the documentation to be placed on the property file will include, but not necessarily be limited to:

1. The construction drawings and specification.
2. All written instructions for variations to the scope of *remedial work*.

3. QA documentation for *remedial work* to framing.
4. QA documentation for other *remedial work*.
5. Minutes of site meetings.
6. Site observation records, including photographs.
7. Practical Completion Certificate (or equivalent provision under the form of contract).
8. The Defects List and Final Completion Certificate (or equivalent provision under the form of contract).
9. The Code Compliance Certificate (for consented works).
10. Warrantees.

## 7.5 Code Compliance Certificate

Section 94 of the Act requires the code compliance certificate to be issued for consented works if the BCA is satisfied on reasonable grounds that the building work complies with the building consent.

If required by the BCA, the following code compliance certificate application documentation is to be compiled, with the level of detail appropriate to the level of project complexity:

1. QA documentation for framing *remedial work*.
2. QA documentation for other *remedial works*.
3. All written instructions for variations to the scope of *remedial work*.
4. Code Compliance Certificate application form.

The QA inspection and reporting process, in conjunction with any variation instructions issued, ensures that the *remedial work* is carried out in accordance with the consented documents. Therefore the provision of the QA documentation will provide the level of satisfaction that the BCA requires to issue the code compliance certificate.

# Appendix A: Glossary

## Acceptable Solution

A non-mandatory means of complying with the *Building Code*. If a building owner chooses to use an *Acceptable Solution* the BCA is required to accept that code compliance has been established.

## Adjacent work

Building work required to a *building element* that does not have *consequential damage* but will be affected by the required *damage repair* and *weathertightness repair* to the extent that the Ministry needs to know of that effect to properly scope the extent and cost of *remedial work*.

## As when it was new

Reinstating the *building element* to the condition and detail as it was at the time it was built, using comparable modern materials.

## Building Code

The *Building Code* is established under the Building Act and is Schedule 1 of the Building Regulations 1992. It contains the functional requirements and performance criteria with which buildings must comply in their intended use. It is a performance-based code enabling building owner's choice of the means by which they meet the code.

## Building element

Any structural or non-structural component and assembly incorporated into or associated with a building. Although for this Remediation Strategy these will usually be elements associated with the building envelope and structure, the definition in the *Building Code* includes fixtures, services, drains, permanent mechanical installations for access, glazing, partitions and temporary supports.

## Consequential damage

The damage to a *building element* caused by a *weathertightness failure*, and that will require *damage repair*. *Consequential damage* includes *observed damage* and *hidden damage*.

## Damage repair

The building work, which may be either repair or replacement, required to fix the *consequential damage* so that the *building element* is returned to a *Building Code* compliant state.

## DT report

The destructive testing report produced under the Building Improvement Programme by building surveyors as a result of destructive or invasive investigation to identify weathertightness issues and construction defects. The *DT report* recommends repair solutions.

## Hidden damage

*Consequential damage* that is not visible from destructive testing and/or visual inspection, but can reasonably be inferred to have occurred from the visible evidence arising from the nature of the *weathertightness failure*, *observed damage* and knowledge of both building science and the building's construction.

## Imminent failure

When it is believed that *weathertightness failure* of a *building element* will occur within twelve months from the time of the *remediation inspection report*.

## Observed damage

*Consequential damage* that is visible from destructive testing and visual inspection, and therefore known to have occurred. If necessary, evidence of *observed damage* can always be supported by photographs, material testing and the like whereas *hidden damage* must be inferred.

## Remediation inspection report

The report prepared to satisfy the requirements of Section 2 of the Ministry's *Weathertightness Remediation and Regulation Strategy*.

## Remedial work

The combined building work arising from *damage repair*, *weathertightness repair* and any *adjacent work*.

## Weathertightness failure

An as-built detail, feature or attribute of a *building element* that has caused any of the following *consequential damage*:

- undue dampness, damage to *building elements* or both caused by the penetration of water,
- undue dampness, damage to *building elements* or both, caused by the absorption or transmittal of moisture
- adverse effects to *building elements* arising from moisture entering the space below suspended floors, or
- condensation, fungal growth or the degradation of *building elements* caused by the accumulation or transfer of external moisture within concealed spaces and cavities.

Any as-built detail, feature or attribute of a *building element* that is not built in accordance with a current *Acceptable Solution* is not considered a *weathertightness failure* unless there is evidence of *consequential damage*.

## Weathertightness repair

The building work, which may be either repair or replacement, required to fix the *weathertightness failure* so that the remediated *building element* is returned to a *Building Code* compliant state.

## Appendix B: References

*Acceptable Solutions and Verification Methods for New Zealand Building Code Clause D1 Access Routes*, 2nd edition, Amendment 6, effective from 1 January 2017, MBIE.

*Acceptable Solutions and Verification Methods for New Zealand Building Code Clause E2 External Moisture*, 3rd edition, Amendment 7, effective from 1 January 2017, MBIE.

*Acceptable Solutions C/AS1 – C/AS7*, MBIE.

*Building Work that does not require a building consent*, 3rd edition, amended August 2017, MBIE.

*C/VM2 Verification Method: Framework for Fire Safety Design – For New Zealand Building Code Clauses C1-C6 Protection from Fire*, MBIE.

*Determination 2013/071 The compliance of proposed repairs to an earthquake-damaged foundation including partial replacement of a concrete perimeter foundation wall, at 130 St Martins Road, St Martins, Christchurch*, MBIE.

*Determination 2015/021 Regarding the refusal to grant an exemption under Schedule 1(2) for plumbing and drainage work at 91A Hamilton Road, Hataitai, Wellington*. MBIE

*Determination 2015/060 Regarding the compliance of concrete exterior stairs at Unit 9A Gunns Crescent, Cashmere, Christchurch*, MBIE.

*Fairley v North Shore City Council* (CRI-2008-404-000408), 2009, High Court, <http://www.nzlii.org/cgi-bin/sinodisp/nz/cases/NZHC/2009/481.html?query=CRI-2008-404-000408>

*Means of establishing compliance: alternative solutions*, 2008, Department of Building and Housing.

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