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# Path Proposal to Building Compliance

# POLICY DOCUMENT

Owner's Proposal framework to Territorial Authority of a process to bring up to and satisfy on reasonable grounds the building complies with the building consent (and building code) in response to Territorial Authority Notice to Fix or after DBH Determination.

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## 1.0 Statutory Obligations of Owner

This section outlines the responsibilities and statutory obligations of the owner of a building, but also shows what they are not required to do.

1. It is the responsibility of the owner to ensure all building work must comply with the building code to the extent required by the Building Act (s17 BA 2004).
2. However, a person who carries out any building work is not required by this Act to— (a) 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; or (b) take any action in respect of that building work if it complies with the building code (s18 BA 2004). Therefore for items where the minimum functional requirements of the building code have been met, the owner has no obligation to carry out works – such as the installation of a cavity system behind a face-fixed cladding system.
3. The onus of proof is on the owner. Therefore it is the owner's responsibility to satisfy the Building Certifier the building complies on Reasonable Grounds. Therefore the driving force behind the path to establishing compliance must come from the owner (see 9.1)

### 1.1. Purpose of this Document

In order to effectively deal with the assessment, alteration and maintenance of a building, a management framework for the building and its various inputs, analysis and outputs must first be established. Once that is done, this will enable the articulation, articulation and referencing of information inside the framework. Then the grounds on which decision are to made can be laid down and any assumptions be drawn forward and agreed upon. This will allow informed, consistent and binding decisions to be made – which are deemed fair from all perspectives. On this foundation, specific action plans can be made to bring the building up to accepted compliance, have it accepted, and then manage the building through its functional life. That is the purpose of this document.

The overarching process of this document is shown in Figure 1. This document is part of a complete process towards compliance as shown in Figure 2.

Figure 1 Overarching Structure of Proposed Path Document to Building Compliance

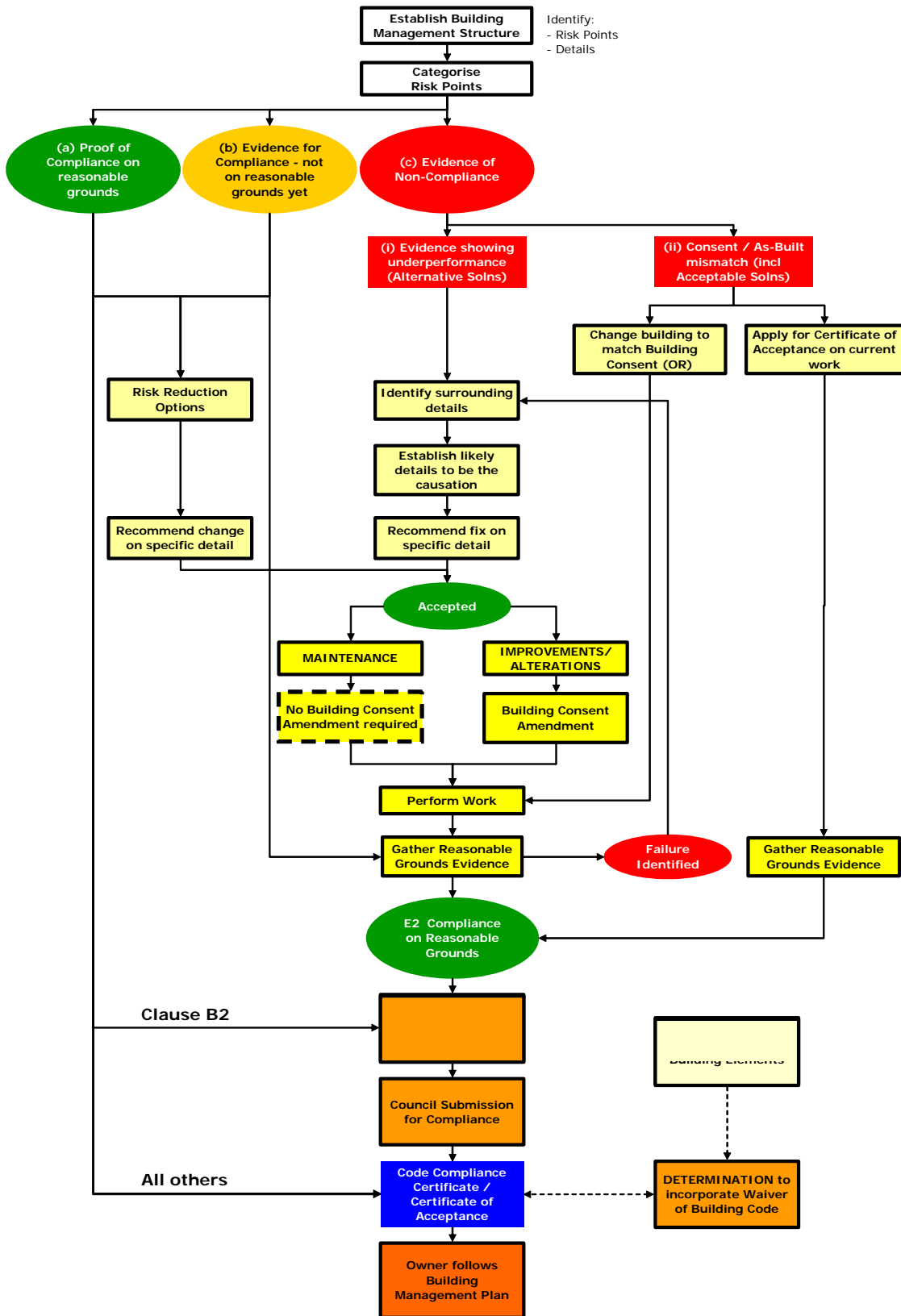
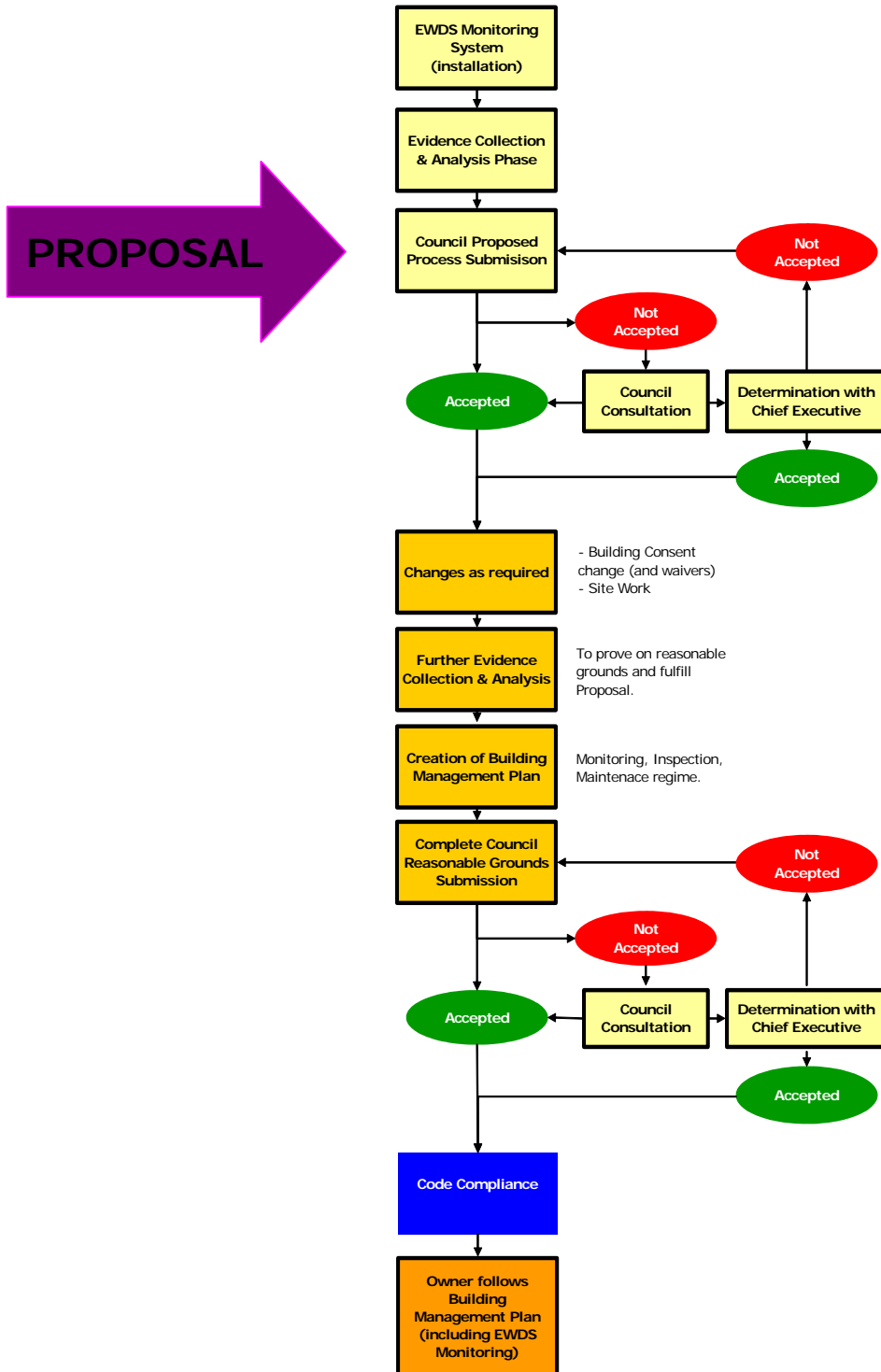


Figure 2 Compliance path for Owner. Arrow shows current position  
CCC Process



## 2.0 Building Management Framework

Before building analysis can begin, a building management framework must first be established.

### 2.1. Building Elements

#### Details

In order to effectively deal with the building, each detail must be uniquely identified to enable its proper management. Details will be grouped according to their general form or function, like doors or windows. Applicable information can then be associated with the appropriate building element.

#### Risk Points

To effectively deal with buildings in an organised way, the building is separated into a number of points called 'risk points'. These risk points are located on the building in the most likely points for moisture to accumulate in the building and cause damage. Research has shown that:

- (a) Where a building wall does not experience undue moisture ingress, moisture in the timber framing preferentially accumulates on the bottom plate, towards the exterior of the wall.
- (b) Where a building wall leaks and enters the building timber framing due to a detail or defect, moisture accumulates above normal levels on the bottom plate directly below.

Therefore these risk points are generally located on the bottom plates around the building at all points where there is potential for moisture ingress below or above (within limits of moisture paths and capillary action) building details that could leak during their lifetime— either through construction defects or inadequate maintenance. These risk points become the 'worst-case-scenario' performance indicators of the building. The performance of the building section surrounding the risk point can then be approximated. This is discussed in depth in later sections.

#### **Risk Point**

A point or area on the building that is susceptible to damage from leaks based on the historic performance of surrounding details, and that damage will have consequence on the structural or operational effectiveness of that point/area.

## 2.2. Risk Point Status

The creation of a risk point building framework allows the integration and cross-referencing of every type of information about a specific point on the building – for example surrounding details, Inspector notes and EWDS building performance analysis all will fall under a specific risk point. The risk point can also take on specific roles in management – such as proving compliance – by being the nodes of reference to which information is hung, then giving a final outcome from the accumulated information.

With regards to the establishment of compliance, the risk points around a building will have a status according to the understood level of compliance of each risk point. That status will be one of four options as shown in Table 1.

**Table 1 Risk Point Status Types**

Status	Compliance Method reference	Type
Proof of Compliance	Acceptable & Alternative Solution	a
Evidence for compliance but not yet on reasonable grounds	Acceptable & Alternative Solution	b
Evidence for non-compliance – underperformance	Alternative Solution only	c (i)
Evidence for non-compliance – Consent/As Built mismatch	Acceptable & Alternative Solution	c (ii)

The evidential outcomes (discussed in later sections) collected around each risk point will designate which status it falls under. For example, where evidence shows underperformance, those risk points affected will then be marked as type c(i) 'Evidence for non-compliance'.

### 2.3. Required Actions

Given the status of a risk point, there will then be specific action required to be taken. These are shown in Table 2.

**Table 2 Required Actions from Risk Point Status**

Risk Point Status	Status Type	Required Action
Proof of Compliance	a	No action required
Evidence for compliance but not yet on reasonable grounds	b	Gather more evidence to complete reasonable grounds
Evidence for non-compliance – underperformance	c (i)	Remediation required
Evidence for non-compliance – Consent/As Built mismatch	c (ii)	Either change detail, change building consent or apply for Certificate of Acceptance.

#### Action for non-compliance – Risk Point Status c(i) & c(ii)

Where there is evidence that areas of the building do not comply with the building code, alterations to the existing area may be required and subsequently shown to be compliant.

#### Action for Underperformance - Risk Point Status c(i)

If the detail is to be assessed under Acceptable Solution, the detail must be changed according to the consented compliance documents. If the detail is to be assessed under Alternative Solution status, the performance of the surrounding area must either be shown to meet the building code despite the evidence shown, or some aspect of details changed to improve the performance of the surrounding detail to meet the minimum performance requirements. Once remedial on specific details are carried out, the area then must prove performance on reasonable grounds.

## NOTES FOR ACCEPTABLE SOLUTIONS

The most common method of establishing building compliance is under Acceptable Solution status. To do this, official compliance documents published by the DBH are specified on the building consent as how the building details will be built. Where the building and the specified acceptable solution match, the building is deemed compliant under Acceptable Solution status. Where differences occur, the building is not compliant. Note that the specific acceptable solution document referred to by the building consent may not be the same as the current acceptable solution document. Technically the building must be assessed with regards to the drawings specified on the building consent.

The remediation of a risk point whose status indicates non-compliance will need to follow the below process:

1. Identify surrounding details of the risk point
2. Establish likely details to be the causation
3. Recommend fix on specific detail(s)
4. Sort out legal technicalities (if improvement of alteration will require Building Consent)
5. Perform work (if improvement of alteration will require Building Consent)
6. Monitor risk point to show for improvement. If no improvement, the problem still exists. The true cause may be another detail, or the detail was not fixed correctly. If adequate improvements are made, the risk point can then begin to accumulate evidence of performance long term.

This process is also the central process as shown in Figure 1.

### **Action for Consent / As-Built Mismatches - Risk Point Status c(ii)**

If there are discrepancies between the consent plans and the as-built building they must be dealt with in one of three ways:

**Method 1:** Change the building to match the building consent plans

**Method 2:** Changing the consent drawings by applying for a building consent amendment under alternative solution status. If a building consent amendment is submitted,

the reasonable grounds that the specified detail will work will be given by the in-service performance as measured by the EWDS System. However Building Consents must be applied for before the building work begins (s44 BA).

**Method 3:** Seek issuance of a Certificate of Acceptance for the unauthorised work (s96). However Certificates of Acceptance are generally for building work where building consent was not obtained.

## 2.4. Recommended Actions

As well as required actions as a result of Risk Point status, there also may be other evidential outcomes (shown in Table 8) that do not require action but can be made as recommendations to the owner. These are shown in Table 3.

**Table 3 Recommended Action from evidential outcomes**

<b>Evidential Outcome</b>	<b>Outcome Type</b>	<b>Recommended Action</b>
Comment on Lack of Proof of Reasonable Grounds	4	Note on Risk Point
Risk Reduction Comment	5	Note on Management Plan under Risk Reduction Section
Compliance Conclusion drawn from Evidence	6	Affects Risk Point Status. Take action as required.
Maintenance Requirement comment	7	Note on Management Plan against Risk Point and/or Detail and/or Detail Group

### **Outcome Type 4 - Comment on Lack of evidence**

Where there is a lack of evidence for either the Territorial Authority or Chief Executive to decide whether on reasonable grounds the building complies with the building consent (and therefore the building code), additional evidence is required to satisfy reasonable grounds. The proposed level of evidence required for this is put forward in this proposal.

### **Outcome Type 5 - Risk Reduction Comment**

As shown in s18 BA 2004, the owner cannot be forced to make improvements above and beyond the minimum level of performance as stated in the building code. Any such work would be deemed as a risk reduction exercise and shall be at the discretion of the owner to decide whether it is in their best interests to consider and execute, following the correct consenting process. Therefore points 1 and 2 will require action,

but any comments of type 3 made will be at the discretion of the owner to decide as to whether to pursue action in this matter as there is no standing legal requirement forcing action.

### **Outcome Type 6 - Compliance Conclusion drawn from evidence**

In some instances, conclusions of overall compliance to either performance or as-built comparisons will be drawn as a result of investigation evidence outcomes and subsequent analysis. These conclusions can impact the status of the affected risk points but not directly require action.

### **Outcome Type 7 – Maintenance Requirement Comment**

Where maintenance requirements are noted by inspectors or others, it is recommended their comments will be noted on the Management Plan against the Risk Point and/or Detail and/or Detail Group it is associated.

### 3.0 Building Performance Analysis Framework

To have a Code Compliance Certificate issued, it is the owners responsibility to satisfy Territorial Authority on reasonable grounds that the building complies with the building consent (as therefore with the building code performance requirements). The first step is to define:

1. What building code clauses are under dispute?

This can be dealt with on a case-by-case basis. The next question relates to the extent of the dispute:

2. For each clause under dispute, what parts of the building are under dispute?

Again, this can be dealt with on a case-by-case basis using the previously stated evidential outcomes from either investigation or determination (especially type 6). After defining (1) the particular clauses in dispute and (2) the parts of the building under dispute, the next two steps are to define for each relevant clause:

3. What actual performance level is adequate for the given clause's performance requirements?
4. What level or quality of performance analysis evidence will constitute reasonable grounds being met to satisfy Territorial Authority?

This Proposal document will put forward a framework to answer those two questions – for the approval of Territorial Authority. As mentioned in 0, in order to have a Code Compliance Certificate issued, it is the owners responsibility to satisfy Territorial Authority on reasonable that the building is compliant (with the building code performance requirements of the clause(s) in question). To do that then for each clause that is applicable, the actual performance level the owner requires must be defined, and the level or quality of performance analysis evidence to constitute reasonable grounds being met to satisfy Territorial Authority must be established in order for the owner to understand their responsibility.

## 4.0 Defining Performance Requirements

The performance requirements are stated in the building code. Adequate interpretation is required to directly relate these requirements with day-to-day analysis data – directed by an understanding of building performance and behaviour. The performance requirements interpretation will be specific to each clause so are dealt with separately in the below sections.

### 4.1. E2 – External Moisture

Interpretation of external moisture requirements for E2 performance: See Figure 3 for External Moisture's overall system movement. Also see 8.4 for E2 section of building code)

#### **PERFORMANCE REQUIREMENTS FOR A RISK POINT AS MEASURABLE BY EWDS SYSTEM**

(Sources referenced below)

**General:** All readings below 18% in the accumulation points for leaks (ie risk points) in timber structures (1) or within limits of the building's EMC levels as defined by the building in comparable locations (2).

**Where EMC is above 18%:** Annual timber moisture level seasonal/ environmental/ climatic movement is below approx 4% MC (3). Building elements can remain durable in given environment (4). See Figure 4 for understanding.

**Location of MC readings:** MC readings are to be at the bottom plate at the accumulation point – generally within 20mm of the cladding face (5).

**Infrequent extreme events:** Where extreme infrequent events such as a storm or accident occurs allowing moisture to ingress, so long as the building system is not exposed to a prolonged period of moisture accumulation and no damage is caused, then the building still complies with E2 (not undue).

**REASONABLE GROUNDS FOR EWDS ANALYSIS ACCURACY**

- Number of MC readings:** At least 6 readings each taken no closer than 2 weeks apart over the span of at least one winter and one summer period. At least 2 readings are to be taken during the astronomical summer months and 4 in the winter months (6).
- MC Reading Equipment:** MC readings must be taken from a permanently inserted probe so as to allow comparison between readings (7).

**SOURCE**

- (1) Literature in past Determinations (including 2005/158) have noted that "moisture levels above 18% recorded after cladding is in place generally indicate that external moisture is entering the structure." (para 5.4).
- (2) MDC data has shown that relating equivalent locations around a building bottom plate to a datum MC will determine whether the points are equivalent to the nominal performance level of the building. This can then be analysed to see if minimum performance has been met.
- (3) MDC data show building equilibrium moisture levels may naturally be higher than 18% in some instances. This is due to the surrounding environment, the building's use and the thermal profiling through the building elements. Moisture level movement in structural timber can be as high as 4% MC and this has been taken as the maximum allowable seasonal/climatic/environmental variation. A movement of over 4% MC may result in the damaging of building elements from expansion and contraction movement. If the moisture levels change rapidly or the change is greater than 4% it is indicative that undue moisture ingress is occurring and the minimum performance requirements are not being met.
- (4) Building elements must be able to withstand the environment they are in. While this is mainly the concern of B2 Durability, it also impacts the acceptable accumulated moisture levels for E2. For instance H4 treated timber can withstand a higher MC accumulation than H1 treated timber.
- (5) The MC level of the timber framing is generally indicative of the MC level of surrounding elements. MDC experimental and field data has shown that in the timber wall structure of a building the MC level in a

timber member will generally distribute itself preferentially towards the exterior of the bottom plate due to (a) wall thermal profiling (b) gravity and (c) timber lignin and cellulose structure. Also see 2.0 (Risk Points). MDC test data has also shown when a moisture ingress event is significant (ie will have consequence) the bottom plate of that wall floor frame will typically experience a raised moisture level due to moisture transport mechanisms. Typically the bigger the moisture ingress the higher the moisture level in the bottom plate will be.

- (6) Field data has shown that buildings experience movement in building MC levels between seasons, past weather patterns or environmental change. 6 readings are to be spaced between the period of a year, to cover a representative variety of weather events. It is especially important to ensure (a) winter readings are taken as this is when the building will experience its heaviest moisture loading throughout the year, and (b) summer readings are taken to establish the expected minimum moisture loading the building will experience. When the minimum and maximum EMC loading is known, the effect of climatic/ seasonal/ environmental change will be known.
- (7) MDC has found that moisture readings must be taken from the same point so they can be comparable to each other. The Mdu Probe (patent pending) Moisture Probe permanently inserted into the measurement location is the preferred option. Where measurements are taken using temporary push-in probes, the read MC level will vary due to the difference in contact quality and depth of insertion. This will affect the reliability of interpretation in comparisons.

Figure 3 Moisture flow patterns and impacts through buildings

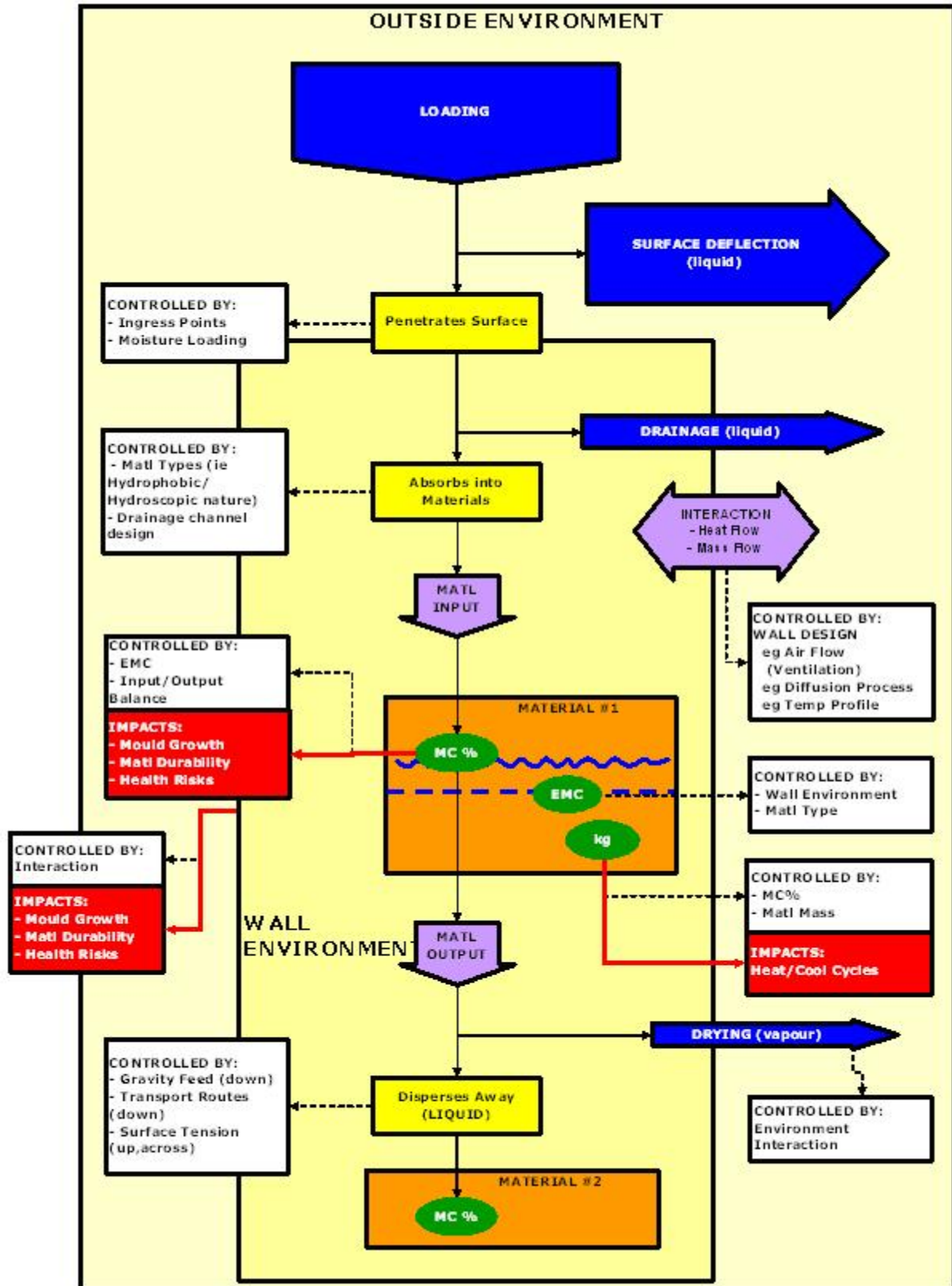
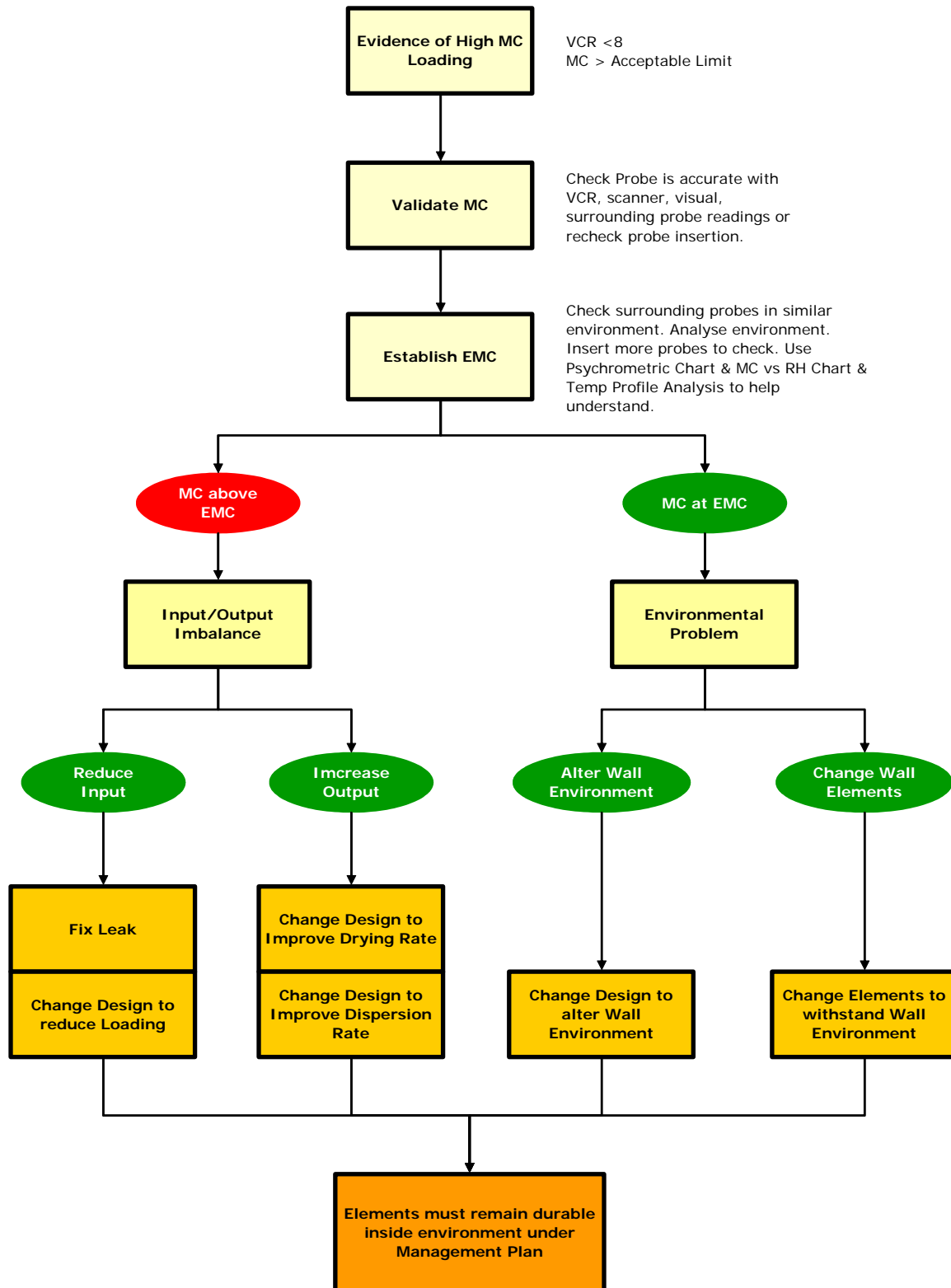


Figure 4 MC Level Inspection Process



## 4.2. B2 – Durability

Interpretation of durability requirements for B2 performance:

B2 relates to the ability of the building in upholding the minimum performance requirements of the other clauses. It also references the future by specifying the time each building element is required to last for with only normal maintenance (see 8.3). Since B2 refers to future performance requirements, then the way to satisfy B2 is to show that (a) the building elements are currently working and (b) there is a specific plan for showing how the building elements will be kept working – through normal maintenance which includes the appropriate monitoring and inspections processes. Figure 5 gives the general considerations required when specifying durability requirements. Also see 8.3 for B2 section of building code.

### PERFORMANCE REQUIREMENTS FOR DURABILITY

(Sources referenced below)

**Current:** Building Element satisfies the minimum performance requirements of the code.

**Future:** The building elements will – with only normal maintenance – continue to satisfy the minimum performance requirements of the building code for the lesser of the specified intended life of the building, if stated, or for a 5 or 15 minimum year term depending on the ease of access to the element as specified.

**Normal Maintenance:** *Inspections* (1) to monitor the building element's performance and environment.

*Activites* (2) to maintain the building element's function.

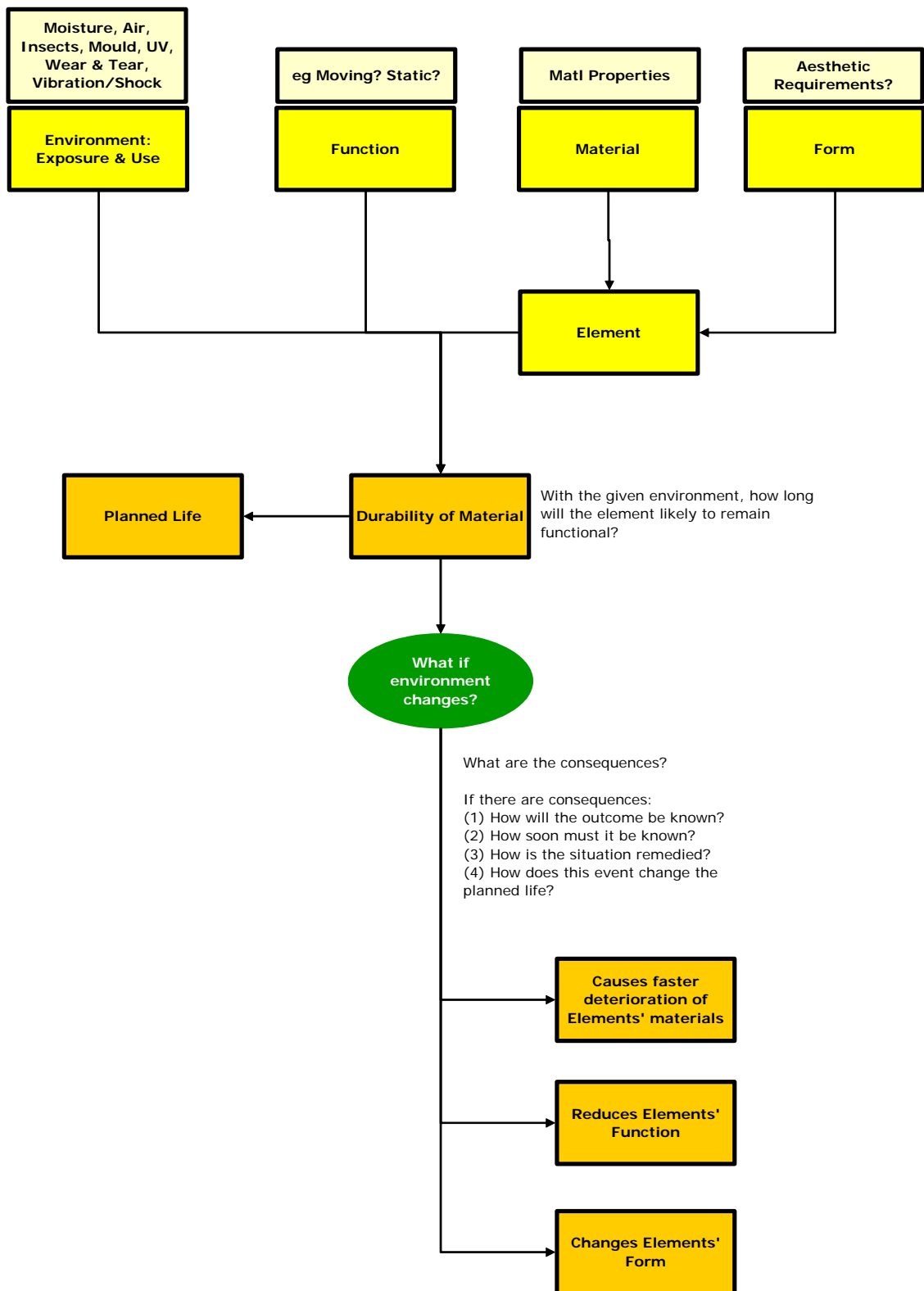
### SOURCE

- (1) *Inspections* – Ensure the surrounding environment of the building element is within the limits as specified by the manufacturer, including MC levels – This can be done by either visual inspection or by measurement gauge if the building element is hidden from view and the condition of the element is not obvious. This can also be gauged by monitoring the materials rate of aging. Aging will become accelerated if the surrounding environment is not adequate. Source:

DBH Determination 2005/123 para 7.4. "Normal Maintenance (of the cladding) means inspections and activities such as regular cleaning, repainting, replacing sealants, and so on." If it is found that the building element is aging at an accelerated rate due to an abnormal environment caused by some other element failure or aging, it would be normal maintenance to find the cause for the failure and re-establish performance.

- (2) *Activities* – The maintenance activities will vary depending on the building element selected. For guidance refer to manufacturer's literature and specifications accompanying the consent application. The adequacies of these activities will be picked up by the inspection processes included in the maintenance procedures.

Figure 5 Items for consideration when specifying durability and management requirements of a building element



## 5.0 Establishing Reasonable Grounds

Once it is known:

- (a) what parts of the building are under question (specific Risk Points),
- (b) what current status they are at (those proven and those unproven), and
- (c) what performance statements need to be proven for each Risk Point

The next step is to establish how the Building Certifier will be satisfied on reasonable grounds that the specified statements are correct. This is the test of reasonable grounds.

To obtain a CCC, compliance of the entire building must be proven on reasonable grounds. Under Alternative Solution status: as-built, in-situ current performance of the entire building must show compliance to the performance requirements based on reasonable grounds. For B2 the requirements are current and future requirements. To achieve this the following concepts must be defined:

1. **Risk Point Evidence Quality Required:** How will the quality of evidence required vary according to that risk point's *Exposure* and *Consequence of Failure*?
2. **Evidence Type & Quality:** What types of evidence collection methods are available and what inherent assumptions come with them?
3. **Approximating Overall Performance:** What reasonable assumptions can be made as to allow practical building assessment?
4. **Satisfying Reasonable Grounds:** What quantity of which evidence types are required for the different exposure/consequence groups of the building to satisfy a decision on reasonable grounds? What reasonable assumptions can be made?
5. **Evidence Type Outcomes:** What impact will evidential outcomes have on risk point status?
6. **Building Management Plan (B2):** How will the future compliance requirements be satisfied
7. **Durability Concerns (B2):** How to deal with concerns of the durability of building elements if the building work in question is a number of years old.

## 5.1. Evidence Quality Requirement

### Evidence required will vary

It is reasonable to assume that the quality and weight of evidence needed to satisfy reasonable grounds will vary between buildings and between points on a building. For instance, a wall with H4 timber on a sheltered side of a building in an low wind zone that has protection from a 2m eave could be approved by sight from a building inspector. However, a parapet-capped wall with untreated timber on a building facing the sea on a high cliff with a multitude of high risk details on it will require more than the steady gaze of a building inspector to be approved, merely because there is more chance of failure and more consequence if failure occurs so there is more to lose.

The amount and quality of evidence required for a building or parts of a building to satisfy performance requirements on reasonable grounds can be determined by the amount of '*exposure*' the building and different parts of the building has in normal operation, and the resulting '*consequence*' the building will experience if a failure occurs. For E2 compliance see Figure 3 for overarching pattern of moisture behaviour.

The quality and weight of evidence required to satisfy reasonable grounds will vary according to exposure and consequence

### Exposure (the chance of failure)

What level of exposure (based on construction risk and external loading) do the different parts of the building have? How does this impact the requirements of satisfying reasonable grounds? For E2, Exposure is defined by the effectiveness of Deflection (See Figure 3):

- **Construction Risk** – the relative likelihood of the given surrounding detail(s) leaking. Potential leak methods and rates. This will be based on available experience, or where possible empirical or statistical data showing performance history
- **Moisture Loading** – How much moisture is loaded on the area during normal operation. Will take into account catchment area and loading protection, wind, rain and sun exposure – including micro effects such as shelter and overhangs, vegetation, retaining walls, drainage patterns). The permanence of exterior shading must be taken into account. There are standards available for determining the site's wind zone, but exposure will be a very point-specific determination that can only be decided from a system perspective and on-site inspection. For the exercise of establishing compliance on reasonable grounds, moisture loading will be assumed to be 'high' unless proven otherwise by onsite investigations showing protection, weather data, risk matrix findings and/or wind zoning.

**Consequence (the consequence of failure)**

What level of consequence will there be if a building element were to underperform? How does this impact the requirements of satisfying reasonable grounds? For E2, consequence is defined by the proponents of Drainage, Drying, Durability and Detection (see Figure 3):

- **Contributory factors:** reduced ability for building area to drain and dry. Reduced inherent durability of materials to withstand altered environment. Area is not regularly monitored or not monitored correctly so detection of potential issues is delayed giving more chance to allow damage to occur.
- **Compensatory/Mitigating Factors:** Ability for building to drain and dry after failure event. Inherent durability of materials to withstand altered environment. Area is regularly monitored with the appropriate methodology to detect issues early so action is taken within window of opportunity to prevent damage.

**Level of Evidence Quality Required**

From this understanding, approximations can be made as to the level of evidential quality required, as shown in Table 4.

**Table 4 Level of Evidential Quality required**

		CONSEQUENCE		
		High	Low	Negligible
EXPOSURE	LOW	MEDIUM	LOW	LOWEST
	MED	HIGH	MEDIUM	LOW
	MED-HIGH	HIGHEST	HIGH	MEDIUM

## 5.2. Evidence Type and Quality

### Evidence Type and Quality

There are a number of collection methods that provide evidence towards compliance of as-built, in-situ performance on reasonable grounds – some are listed in the DBH's 'Toolbox' (see Appendix 9.1). Most of these methods contain hidden assumptions that must be used for the method to provide reasonable grounds toward as-built, in-situ performance. These must be explicitly stated to establish the platform of reasonable grounds for each method. Weak methods require many assumptions. Stronger evidence collection methods require fewer assumptions and their use will lead to more robust conclusions – as there are less complicating factors that can alter the final outcome.

### Degree of Separation and Soundness/Quality of Evidence

A method of summarising the relative quality of a method is to establish its 'Degree of Separation' from showing as-built, in-situ performance (in the future - B2, at present – all others). The larger the degree of separation from the required measure, the more assumptions required. This can also be described as the 'Evidence Quality'.

Overall, the soundness of the evidence collection method can be determined by the help of collaborative expert support or having a determination on a similar proposal. – ie a low quality piece of evidence requires many assumptions to reach its final conclusion. A high quality piece of evidence in turn requires fewer assumptions.

### Comparisons between different Evidence Types

Where sets of evidence of different evidence types draw conflicting outcomes, the outcome with the higher level evidence type will be taken as correct – with the other noted. If this is disputed, a strong argument must be forwarded to prove to the contrary and ruled on by the Territorial Authority or Chief Executive.

### Examples

Table 5 shows evidence collection methods split into 4 levels. The top level is future in-situ, as-built performance. The second level and each level below that has a degree of separation from that together with the inherent assumptions required taken.

**Table 5 Evidence Collection Methods**

Quality of Evidence	Clause	Evidence Collection Method	Assumptions/ Limitations
HIGH QUALITY Future In-Service performance	B2	NZBC Clause B2 - Durability	
Building Management Plan	B2	Method and recording procedures for appropriate: - Inspection - Maintenance - Monitoring using EWDS system to ensure compliance is retained.	Reliant on adequacy of EWDS assumption basis.
HIGH QUALITY Current In-Service performance	E2 B1	Alternative Solution Performance Level (excluding B2)	Point-in-time only
EWDS Analysis of As-built details in service.	E2	Data time, type, collection points and interpretation model must be accurate to ensure performance analysis is accurate	Data is time and point-specific. House degrades naturally over time.
EWDS Analysis	B1	VCR Testing	Timber sample is representative only
MED QUALITY Assumptive Performance	B1 E2	Alternative Solution Performance (excluding B2)	Similarity and sameness between points.
Comparative Performance Analysis	B1 E2	If a particular risk point is performing then a similarly or lower exposed (constructed and loaded) risk point will have the same performance.	Actual performance is not assessed

MED QUALITY  As-Built/ During Construction	Eg E2/AS1	Acceptable Solution Level	In-Service Performance of Details not known.
Construction comparison with similar as-built items	E2	Inspection Checks at various stages. Proof from in-service history the compared detail performs (Sub Surface / Surface Only) G0dd example: Territorial Authority Inspections during construction and final CCC Check off.	Can only assess visual aspects. Ability to satisfactorily cover all details at all key points of construction. Detail may change after inspection.
Comparison with Compliance Documents	E2/AS1		
Comparison with a product previously accepted by a building consent authority	E2		
Local Environmental considerations		Evidence of a sheltered site supported by meteorological or horticultural evidence.	Only gives data on the expected moisture and wind loading of the detail
Comparison with Building Consent drawings			Reliant of adequacy of building consent designs.
LOW QUALITY Consent Drawings	All	All Clauses Apply	In-service performance & accuracy of as-built detail not known.
Manufacturer's Literature		Proof the detail will perform as required in the selected environment and construction	Scope of testing often restricted to simple situations and does not include many in-situ conditions and complicating factors.
Product Appraisal		Short timed testing on specifically as-built unit to replicate in-situ use and extrapolate performance over time and aging.	

<p>QUALITY DEPENDENT ON PREVIOUS ANALYSIS</p>	<p>Eg E2 B1</p>	<p>Alternative Solution Performance</p>	<p>Quality of previous evidence</p>
<p>Implied Performance Analysis</p>	<p>Eg E2 B1</p>	<p>If a risk point is performing, then it can be implied that the surrounding bottom plate is performing, and that the surrounding wall is performing and the surrounding building section is performing.</p>	<p>Actual performance is not assessed</p>

### 5.3. Approximating Performance

#### Reasonable Assumptions for Performance Approximation

The whole building is to have performance analysis as all of the building is a potential risk. However, it is impractical to directly assess the weathertightness performance of every single part of the building. Therefore reasonable assumptions can be made to make performance measurements at selective locations representative of the entire building.

From this basis, the general approach is to obtain direct evidence as to the performance of the 'worst-case-scenarios' (high construction risk) around the building (referred to as Risk Points). The performance of the other lower risk sections in close proximity which are of similar exposure and consequence are then estimated by extrapolating this 'worst-case-scenario' performance onto them. This assumes that of the building, the risk points will generally be the first parts to under-perform, or if a lower-risk area in close proximity under-performs, then the associated risk point will also under-perform. See Figure 6 for the assumption bases laid out in a step by step fashion.

What Figure 6 establishes is that parts of the building other than risk points can be shown on reasonable grounds to perform using evidence that is of a lower quality than direct EWDS and VCR testing. Instead, implied performance is enough to prove an associated piece of building is performing.

**Figure 6 Scoping of Performance Measurement Requirements for Reasonable Grounds**

**BASIS 1 – BUILDING:** Complete building performance measurement at points in time gives understanding of building performance.

**BASIS 2 – BUILDING WALL:** Building Wall performance measurement gives approximation of building performance.

**Assumption:** Building Walls are largely representative of building performance  
**Backing:** Moisture Movement theory, Research Findings  
**Exclusion:** Parts of building that are not the walls

**BASIS 3 – BOTTOM PLATE:** Bottom Plate Performance Measurement gives adequate approximation of building performance.

**Assumption:** Bottom Plate of Walls are the Main Accumulation Points on Walls and will normally be the highest risk portion of the wall.  
**Backing:** Moisture Movement theory, Research Findings  
**Exclusion:** Non-bottom plate portion of walls.

**BASIS 4 – RISK POINT:** Specific Risk Points on Bottom Plate gives adequate approximation of surrounding bottom plate building performance.

**Assumption:** Specific points along the bottom plate at detailed construction walls on building are more likely to fail than non-detailed walls.  
**Backing:** Risk Point identification using MDC Database, Research findings.  
**Exclusion:** Low exposure portions of bottom plate

## 5.4. Satisfying Reasonable Grounds

### Requirements for Reasonable Grounds

Within identical loading patterns, a point on the building with lower (minimal) construction risk will perform to at least equivalent performance as another similar point. Table 6 gives the approximated minimum quality evidence types is required to satisfy reasonable grounds for the different consequence and exposure types.

**Table 6 Minimum Required Evidence to Satisfy Reasonable Grounds**

		General Building Sections	CONSEQUENCE			
			HIGH	MED	LOW	
<b>EXPOSURE</b>	<b>Construction Risk</b>	Low	Whole Building	Implied Performance	Implied Performance	Implied Performance
		Med-low	Building Wall	Implied Performance	Implied Performance	Implied Performance
		Med	Bottom Plate	Implied Performance	Implied Performance	Implied Performance
	<b>Loading</b>	High	Risk Point	Performance Opinion	Performance Opinion	Performance Opinion
			Risk Point	B1: VCR E2: EWDS	Comparative Performance	Performance Opinion
		High	Risk Point	B1: VCR E2: EWDS	B1: VCR E2: EWDS	Comparative Performance

## **Robustness**

With reference to the minimum required evidence level to satisfy reasonable grounds as shown in Table 6, for robustness of process and to ensure undue reliance is not placed on a single evidence method, Table 7 shows the different evidence types that have been deemed as required fields to satisfy reasonable grounds for proving compliance to either acceptable or alternative solution status for B1, E2 and B2. The fields marked as 'rq' are evidential grounds that are deemed as required to satisfy compliance on reasonable grounds.

When performance measurements of single points in houses fail to achieve compliance at those points, the next step is to repeal some assumptions and directly investigate the level above to establish reasonable grounds of the entire building.

Where an area of a building does not get investigated to the level required by Table 7, there must be a strong argument must be forwarded to prove the area still complies on reasonable grounds and ruled on by the Territorial Authority or Chief Executive.

**Table 7 Register of Required Reasonable Grounds Evidence Types**

		Evidence Quality								
		HIGH	←				→		LOW	
		As-Built						Construction	Building Consent	
		Building Mgmt Plan	EWDS	VCR	Comparative Performance	Performance Opinion	Implied Performance	Sub-surface Investigation	Surface Investigation	Appraisals, Tests, Manufacturer's Specs
		B2	E2	B1	E2 B1	E2 B1 B2	E2 B1	E2/AS1 B2	All	
<b>Building Sections &amp; Consequence</b>										
Entire Building		rq	-	-	-	-	rq	rq	rq	rq
Building Walls		rq	-	-	-	-	rq	rq	rq	Rq
Bottom Plate		rq	-	-	-	-	rq	rq	rq	Rq
Risk Point - Low loading		rq	-	-	-	rq	-	rq	rq	rq
Med loading/ consequence Risk Point		rq	-	-	rq	-	-	rq	rq	rq
High loading/ consequence Risk Point		rq	rq	rq	-	-	-	rq	rq	rq

### 5.5. Evidence Type Outcomes:

In the previous section, each set of evidence will be graded in evidence quality according to their type. The next step is to establish what different outcomes the evidence types will have and how they will affect the risk point status. Each outcome will have a different effect on the risk point status levels. Inspection notes on the building can be classified in one of seven ways. This is shown in Table 8 below and some are explained in more depth below

**Table 8 Evidence Type Outcomes and Impact on Risk Point status**

Type	Description	Risk Point status outcome
1	Evidence showing Compliance	(b) Evidence for compliance
2	Evidence showing Non-Compliance – underperformance	(c)i Evidence of Non-Compliance - underperformance
3	Evidence showing Non-Compliance – mismatch between consent drawings and as-built details.	(c)i Evidence of Non-Compliance – Mismatch
4	Comment on lack of proof of reasonable grounds	No effect – noted
5	Risk Reduction Point of Interest	No effect – logged on Management Plan
6	Compliance conclusion drawn from evidence	(a) (b) or (c)
7	Maintenance/Durability comment	No direct effect – logged for Management Plan

### **(1) Evidence showing Compliance**

Evidence stating, showing or suggesting compliance on reasonable grounds – either by way of construction detailing for Acceptable Solutions or performance proof for Alternative Solutions.

### **(2 & 3) Evidence showing Non-Compliance**

Evidence stating, showing or suggesting non-compliance on reasonable grounds – either by way of performance failure (Alternative Solutions) or Consent/As-built mismatch – in comparison the details on the building and the consent drawings are not identical (Acceptable/Alternative Solution status).

### **(4) Comments on lack of proof of reasonable grounds**

Comments about the lack of proof on reasonable grounds the point on the building complies with the performance requirements (Alternative Solution status) or built according to the Consented Drawings (Acceptable Solution).

### **(5) Risk Reduction Points of Interest**

Risk Reduction Points of Interest – comment noted by the inspector of the general construction or behaviour of the building. Notes will often draw comparison between the building and good construction practices, accepted construction practices or relevant compliance documents. This will be logged in the Building Management Plan Risk Reduction section.

### **(6) Compliance Concerns drawn from Evidence**

A recognised person may draw specific compliance conclusions during an inspection procedure or upon analysis of inspection information. This conclusion will have direct impact on the status of the involved risk point(s).

### **(7) Maintenance/Durability comments**

A maintenance/durability comment is where a component is noted for its signs of wear or where a comment is made as to the maintenance requirements of a particular detail or detail group. This will be logged and referred to the Building Management Plan.

## 5.6. Building Management Plan

B2 must be satisfied by showing how the building and its various elements intend to last over the course of the building's life. The Building Management Plan is the document for showing how this will be achieved and is an important part of proving compliance to B2 Durability for the building. It is also a functional document for the owner and acts like a building instruction manual showing how to effectively maintain the building and its details.

This will be done through as well as regular scheduled activities to ensure the building continues to satisfy the performance requirements of the building code for the remaining life of the building.

To satisfy these requirements, the Building Management Document will include:

### 1. Scheduled Tasks

- a. Inspections: Scheduled inspections using visual inspection and EWDS monitoring,
- b. Activities: Scheduled maintenance items.

### 2. Procedure Documents

- a. Maintenance processes in response to the outcomes of inspection activities
- b. Actions in response to extreme circumstances - for example storms.

### 3. Options for Risk Reduction – design change options that will reduce building risk that can be effected at a later date at the discretion of the owner.

## 5.7. Durability Concerns (B2)

Concern may exist surrounding the age of building elements (relating to B2 durability requirements) especially if practical completion of the building is a number of years before the current application for a Code Compliance Certificate. Also there are powers in s67 of the Building Act that allow the Territorial Authority to grant building consent subject to waivers or modifications of building code. A recently issued DBH Determination (by John Gardiner - Determinations Manager) summarises the steps required to deal with this concern, (extracted from Determination 2006/42 - 19 May 2006):

Para 5.6 As set out in clause 2.6 of the notice to fix, the territorial authority has concerns about the durability, and hence the compliance with the Building Code, of the elements of the building listed in the notice. I am of the opinion that the territorial authority should amend the original building consent by making it subject to a modification of the Building Code in accordance with section 34(4) of the Act to the effect that the durability of the elements about which they have concerns is to be measured from the date of the substantial completion of the building instead of from the time of the issue of the code compliance certificate. The land information memorandum relating to this house should also be amended in line with the above. For the purposes of this determination I am of the opinion that "substantial completion" of the building is achieved when the building is ready for occupation.

Para 5.7 I therefore determine that the territorial authority is to amend the original consent to incorporate a modification of clause B2 of the Building Code to the effect that the required durability periods for the elements of concern to the territorial authority are to be measured from the date of the substantial completion of the building and not from the date of the issue of a code compliance certificate. If the durability period relating to any element would have expired under the above criteria, consideration should be given to waiving the B2 requirement for these items.

Para 5.8 Following this amendment, any code compliance certificate subsequently issued by the territorial authority should be issued in line with the amended building consent.

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# **BUILDING LAW APPENDIX**

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## 6.0 Controlling Structure of 1992 Building Act Legislation

Source: <http://www.building.dbh.govt.nz/e/publish/cdocs-furtherinfo.shtml>

12 June 2006

### Compliance Documents and the Building Code - how they fit together

In combination, the New Zealand Building Code and Building Code Compliance Documents have a five-level structure that follows an international approach to performance-based building regulations.

The five levels are:

1. Objectives
2. Functional requirements
3. Performance criteria
4. Verification methods
5. Acceptable Solutions

In New Zealand the structure works like this:

### New Zealand Building Code - Mandatory

Originally established under Part VI of the Building Act 1991, and set out in the First Schedule to The Building Regulations 1992. It is a performance-based code in which each technical clause has three criteria.

- **Level 1. Objective** - The social objectives which the building must achieve.
- **Level 2. Functional requirement** - Describes what the building must do to satisfy the social objective.
- **Level 3. Performance** - Qualitative or quantitative criteria which the building must meet in order to comply.

### Compliance Documents - Non-mandatory

Issued by the Department of Building and Housing, these documents provide methods of compliance with the Building Code. They contain:

- **Level 4. Verification Methods** - Tests and calculation methods by which an alternative solution may be evaluated for compliance.
- **Level 5. Acceptable Solutions** - Examples of prescriptive solutions which provide a means of compliance.

Compliance Documents do not have the same mandatory status as the Building Code. They are always described either generally as the Compliance Documents, or referred to specifically by their unique identification numbers. For example, G8/VM1 and G8/AS1 as given in the example below.

An example of how the building controls are written follows. In this instance, it is Building Code clause G8 Artificial light.

### **Example - G8 Artificial light**

#### **Objective**

G8.1 The objective of this provision is to safeguard people from injury due to lack of adequate lighting.

#### **Functional requirement**

G8.2 Spaces within buildings used by people shall be provided with adequate artificial lighting which, when activated in the absence of sufficient natural light, will enable safe movement.

#### **Performance**

G8.3 Illuminance at floor level shall be no less than 20 lux.

#### **Verification Method G8/VM1**

##### 1.0 Illuminance

1.0.1 An acceptable verification method for the measurement of illuminance is contained in NZS 6703 Section 11.

*(Continues with paragraphs 1.0.2 to 1.0.5)*

#### **Acceptable Solution G8/AS1**

##### 1.0 Illuminance

1.0.1 To provide a minimum illuminance of 20 lux, the total wattage required per m<sup>2</sup> of floor area is shown in Table 1.

*(Continues with paragraphs 1.0.2 and 1.0.3)*

## **7.0 Building Act**

### **7.1. Purpose of Building Code (s16)**

#### **s16 Building code: purpose**

The building code prescribes functional requirements for buildings and the performance criteria with which buildings must comply in their intended use.

### **7.2. Requirement to comply with Building Code (s17)**

#### **s17 All building work must comply with building code**

All building work must comply with the building code to the extent required by this Act, whether or not a building consent is required in respect of that building work.

Compare: 1991 No 150 s 7(1)

### **7.3. Building Work not required to achieve performance criteria additional to or more restrictive than building code (s18)**

#### **s18 Building work not required to achieve performance criteria additional to or more restrictive than building code**

(1) A person who carries out any building work is not required by this Act to—

(a) 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; or

(b) take any action in respect of that building work if it complies with the building code.

(2) Subsection (1) is subject to any express provision to the contrary in any Act.

## **7.4. Issuing a Project Memorandum (s34)**

### **s34 Issue of project information memorandum**

(1) A territorial authority must issue a project information memorandum within 20 working days after receiving an application under section 31(1)(a) or section 32.

(2) However, if the territorial authority requires any information under section 33(1)(b) or (c), the period specified in subsection

(1) is suspended until it receives the information.

(3) The territorial authority must issue the project information memorandum within 10 working days after receiving that information.

(4) A territorial authority may, within the period specified in subsection (1) or, if applicable, in subsection (3), reissue a project information memorandum if the territorial authority—

(a) considers, on reasonable grounds, that the project information memorandum contains an error or omission; or

(b) receives information that affects the project information memorandum.

## **7.5. Building Consents must be issued before works carried out (s44)**

### **s44 When to apply for building consent**

(1) An owner intending to carry out building work must, before the building work begins, apply for a building consent to a building consent authority that is authorised, within the scope of its accreditation, to grant a building consent for the proposed building work.

## **7.6. Waivers and modifications (s67-69)**

### **s67 Territorial authority may grant building consent subject to waivers or modifications of building code**

(1) A building consent authority that is a territorial authority may grant an application for a building consent subject to a waiver or modification of the building code.

(2) A waiver or modification of the building code under subsection (1) may be subject to any conditions that the territorial authority considers appropriate.

(3) Subsection (1) is subject to section 69.

### **68 Territorial authority must notify chief executive if waiver or modification granted**

If a territorial authority grants a building consent subject to a waiver or modification of the building code, the territorial authority must notify the chief executive of the waiver or modification.

### **69 Waiver or modification may only be granted by chief executive in certain cases**

(1) This section applies to a waiver or modification of the building code that relates to—

(a) an existing building to which section 118 applies (Access and facilities for persons with disabilities to and within buildings); and

(b) access and facilities for use by people with disabilities.

(2) If this section applies, the chief executive may grant a waiver or modification only in a determination issued under subpart 1 of Part 3.

(3) This section does not apply to a waiver or modification of the building code that relates to a new building.

## **7.7. Issuance of Code Compliance Certificate (s94)**

### **s94 Matters for consideration by building consent authority in deciding issue of code compliance certificate**

(1) A building consent authority must issue a code compliance certificate if it is satisfied, on reasonable grounds,—

(a) that the building work complies with the building consent; and

(b) that,—

(i) in a case where a compliance schedule is required as a result of the building work, the specified systems in the building are capable of performing to the performance standards set out in the building

consent; or

(ii) in a case where an amendment to an existing compliance schedule is required as a result of the building work, the specified systems that are being altered in, or added to, the building in the course of the building work are capable of performing to the performance standards set out in the building consent.

## **7.8. Certificate of Acceptance (s96)**

### **96 Territorial authority may issue certificate of acceptance in certain circumstances**

(1) A territorial authority may, on application, issue a certificate of acceptance for building work if—

(a) an owner, or the owner's predecessor in title (whether an immediate predecessor in title or otherwise), carried out building work for which—

(i) a building consent was required; and

(ii) the building consent was not obtained; or

(b) section 42 applies (which relates to building work that had to be carried out urgently); or

(c) section 91(3) and (4) applies (which relates to the situation where a building consent authority that is not a territorial authority is unable or refuses to issue a code compliance certificate in relation to building work for which it granted a building consent).

(2) A territorial authority may issue a certificate of acceptance only if it is satisfied, to the best of its knowledge and belief and on reasonable grounds, that, insofar as it could ascertain, the building work complies with the building code.

(3) This section—

(a) does not limit section 40 (which provides that a person must not carry out any building work except in accordance with a building consent); and

(b) accordingly, does not relieve a person from the requirement to obtain a building consent for building work.

## **7.9. Compliance Schedule (s100)**

(2) A compliance schedule is required for a building (except a building used wholly as a single household unit) if the building has any specified systems.

## 8.0 Building Regulations 1992

### 8.1. Building Code (s3)

#### **s3. Building code—**

- (1) In accordance with Part VI of the Act, the building code shall be the building code set out in the First Schedule to these regulations.
- (2) Except as otherwise provided by the Act, each building shall achieve the performance criteria specified in the building code for the classified use of that building, and, if the building has more than one classified use, any part of it used for more than one classified use shall achieve the performance criteria for each such classified use.
- (3) The classified use or uses of a building or part of a building shall be the ones that most closely correspond to the intended use or uses of that building or part of that building.

## 8.2. B1 – Structure

*Building Regulations 1992*

*First Schedule*

### OBJECTIVE

**B1.1** The objective of this provision is to:

- (a) Safeguard people from injury caused by structural failure,
- (b) Safeguard people from loss of *amenity* caused by structural behaviour, and
- (c) Protect *other property* from physical damage caused by structural failure.

### FUNCTIONAL REQUIREMENT

**B1.2** *Buildings, building elements* and *sitework* shall withstand the combination of loads that they are likely to experience during *construction* or *alteration* and throughout their lives.

### PERFORMANCE

**B1.3.1** *Buildings, building elements* and *sitework* shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during *construction* or *alteration* and throughout their lives.

**B1.3.2** *Buildings, building elements* and *sitework* shall have a low probability of causing loss of *amenity*

through undue deformation, vibratory response, degradation, or other physical characteristics throughout their lives, or during *construction* or *alteration* when the *building* is in use.

**B1.3.3** Account shall be taken of all physical conditions likely to affect the stability of *buildings, building elements* and *sitework*, including:

- (a) Self-weight,
- (b) Imposed gravity loads arising from use,
- (c) Temperature,
- (d) Earth pressure,
- (e) Water and other liquids,
- (f) Earthquake,
- (g) Snow,
- (h) Wind,
- (i) *Fire*,
- (j) Impact,
- (k) Explosion,
- (l) Reversing or fluctuating effects,
- (m) Differential movement,
- (n) Vegetation,
- (o) Adverse effects due to insufficient separation from other *buildings*,

(p) Influence of equipment, services, non-structural elements and contents,

(q) Time dependent effects including creep and shrinkage, and

(r) Removal of support.

**B1.3.4** Due allowance shall be made for:

(a) The consequences of failure,

(b) The intended use of the *building*,

(c) Effects of uncertainties resulting from *construction* activities, or the sequence in which *construction* activities occur,

(d) Variation in the properties of materials and the characteristics of the site, and

(e) Accuracy limitations inherent in the methods used to predict the stability of *buildings*.

**B1.3.5** The demolition of *buildings* shall be carried out in a way that avoids the likelihood of premature collapse.

**B1.3.6** *Sitework*, where necessary, shall be carried out to:

(a) Provide stability for *construction* on the site, and

(b) Avoid the likelihood of damage to *other property*.

**B1.3.7** Any *sitework* and associated supports shall take account of the effects of:

(a) Changes in ground water level,

(b) Water, weather and vegetation, and

(c) Ground loss and slumping.

### 8.3. B2 – Durability

(*Building Regulations 1992*)

*First Schedule*

*Includes Building Amendment Regulations 1997*

#### OBJECTIVE

**B2.1** The objective of this provision is to ensure that a *building* will throughout its life continue to satisfy the other objectives of this code.

#### FUNCTIONAL REQUIREMENT

**B2.2** *Building* materials, components and *construction* methods shall be sufficiently durable to ensure that the *building*,

without reconstruction or major renovation, satisfies the other functional requirements of this code throughout the life of the *building*.

#### PERFORMANCE

**B2.3.1** *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: .

(Performance B2.3.1 applies from the time of issue of the applicable *code compliance certificate*. *Building elements* are not required to satisfy a durability performance which

exceeds the *specified intended life* of the *building*)

(a) The life of the building, being not less than 50 years, if:

(i) Those *building elements* (including floors, walls, and fixings) provide structural stability to the *building*, or

(ii) Those *building elements* are difficult to access or replace, or

(iii) Failure of those *building elements* to comply with the *building code* would go undetected during both normal use and maintenance of the *building*.

(b) 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, or

(ii) Failure of those *building elements* to comply with the *building code* would go undetected during normal use of the *building*, but would be easily detected during normal maintenance.

(c) 5 years if:

(i) The *building elements* (including services, linings, renewable protective coatings, and *fixtures*) are easy to access and replace, and

(ii) Failure of those *building elements* to comply with the *building code* would be easily detected during normal use of the *building*.

**B2.3.2** Individual *building element* which are components of a *building* system and are difficult to access or replace must either:

- (a) All have the same durability, or
- (b) Be installed in a manner that permits the replacement of *building elements* of lesser durability without removing *building elements* that have greater durability and are not specifically designed for removal and replacement."

## 8.4. E2 - External Moisture

*Building Regulations 1992*

*First Schedule*

### OBJECTIVE

**E2.1** The objective of this provision is to safeguard people from illness or injury which could result from external moisture entering the *building*.

### FUNCTIONAL REQUIREMENT

**E2.2** *Buildings* shall be constructed to provide *adequate* resistance to penetration by, and the accumulation of, moisture from the outside. Elements and building as a whole in all as-built environments

### PERFORMANCE

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

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

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

**E2.3.4** *Building elements* susceptible to damage shall be protected from the adverse effects of moisture entering the space below suspended floors.

**E2.3.5** *Concealed spaces* and cavities in *buildings* shall be constructed in a way which prevents external moisture being transferred and causing condensation and the degradation of *building elements*.

**E2.3.6** Excess moisture present at the completion of *construction*, shall be capable of being dissipated without permanent damage to *building elements*.

## 8.5. E3 – Internal Moisture

*Building Regulations 1992*

*First Schedule*

*Includes Building Amendment Regulations 2004*

### OBJECTIVE

**E3.1** The objective of this provision is to—

- (a) safeguard people against illness, injury, or loss of *amenity* that could result from accumulation of internal moisture; and
- (b) protect *household units* and *other property* from damage caused by free water from another *household unit* in the same *building*.

### FUNCTIONAL REQUIREMENT

**E3.2** *Buildings* must be constructed to avoid the likelihood of—

- (a) fungal growth or the accumulation of *contaminants* on linings and other *building elements*; and
- (b) free water overflow penetrating to an adjoining *household unit*; and
- (c) damage to *building elements* caused by the presence of moisture.

### PERFORMANCE

**E3.3.1** An *adequate* combination of *thermal resistance*, ventilation, and space temperature must be provided to all *habitable spaces*, bathrooms, laundries, and other spaces where moisture may be generated or may accumulate.

(Performance E3.3.1 does not apply to *communal non-residential, commercial, industrial, outbuildings, or ancillary buildings*.)

**E3.3.2** Free water from accidental overflow from *sanitary fixtures* or *sanitary appliances* must be disposed of in a way that avoids loss of *amenity* or damage to *household units* or *other property*.

**E3.3.3** Floor surfaces of any space containing *sanitary fixtures* or *sanitary appliances* must be *impervious* and easily cleaned.

**E3.3.4** Wall surfaces adjacent to *sanitary fixtures* or *sanitary appliances* must be *impervious* and easily cleaned.

**E3.3.5** Surfaces of *building elements* likely to be splashed or become contaminated in the course of the *intended use* of the *building*, must be *impervious* and easily cleaned.

**E3.3.6** Surfaces of *building elements* likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into *concealed spaces*.

## 9.0 Guidance Documents

### 9.1. Guiding Document - Official Alternative Solution Process for Proving Compliance with NZBC on Reasonable Grounds

Source: [http://www.building.dbh.govt.nz/e/publish/industry\\_alternative.shtml](http://www.building.dbh.govt.nz/e/publish/industry_alternative.shtml)

12 June 2006

#### **What an Alternative Solution is:**

An alternative solution is anything outside the Compliance Documents that complies with the Building Code. It can include a material, component or construction method that differs completely or partially from those described in the Compliance Documents. It can be a minor variation from a Compliance Document, or a radically different design and construction approach.

#### **How to obtain a Building Consent for Alternative Solutions:**

To obtain a building consent for an alternative solution, the building consent authority must accept that the proposed building work will comply with the Building Code. Only then will a building consent be issued.

#### **Onus of Proof is on Homeowners:**

The onus of proof of compliance is with the building owner (or the owner's agent, e.g. an architect, engineer, or builder) who needs to provide sufficient evidence that the proposal will meet the provisions of the Building Code. The standard of proof may be significant - the building consent applicant's word that it will work will usually not be sufficient.

#### **The Process:**

**Scope the project:** Determine which parts of the project are not covered by a Compliance Document. These parts will require an alternative solution.

**Identify the relevant Building Code clauses:** Note that Clause B2 Durability must always be included.

**Identify the performance criteria that apply** (How much is needed - by quantitative or qualitative measures)

**Establish the proof:** The documentation for the proposed alternative solutions must contain sufficient proof to show that the performance criteria of all identified clauses will be met. A building consent application will be accepted when compliance is clearly established.

### **The toolbox:**

A range of 'tools' exists to establish the proof, i.e. to provide the quantitative or qualitative measures that will verify compliance.

#### **1. Is there a calculation or test method available?**

#### **2. Comparison with a Compliance Document.**

Compliance Documents are one set of instructions that lead to compliance. Deviation from some of the steps is possible to accommodate different materials or detailing for example. In many cases, Compliance Documents provide an excellent guidance mechanism for assessing the robustness of an alternative solution.

#### **3. Comparison with a product previously accepted by a building consent authority.**

For example, some building methods not covered by Compliance Documents may have been previously accepted by a building consent authority on a comparable building.

#### **4. Is there a determination on a similar proposal?**

Although determinations are case-specific and therefore have a very limited application they do provide sound guidance on interpretation of the Building Act and Building Code at a particular point in time.

#### **5. Is it a proprietary product?**

The manufacturer's literature may contain technical data that supports the proposal. Better still is a current appraisal certificate that describes how compliance with the Building Code is achieved.

#### **6. Is there proof that arises from in-service history?**

For example, has the proposed material been used in a similar application on a similar site. Overseas evidence can be used, but be mindful of New Zealand conditions such as seismic activity, exposure to the salt-laden winds, and wind-driven rain.

### **7. Is there proof that arises from local environmental conditions?**

For example, a very sheltered site that is supported by meteorological or horticultural evidence.

### **8. Is there collaborative expert support?**

Peer review of the proposed solution or opinions obtained from credible organisations. A producer statement can be provided for the proposal, however, the building consent authority has the discretion to accept or decline it.

### **Present your evidence**

Provide a strongly argued case to the building consent authority by including as many of the above 'tools' as possible. Be sure to state exactly what Building Code clauses and performances are being addressed. The clearer the supporting documentation the easier the evaluation of it will be, and note that outside help may be sought by the building consent authority in assessing all or specific aspects of a proposed alternative solution.