



Determination 2012/002

Compliance of proposed building work on land subject to inundation at 138 Kauaeranga Valley Road, Thames

1. The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing (“the Department”), for and on behalf of the Chief Executive of the Department.
- 1.2 The parties to the determination are:
- the building owners A Gillooly and G Small (“the applicants”)
 - the Thames Coromandel District Council (“the authority”) carrying out its duties and functions as a building consent authority and a territorial authority.
- 1.3 This determination arises from a proposal by the applicants to build a house (“the proposed work”) in the flood plain of the Kauaeranga River being land which is subject to inundation. It is proposed to locate the house on a specifically engineered building platform in order to raise the house above the level of a 100-year flood event. In conjunction with building the platform the applicants propose to carry out earthworks to modify the river terrace adjacent the river to compensate for the obstruction caused by the platform. The authority considered that the proposed work will not meet the requirements of the Building Code in respect of the possible adverse effect of the work on neighbouring property.
- 1.4 I consider that the matter to be determined² is whether the proposed work would, in principle, comply with Clause E1 Surface water³ of the Building Code (Schedule 1, Building Regulations 1992). I note that a formal application for building consent has been subsequently made by the applicants and refused by the authority (refer paragraph 3.8). I consider the reasons for the authority’s decision to refuse the application do not have a direct bearing on matter to be determined.
- 1.5 In making my decision, I have considered the submissions of the parties, the report of a firm of independent consultants (“the experts”) commissioned by the

¹ The Building Act, Building Code, Compliance documents, past determinations and guidance documents issued by the Department are all available at www.dbh.govt.nz or by contacting the Department on 0800 242 243.

² Under section 177(1)(a) of the Act

³ In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

Department to advise on this dispute, and the other evidence in this matter. I have not considered any other aspects of the Act or the Building Code; in particular I have not considered the compliance of the proposed building platform with Clause B1 Structure.

- 1.6 The relevant sections of the Act and the Building Code are provided in Appendix A, and a decision tree relating to building sites subject to natural hazards in Appendix B.

2. The building work

- 2.1 The building platform is 15 metres long x 7 metres wide in plan and is situated on a property with a southern boundary bordering on the Kauaeranga River. The platform is proposed to be some 165 metres from this southern boundary, and consists of engineered fill contained within concrete retaining walls on three sides and with a battered slope at the remaining side. Based on models prepared by Environment Waikato, the finished floor level will be at RL 9.1 metres, which is some 500mm above the 100-year flood level.
- 2.2 It is proposed that earthworks adjoining the terraces will be carried out to increase the capacity of the property's river terrace to convey water during flood events. A firm of consultants engaged by the applicants ("the consultants") were of the opinion that these earthworks would offset the capacity lost due to the creation of the platform. The proposed work is shown in Figure 1 below.

3. Background

- 3.1 In April 2008, Environment Waikato produced a 'River flood hazard assessment' ("the flood hazard assessment") for the Kauaeranga River.
- 3.2 On 17 August 2010, Environment Waikato produced a summary of flood hazard information ("the flood hazard summary") in regard to the property. The flood hazard summary gave an overview of the inundation and flood hazard for the property and specifically noted:

The flood level that is predicted to affect this property due to the Kauaeranga River is:

RL 8.6 m during a river flood event with a 1% AEP⁴

This level is taken from the local flood hazard assessment and explicitly include the predicted effects of climate change on rainfall intensity (+ 20%) and sea level (+0.5 m) to the year 2080

- 3.3 The flood hazard summary also stated:

This flood hazard information is based on the existing channel geometry and floodplain topography. However, this excludes existing and future obstructions such as fences, trees and buildings. These obstructions may cause localised changes to the flood extent, depth and/or speed.

This predicted flood level does not represent the maximum expected flood. There is the potential for larger river/tidal events to occur, resulting in a higher flood level.

⁴ AEP refers to 'Annual Exceedance Probability'. The term '1% AEP' means an event having a 1% probability of occurring annually and can also be referred to as a '100-year event'. A 2 % AEP refers to a 50-year event, a 10% AEP refers to a 10-year event.

- 3.4 On 30 May 2011, the authority produced a Land Information Memorandum (“LIM”) relating to the property, and which included the reports prepared by Environment Waikato including the flood hazard summary.
- 3.5 The applicants engaged the consultants to undertake ‘a desk top study for the flood assessment and mitigation options associated with the potential developments within the property’. The study, dated 1 September 2011, described the construction of the platform and noted that the finished floor would need to be located 0.5 metres above the top water level during a 100-year annual reoccurring event (1% AEP). The consultants estimated the required level to be at RL9.1 metres, or 500mm above the 100-year flood level estimated by Environment Waikato.
- 3.6 The consultants considered that the best option for development would be to create a building platform of engineered fill, complete with access, on the upper portion of the site. Earthworks to modify the river terrace to compensate for the loss of flow cause by the platform during flood events was also required. The consultants attached a drawing indicating flood flow cross sections relative to the platform and the estimated flood levels.

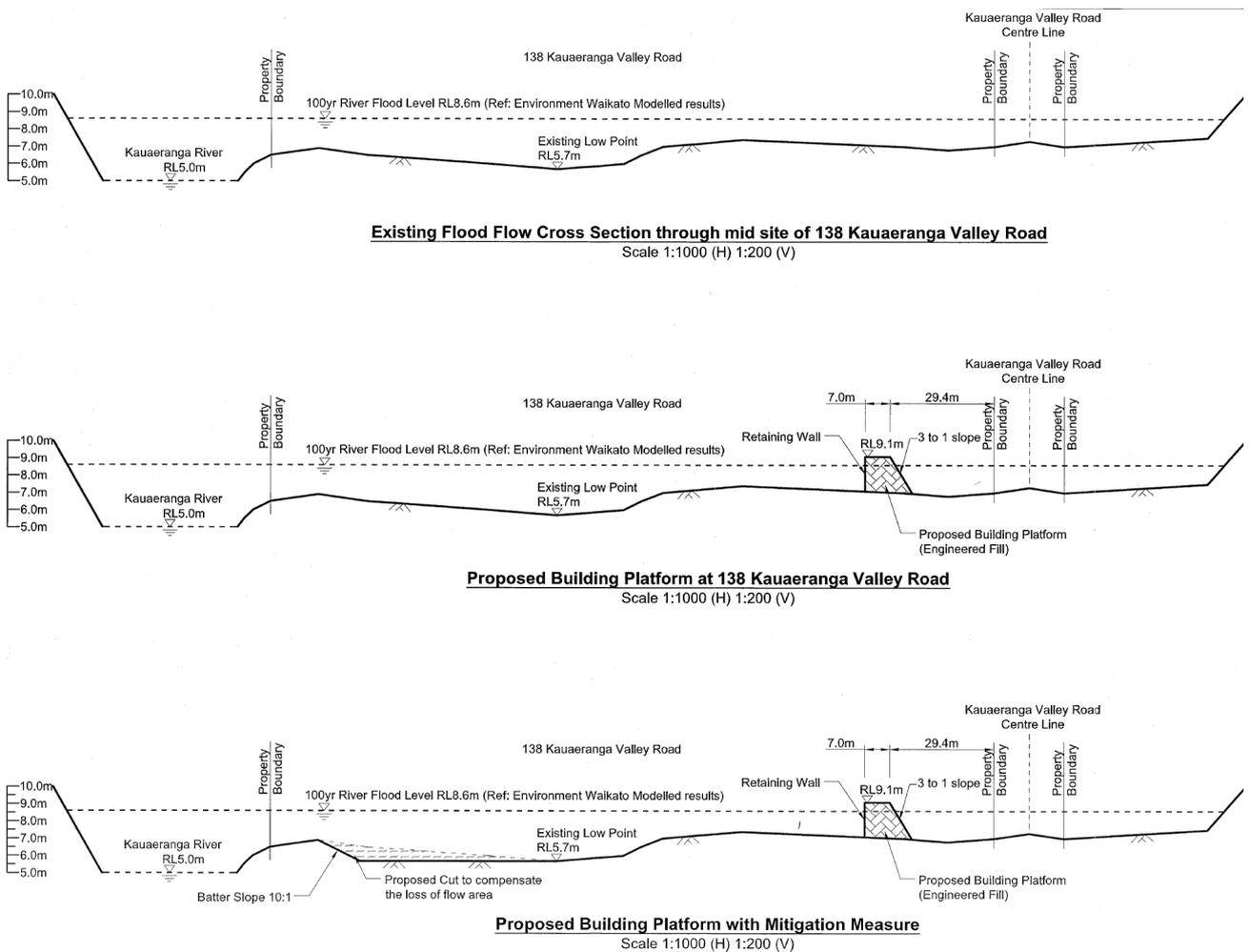


Figure 1: The river valley showing the current situation and the proposed building platform (Note that the vertical scale is exaggerated)

- 3.7 The application for a determination was received by the Department on 15 September 2011.

3.8 On 28 September 2011, the applicants applied to the authority for a building consent to construct the platform. The authority verbally advised the applicants, both prior to and after the application, that it would refuse to issue the building consent. It was also noted that if building consent was to be granted, the presence of a natural hazard would be notified on the certificate of title. The authority's letter to the applicants declining the application said:

There is insufficient information to support the building consent. The engineering information should clearly show that the speed and flow of water would not erode the building platform for at least the life of the building.

The [consultant's] report refers to the need for a detailed hydrological and hydraulic modelling. [The authority takes] the view that this modelling should be done and provided as part of the building platform application.

[The authority] still holds the view that [it] must consider refusing the consent under Section 71 of the Building Act or, if the consent is granted, the presence of the natural hazard will be notified on the certificate of title.

The letter suggested that the application should await the outcome of the determination.

4. The submissions

4.1 In a submission to the Department dated 18 October 2011, the authority described the application for a building consent and the flood hazards identified in the area of the property. The submission noted that:

- The authority 'would be very concerned for the integrity of any habitable building if it were to be built without the owners putting in place measures that would safeguard the building, its occupants and neighbouring properties from possible inundation'.
- Inundation could cause damage to foundations, any sub-floor structure, materials stored on site, including water tanks and machinery, and waste water treatment provisions.
- The flood levels could be higher than those predicted by Environment Waikato.
- The 'decision to refuse the consent for the platform is based on there being insufficient detailing in the application to satisfy [the authority] that the provisions [of] section 71(1)(b), 71(2)(a), and 71(3)(a) have ... been met'.
- No details had been provided for the platform and how it is to be protected from inundation. The authority was not satisfied that the platform is situated in a 'medium flood hazard zone'.

The authority also referred to previous determinations published by the Department to support its position regarding the platform.

4.2 The authority forwarded copies of:

- the authority's 'Flood Hazard Map'
- the flood hazard summary
- the flood hazard assessment
- extracts from the LIM

- the High Court decision in *Davidson v Palmerston North City Council*⁵.

4.3 In a covering letter to the Department the applicants described the background to the dispute and responded to the authority's comments as summarised below:

- As the authority had only identified the risks relating to inundation, riverbank erosion was not relevant to the current situation
- Waste water disposal would be dealt with at a separate stage of the development.
- The authority had based its building height rules on the Environment Waikato modelling, which allowed for 100-year event plus a 24% contingency. Accordingly, the risk factor is 'negligible or very minimal at best'.

The submission distinguished the Department's previous determination decisions referred to by the authority, and noted that the decision in *Davidson* was in relation to erosion, which the applicants considered was not relevant to this determination. Finally, it was stated that the life of the building platform was proposed to be indefinite.

4.4 The applicants forwarded copies of:

- the various reports prepared by the authority and Environment Waikato
- the consultants' study dated 1 September 2011
- the property LIM
- the High Court decision in *Gavin Logan v Auckland City Council*⁶
- aerial photographs of the property.

4.5 In an email to the Department dated 18 November 2011, the applicants commented on the authority's submission as follows (refer also paragraph 6.3):

- The applicants would prefer to apply for a larger building platform which, apparently, would not result in any further hazard to people or property in accordance with the Act and the Building Code.
- The platform has been 'conservatively' located and the applicants queried whether moving it closer to the northern boundary would make any difference.
- The platform as detailed was a second choice to the applicant's preferred pole/pile foundation and the applicants were unclear as to why the authority was averse to the pole/pile foundation.
- An additional consideration is the topography of the areas upstream of the property. These contain many trees and plantings that could reduce floodwater speeds and currents.

5. The expert's report

5.1 As described in paragraph 1.5, I engaged a firm of independent experts, who are Chartered Professional Engineers with specialist expertise in water management.

⁵ *Christine Mary Davidson v Palmerston North City Council* HC PMN CIV-2006-085-1462 [30 May 2008]

⁶ *Gavin Logan v Auckland City Council* 9/3/99, (2000) 4 NZ ConvC 193, 184

The experts were engaged to provide me with an assessment of the technical matters associated with the dispute.

- 5.2 The experts issued a report dated 25 October 2011 that assessed the proposed platform and earthworks in terms of the following clauses:

Clause E1.3.1

- 5.3 The assessment regarding the runoff from the proposed platform in terms of Clause E1.3.1 needed to be considered in a 10% AEP event compared with such an event occurring on the Kauaeranga River floodplain.
- 5.4 The peak flows from the building platform in the 10-year event were likely to be in the order of 1.5 litres/second (0.0015 m³/second). This is compared to the flow in the floodplain in the same event of hundreds of m³/second, which is in the order of 100,000 times greater than that relating to the platform. The proposed earthworks to the river terrace would ensure that surface water passing over the floodplain in a 1% AEP would be unlikely to provide damage or nuisance to other property.
- 5.5 If a more realistic building platform of three times the size was to be considered, then the 1.5 litres /second figure would increase to around 5 litres /second,
- 5.6 The experts found that in relation to the larger 1% AEP (100-year) event:

The size of the earthfill with respect to the floodplain and its capacity, its location relative to other property, velocity and depth shown by Environment Waikato, and topography indicate that negligible change in velocity or water direction is expected beyond the boundary of [the property] as a result of the earthfill proposed, simply because of the scale of the proposed fill in the valley floor is less than 1% of the theoretical flow path area'.

- 5.7 The experts also supported the applicants' proposal that further hydrologic and hydraulic modelling be carried out later to support a resource consent.

Clause E1.3.2

- 5.8 The experts noted that the theoretical 1% AEP event predicted by Environment Waikato gives a flood level of some 500mm below the proposed building platform. The experts also endorsed the 500mm freeboard proposed by Environment Waikato.
- 5.9 On the basis of the information provided, the experts were of the opinion that as the level of the platform was appropriate to protect building work located on the platform, the requirements of Clause E1.3.2 would be met.
- 5.10 The experts also stated that careful engineering design was required to ensure the stability and longevity of the engineered fill forming the platform.

6. The draft determination

- 6.1 Copies of a draft determination were forwarded to the parties on 7 December 2011.
- 6.2 The authority accepted the draft without further comment.
- 6.3 The applicants accepted the draft subject to comments that were listed in a covering letter dated 6 January 2012. I have made those amendments I consider appropriate and summarise the remaining comments as follows:
- The proposed house is situated "adjacent to" rather than within the Kauaeranga River floodplain.

- The applicants suggested that the authority should come up with the best alternative solution to the suggested pole house construction.
- As the building consent application was made subsequent to the determination application and is separate, the two comments made by the authority in its submissions as set out in bullet points four and five of paragraph 4.1 should be deleted.
- The applicants would prefer to build either a pole or concrete foundation or a combination of the two to the required height, with an engineered earth mound retained by concrete walls with a slope on one side, to be a garage.
- There were also other elements additional to trees and plantings that are relevant to the topography of the property.
- The applicants requested guidance on the suitability of alternative foundation options.

7. Discussion

7.1 General

7.1.1 The application for determination has been made in respect of proposed work that is not yet fully detailed. However, the applicants have provided sufficient information for the experts to reach an opinion about the compliance of the proposed work. Given that further work is required by the applicants to demonstrate compliance with E1 to the authority, I believe it is most useful for me to give my opinion in respect of the methodology to be used by the applicants to determine compliance in respect of the proposed work, rather than make a definitive decision about what is not yet a fully developed solution.

7.2 Compliance with Clause E1

Clause E1.3.1

7.2.1 The experts have noted that flows from the building platform in the 10-year event are likely to be of the order of 1.5 litres/second. This compares with a floodplain flow in the same event of hundreds of m³/second (a 100,000-fold increase). Even with a three-fold increase in platform size, the flow is increased to approximately 5 litres/second. This assessment doesn't consider the effect of the built-up platform on the flood flows, but only what is discharged from the platform into those flows. However, in considering this in relation to the larger 1% AEP (100-year) event, the experts found that the size of the platform with respect to the floodplain, together with its location and topography, indicated that a negligible change in velocity or water direction was expected beyond the boundary of the property. This was due to the size of the proposed platform located in the valley floor being less than 1% of the theoretical flow path area.

7.2.2 Accepting the experts' opinion that any effect on the platform is considered negligible in the 1% AEP event, I then find that this negligible effect would also relate to a 10% AEP event. Accordingly I consider that the experts' report demonstrates there is no issue regarding compliance with Clause E1.3.1. In addition, I accept that this position would also apply to a platform that was some three-times larger than that proposed.

Clause E1.3.2

- 7.2.3 The experts have accepted the 500mm freeboard proposed by Environment Waikato. I also note that this freeboard complies with paragraph 4.3 of Verification Method E1/VM1.
- 7.2.4 I am of the opinion that the freeboard to the floor level of the proposed house will be greater than 500mm because:
- The flood level to be considered under Clause E1.3.2 is the 2% AEP (50 year) event; not the 1% AEP event. The difference in height between the two events is likely to be significant given the limited width of the flooded river channel when compared with, say a large open flat flood plain.
 - Depending on the type of construction, the finished floor level in the house will be somewhat higher than the proposed platform RL of 9.1. If the house has a concrete slab it will be at least a 150mm higher, and if it has a timber floor it will be some 500mm higher. The freeboard would, in effect, be raised from 500mm to somewhere between 650 to 1000mm, depending on the constructed form of the building.
- 7.2.5 Accordingly, taking into account the experts' report and the conclusions that I have reached, I am of the opinion that proposed floor level would comply with the requirements of Clause E1.3.2.

7.3 Application of sections 71 and 72

- 7.3.1 Before the application of section 71 can be discussed, the code-compliance of the proposed work should be considered. In my view the proposed platform using the methodology proposed by the applicants will meet the requirements of Clauses E1.3.1 and E1.3.2; as regards the other relevant Building Code clauses, these must be considered by the authority when the application for consent is made.
- 7.3.2 In considering the authority's concerns regarding section 71, I must follow the process described in the Act, and which is illustrated diagrammatically in Appendix B.
- 7.3.3 First, I must consider whether the land on which the platform is built falls within either of the two categories described in sections 71(1)(a) and (b). Based on the information I have received, I accept that the land "intimately connected" with the building site is subject to a natural hazard and that section 71(1)(a) applies.
- 7.3.4 Second, having accepted that the property is subject to a natural hazard in terms of section 71, I must consider the provisions of section 72. This section states that a building consent authority must issue a building consent if all the requirements set out in subsections 72(a) to (c) are met.
- 7.3.5 In the present circumstances, I am of the opinion that, in terms of section 72(a) the proposed work will not accelerate, worsen, or result in the natural hazard on the land on which the building work is to be carried out, or on any neighbouring property.
- 7.3.6 As I have already decided that the property is subject to inundation, then it follows that section 72 (b) also applies.
- 7.3.7 With regard to section 72(c), based on my decisions in previous determinations (see Determination 2007/110), I am of the opinion that the authority should not require the applicants to apply for a waiver as the platform is code-compliant and both it and

the property are affected by a natural hazard. Accordingly I am of the opinion that section 72(c) is satisfied even though no waiver or modification is required.

- 7.3.8 The authority has referred to section 71(3)(a) in relation to the possible erosion of the platform. I consider the authority's concerns should be satisfied once the applicant has submitted a properly detailed application for building consent (refer also paragraph 7.5.2).

7.4 The authority's concerns

- 7.4.1 The authority is concerned that if any habitable building to be built on the property is not properly safeguarded, its integrity will be threatened. However, I note that if future building work is designed to comply with the Building Code, then the authority should have no concerns about its integrity. In this respect, I consider that following advice from the authority as to the essential requirements for the building consent, it would be reasonable for the authority to request a robust analysis of the building work. In addition, foundations and water tanks would need to be designed to accommodate any extra loading regarding the risk of inundation. Damage to materials and machinery is not a Building Code matter.
- 7.4.2 While damage to waste disposal systems is a valid consideration, the authority needs to receive and consider proposals from the applicants rather than apply a blanket refusal to issue a building consent.
- 7.4.3 The authority has also questioned the flood levels predicted by Environment Waikato. I accept that while the Environment Waikato summary contains certain disclaimers, it represents the most recent assessment of the current situation. It also specifically allows for the predicted effects of rainfall intensity and rising sea levels up to the year 2080. In my view the technical information provided by Environment Waikato is reasonable, and I do not accept the authority's view that events larger than the 1% AEP need to be considered.

7.5 Conclusions

- 7.5.1 I accept that the methodology proposed by the applicants to determine compliance is acceptable and that, in principle, the proposed work will comply with Clause E1.
- 7.5.2 Under section 45 the applicants are required to submit with their building consent application sufficient detail to show compliance with the Building Code. I accept that this has not yet been done and that further detailed work is to be provided by the applicants' consultant to inform and confirm the compliance of the proposed work. In this respect, I acknowledge that the applicants have requested some guidance as to the most suitable foundation construction in relation to the site. As it is outside the ambit of the determination process to provide this information I suggest that the applicants liaise with their consultants and the authority to arrive at the most suitable solution.
- 7.5.3 I note the experts' recommendations that further hydrologic and hydraulic modelling be carried out later to support any resource consent application and that careful engineering design is applied to the building work. I also note that the basis on which the platform is to comply with Clause B1 is yet to be established.
- 7.5.4 For its part, the authority is required to base its consideration on the information that is supplied by the applicants (including their responses to reasonable requests for

further information to demonstrate compliance) and not on general principles that it appears to have applied to date.

- 7.5.5 Given that the whole property is subject to inundation, then a section 73 notification should be applied as a condition of the building consent.

8. The decision

- 8.1 In accordance with section 188 of the Act, I hereby determine that, in principle, the proposal by the applicants to construct a building platform, done in conjunction with the modification of the river terrace to compensate for the loss of capacity caused by the platform, will comply with the requirements of Clauses E1.3.1 and E1.3.2 of the Building Code.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 20 January 2012.

John Gardiner
Manager Determinations

APPENDIX A The legislation

A.1 The relevant sections of the Act are:

71 Building on land subject to natural hazards

- (1) A building consent authority must refuse to grant a building consent for construction of a building, or major alterations to a building, if –
 - (a) the land on which the building work is to be carried out is subject or is likely to be subject to 1 or more natural hazards: or
 - (b) the building work is likely to accelerate, worsen or result in a natural hazard on that land or any other property.
- (2) Subsection (1) does not apply if the building consent authority is satisfied that adequate provision has been or will be made to –
 - (a) protect the land, building work, or other property referred to in that subsection from the natural hazard or hazards; or
 - (b) restore any damage to that land or other property as a result of the building work.
- (3) In this section and sections 72 to 74, natural hazard means any of the following:
 - (c) subsidence:
 - (e) slippage.

72 Building consent for building on land subject to natural hazards must be granted in certain cases

Despite section 71, a building consent authority must grant a building consent if the building consent authority considers that-

- (a) the building work to which an application for a building consent relates will not accelerate, worsen, or result in a natural hazard on the land on which the building work is to be carried out or any other property; and
- (b) the land is subject or is likely to be subject to 1 or more natural hazards: and
- (c) it is reasonable to grant a waiver or modification of the building code in respect to the natural hazard concerned.

73 Conditions on building consents granted under section 72

- (1) A building consent authority that grants a building consent under section 72 must include, as a condition of the consent, that the building consent authority will, on issuing the consent, notify the consent to,—
 - (c) . . . the Registrar-General of Land.

A.2 The relevant provisions of the Building Code are:

PERFORMANCE

E1.3.1 Except as otherwise required under the Resource Management Act 1991 for the protection of other property, surface water, resulting from an event having a 10 percent probability of occurring annually and which is collected or concentrated by buildings or sitework, shall be disposed of in a way that avoids the likelihood of damage or nuisance to other property.

E1.3.2 Surface water, resulting from an event having a 2 percent probability of occurring annually, shall not enter buildings.

APPENDIX B Building sites subject to natural hazards

Building Sites Subject to Hazards – Decision Tree

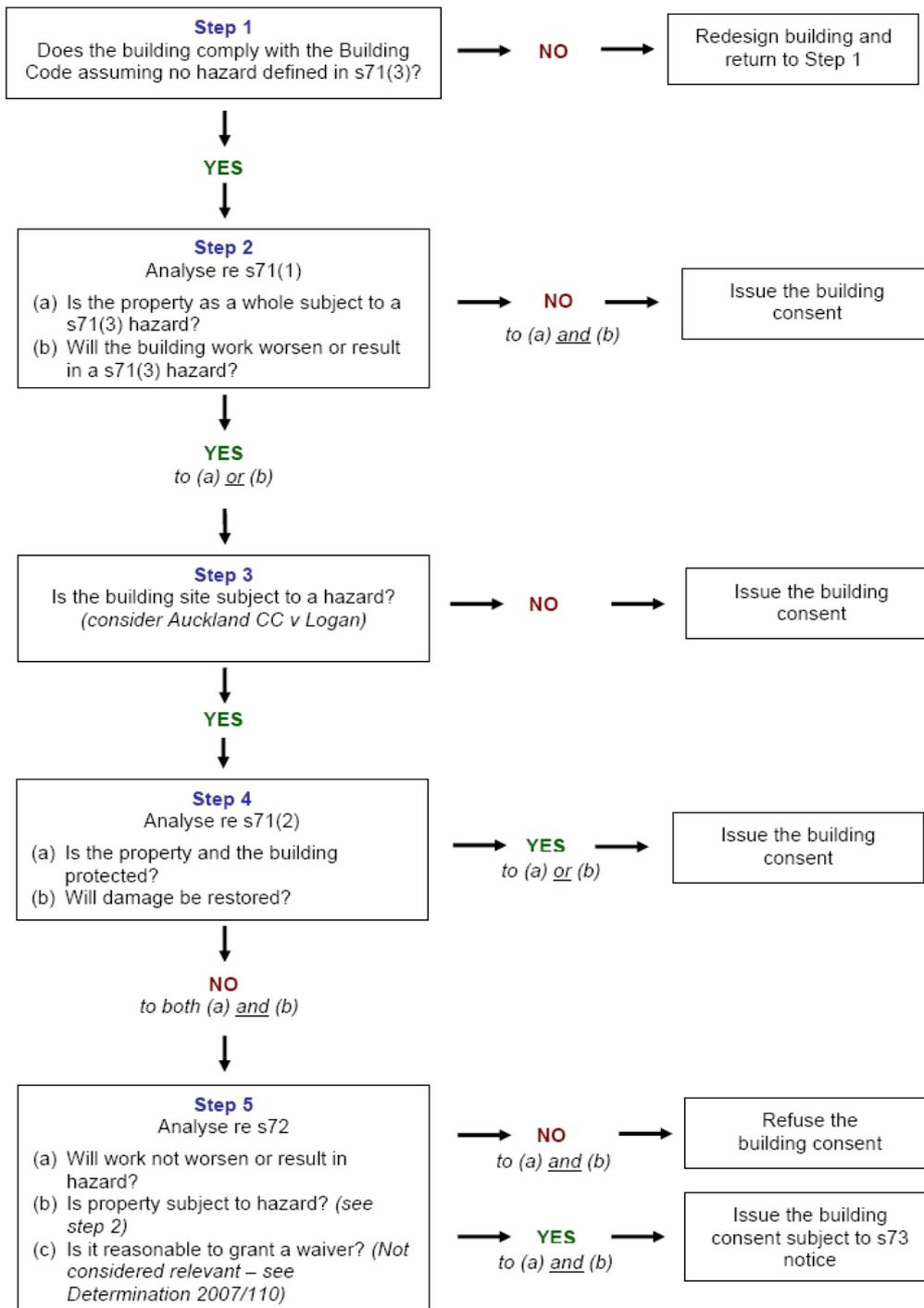


Figure 1: Building sites subject to hazards – the decision process described in the Building Act 2004