



## Determination 2011/113

# Whether building consents for proposed new houses on land subject to subsidence and slippage at Ohinau Drive, Opito Bay should be subject to section 73(1) notifications

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## 1 The matter to be determined

1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004<sup>1</sup> (“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 this determination are

- Cawdor Properties Limited, the owner of a subdivision, (“the applicant”), acting through a firm of barristers and solicitors (“the applicant’s legal advisers”)
- Thames-Coromandel District Council (“the authority”) carrying out its duties and functions as a territorial authority and a building consent authority, acting through a firm of barristers and solicitors (“the authority’s legal advisers”)
- P and L Robinson, the owners of Lot 48<sup>2</sup> of the subdivision:
  - in a letter to the Department dated 8 July 2010, the applicant requested that Lot 48 be included in the matters to be determined, and the owners of Lot 48 agreed to become a party to the determination
- the Juno Family Trust, the owner of Lot 49 of the subdivision.

1.3 The initial application for a determination related to a decision by the authority that any building consent it issues in the future in respect of 11 lots (Lots 42 to 51 DPS 66560 and Lot 8 DPS 26541) of a subdivision will be subject to a section 73(1)<sup>3</sup> notification entered on the certificates of title of the land. A building consent has been issued for Lot 48 of the subdivision subject to a section 73(1)(c) notification. The basis for these decisions is that the land on which the subdivision is situated is subject to the natural hazards of subsidence and slippage.

1.4 I take the view that the matters to be determined<sup>4</sup> are:

- whether the authority correctly exercised its powers when it proposed to impose a section 73(1) notification requiring an entry on the certificate of title on any future building consent to be issued in respect of Lots 42 to 47 and 49 to 51, and Lot 8
- whether the authority correctly exercised its powers when it issued a building consent subject to a section 73(1)(c) notification requiring an entry on the certificate of title for a house constructed on Lot 48
- whether any future building consent in respect of Lots 42 to 47 and 49 to 51, and Lot 8 should be subject to a section 73(1) notification requiring an entry on the certificate of title, given the proposed monitoring and maintenance plan.

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<sup>1</sup> The Building Act 2004, the Building Code the Compliance Documents, past determinations, and guidance documents issued by the Department are available from the Department’s website at [www.dbh.govt.nz](http://www.dbh.govt.nz) or by contacting the Department on 0888 242 243.

<sup>2</sup> For the purposes of this determination I have referred to these lots using their lot number, without the DPS number.

<sup>3</sup> 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.

<sup>4</sup> Under sections 177(1)(b), 177(2)(a) of the Act

- 1.5 I take the view that the determination turns on whether, in terms of section 71(1)(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’, in this case slippage caused by subsidence and slippage.
- 1.6 In making my decision, I have considered the submissions of the parties, including the reports of various consultants engaged by the parties (refer to paragraph 1.8), the report of the independent expert (“the expert”) commissioned by the Department to advise on this dispute, and the other evidence in this matter.
- 1.7 While I have carefully considered the parties’ submissions and the various consultants’ reports, I have only summarised the main points of this documentation in the context of the determination.
- 1.8 The following table identifies the various specialist engineers engaged by the parties, and the description I have used for those engineers throughout this determination.

<b>Consultant</b>	<b>Engaged by</b>	<b>Technical auditor</b>
Consultants A	Applicant	Consultants B
Consultants C	Applicant	Consultants D
Consultants E	Authority	
Consultants F	Applicant	

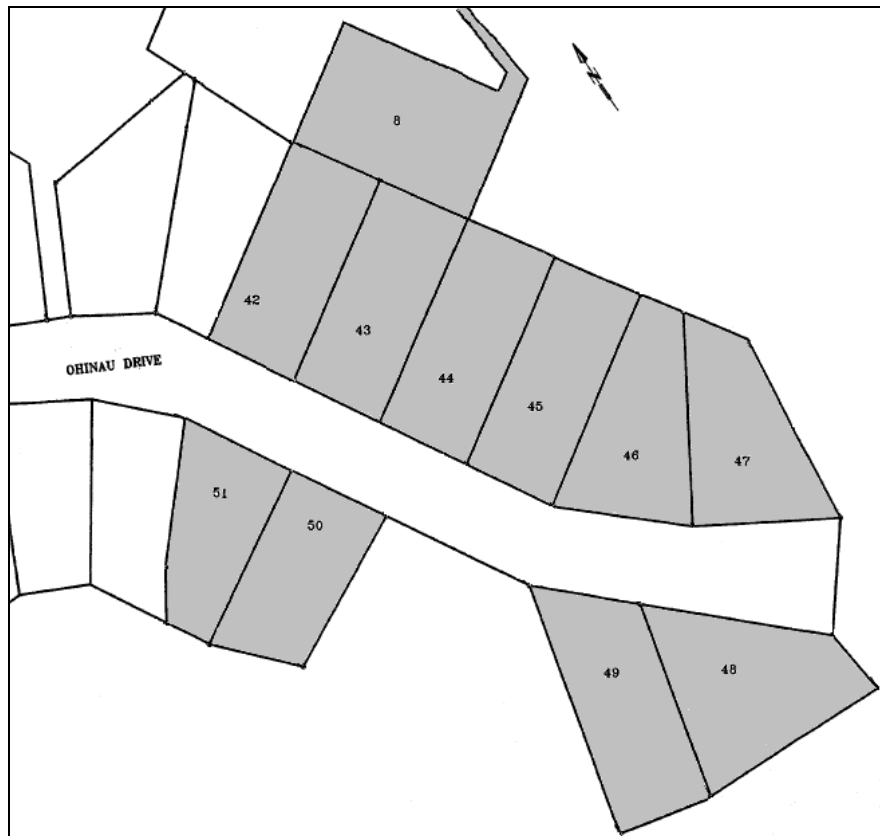
- 1.9 I have not considered any other aspects of the Act or the Building Code (Schedule 1, Building Regulations 1992). Appendix A contains the relevant sections of the Act and the Building Code referred to in this determination.

## **2 The subdivision**

- 2.1 The eleven properties in question are part of a subdivision on Moore Place (“the subdivision”). The subdivision is set out on an area of steeply contoured land that slopes upwards to a maximum height of some 25 metres above the adjoining roadway. The subdivision is bisected by an access road notated as Ohinau Drive. The subdivision has roading infrastructure and sanitary and stormwater drains. All of the lots are owned by the applicant, with the exception of two (Lots 48 and 49) that are owned by others (refer to paragraph 1.2).
- 2.2 The dwelling built on Lot 48 was subject to a building consent that was issued on 6 December 2006 subject to a section 73(1)(c) notification requiring an entry on the certificate of title. The house was duly constructed and a code compliance certificate was issued on 31 October 2007. At the present time, there is no dwelling constructed on Lot 49.
- 2.2.1 The parties provided me with information regarding which properties are to be included in this determination. The applicant requested that the determination consider the imposition of a section 73(1) notification by the authority in respect of all the lots listed in a project information memorandum (“PIM”) issued by the authority to the applicant, those being Lots 38, 41 to 47, 50, 51, and Lot 8. The

authority subsequently stated that the PIM does not include Lots 38 to 41 as being subject to the hazard.

- 2.3 The following figure shows the subdivision and location of the 11 lots that are subject to this determination (Lots 42 to 51 and Lot 8) shown here shaded.



- 2.4 With respect to the drainage system and geotechnical investigations, various states of geotechnical site investigation work, including drilling test bores, was carried out over a number of years. An inclined bore was drilled in 1997 to an artesian aquifer and two vertical investigation holes were also drilled, into which piezometers were installed to monitor ground water levels. Additional bores were subsequently drilled. The drainage system now consists of a series of bores, including inclined bored drains, counterfort drains, a series of piezometers, inclinometers, and flow monitoring devices.

- 2.5 The proposed monitoring and maintenance plan consists of:

- the Draft Constitution of the Opito Bay Water Company Limited which sets out the operation and purpose of the company, the requirements for management of the drainage system and reporting on its condition
- the Memorandum of Encumbrance
- the Ohinau Drive Subdivision - Monitoring and Maintenance Manual (“the Manual”), which includes the requirements for monitoring and maintenance on the site, the continuous monitoring plan, requirements for future maintenance, and the procedures for remedial actions if the drains become blocked.

### 3 Background

#### 3.1 The background to the determination

3.1.1 The subdivision was developed some time in 1980 and, during the earthworks operations, a maximum 5 metres high knoll was removed from a ridge at the upper end of the subdivision. In August 1996, the applicant became aware of a “scarp feature” that suddenly appeared behind two of the lots, together with some minor damage to some cesspit surrounds.

3.1.2 The applicant subsequently engaged various consulting engineers to assess the property and install appropriate land management systems. The authority also engaged consulting engineers to review reports produced by the applicant. The following table summarises the reports provided by the consultants.

Date	Report	Notes
March 1997	Consultants A, in conjunction with Consultants B, Investigation of slope instability report	Signs of site movement consistent with relatively deep-seated soil failure
December 1997	Consultants A, Interim report on ground stabilisation	Ground movement reduced
May 1998	Consultants A, reviewed by Consultants B, Updated report on ground stabilisation	Groundwater conditions remain unclear; recommend further investigation
June 2002	Consultants C, Revised Geotechnical Investigation and Stability Assessment, with technical audit by Consultants D	Further stability improvement required; recommend provision of additional horizontal bored drains, frequent monitoring, and flushing every 3 years
October 2002	Consultants C, additional testing and stability analysis with technical audit by Consultants D	Seismic assessments concluded displacements of less than 20mm with 1-in-500 earthquake
May 2003	Consultants E, commissioned by authority to report on Consultants A's findings	Concerns raised re stability calculations
August 2004	Consultants A and Consultants C, advisory note intended as guidance for owners and designers of future developments on the subdivision	Summary of works undertaken so far and site specific controls required by individual lot owners
November 2005	Consultants A and Consultants C, Land Stability Joint Report	Summary of investigations, stability works and monitoring undertaken; included comparison of subdivision characteristics with assessment of a landslide within the authority's district
November 2005	Consultants C, Updated Geotechnical Investigation and Stability Assessment	
December 2005	Consultants D, assessment peer review	Applicant had 'effectively demonstrated through investigation, analyses, stabilisation works and a reasonable monitoring process that adequate stability of the land has been achieved'; suggest ongoing monitoring and

		maintenance be carried out
February 2006	Consultants C, summary of stability analyses	Concluded that 'stability analyses indicate the installed drainage has significantly improved site stability'
July 2006	Consultants A and Consultants C, second land stability (joint) report  Update of November 2005 report	Protective drainage works subjected to sufficiently severe test to verify performance: monitoring and technical analyses undertaken provided evidence of adequate provision in place to protect against the hazard of 'slippage'
September 2006	Peer review of (Second) Land Stability Joint Report by Consultants D	Satisfied with the adequacy of the investigations, monitoring and analyses carried out
October 2006	Consultants E,  Review (Second) Land Stability Joint Report by Consultants E	Strength along failure surface and derived factors of safety overestimated; concluded that 'despite reasonably extensive investigations and assessment (undertaken by the applicant), the possibility of future movement cannot be discounted'
October 2006	Consultants F, technical opinion on stability of the land	
February 2007	Consultants F, technical opinion on stability of the land	Drainage works demonstrated to have reduced piezometric pressures and increased stability of area affected by ground movements; therefore arguable that works undertaken satisfied the intent of section 71(2)(a)

3.1.3 Following an application from the applicant, the authority issued a PIM dated 3 December 2007 that identified Lots 42-51 and Lot 8 as land affected by land instability and required any building consents issued in respect of these lots to be subject to sections 72 and 73. The authority noted that Lot 7 DPS 26541 and Lot 1 DPS 56276 are also affected by the original land movement.

## 3.2 Lot 48

3.2.1 In a letter to the owners of Lot 48 dated 3 March 2006, Consultants A noted that the site had shown no indication of continual movement due to the deep-seated failure plane under this part of the subdivision. The counterfort drains previously installed on Lots 48 and 49 were effectively lowering the general winter water table. In addition, calculations indicated that the current factor of safety against movement at shallow and deeper levels were not less than the minimum factor of safety expected for stability on new subdivisions. The report noted that despite these factors, the authority was reluctant to uplift the section 73(1) notice recorded on its files.

3.2.2 In an email to the owner dated 30 August 2006, the authority acknowledged receipt of the revised Geotechnical Investigation & Stability Assessment, reissued 18 June 2002, from Consultants C regarding the site. The authority stated that it considered the report did not specifically address the effects of the land movement on Lot 48.

- 3.2.3 On 30 October 2006, Consultants A provided a “Stability Report for Building Purposes” in relation to Lot 48. The report described the work undertaken to stabilise the site and noted the authority’s concerns regarding site stability. The report recommended that ‘It is considered reasonable and appropriate for [the authority] to accept that S.72(a) of the Building Act 2004 should apply to this property, and therefore accordingly issue its consent subject to S.73 conditions.’
- 3.2.4 The authority issued a building consent (No ABA/2006/1055) dated 6 December 2006, for the construction of a house to be built on Lot 48. Following a series of inspections, the authority issued a code compliance certificate dated 31 October 2007 in respect of that consent. A notification was entered on the Freehold Register for Lot 48 that stated: ‘...a building consent issued pursuant to Section 72 Building Act 2004 identifies slippage as a natural hazard – 20.2.2007 at 9 am.’

### **3.3 The determinations process**

- 3.3.1 The Department received an application for a determination on 11 March 2008. The authority provided copies of various documents from the authority’s files on 18 April 2008 and indicated that they wish to file a submission but would wait until it received the independent expert report commissioned by the Department. A copy of the authority’s building file was received on 15 August 2008 and then the authority provided a full submission on 14 November 2008.
- 3.3.2 Copies of a draft determination were forwarded to the parties on 26 June 2008. The authority accepted the draft subject to some non-contentious amendments. The applicant did not accept the draft.
- 3.3.3 I engaged an expert who produced a report dated 7 July 2008 (refer to paragraph 4.1). I provided the expert’s report to the parties for comments and received submissions from the parties in response. I subsequently wrote to the applicant, the authority, and the owners of Lot 48 on 28 October 2008, inviting them to make submissions on what mechanisms could be put in place that would ensure that ongoing monitoring and maintenance of the drainage system will occur into the future.
- 3.3.4 I received responses on 14 November 2008 from the authority’s legal advisers and the applicant’s legal advisers. The authority’s legal advisers subsequently responded to the applicant’s submission on 21 November 2008, and the applicant made a further submission in response dated 9 December 2008.
- 3.3.5 A second draft determination, dated 20 December 2008, was sent to the parties on 24 December 2008. A response accepting the determination was received from the authority on 23 February 2009. On 27 February 2009 the applicant requested that the issue of a final determination be suspended until 29 May 2009, so that the parties could resolve certain matters. In order to recommence the case, another copy of the draft determination, dated 20 December 2008, was sent to the parties on 22 June 2009.

- 3.3.6 The applicant responded on 14 July 2009, noting that it did not accept either of the two draft determinations and requested that there be a hearing. I held a hearing at Whitianga on 20 October 2009. I was accompanied by a Referee engaged by the Chief Executive under section 187(2) of the Act. The hearing was attended by; two representatives of the applicant, the applicant's legal adviser and five consultants; the authority represented by its legal adviser, a consultant, and one of its officers; one of the owners of Lot 48; the expert engaged by the Department; and two other officers of the Department. The hearing included a visit to the site.
- 3.3.7 Following the hearing, the parties provided various submissions (see paragraph 5.4), the expert provided additional comment (see paragraph 4.4), there were extensive submissions regarding the maintenance and monitoring plan (see paragraph 5.5), and the expert provided additional comment on this (see paragraph 4.5).

## **4 The expert's reports**

- 4.1 As mentioned in paragraph 1.6 and 3.3.3, I engaged an independent expert ("the expert"), who is a consulting engineer specialising in geotechnical engineering and a Fellow of the Institution of Professional Engineers New Zealand and a chartered professional engineer.
- 4.2 The expert provided:
- A report ("the expert's report") (refer to paragraph 4.3)
  - An addendum to the report ("the expert's addendum report") (refer to paragraph 4.4)
  - Comments about the proposed monitoring and maintenance plan ("the expert's comments") (refer to paragraph 4.5).

### **4.3 The expert's report**

- 4.3.1 The expert provided me with an assessment of the existing site conditions of the land on which the subdivision is situated.
- 4.3.2 The expert carried out a desk-top review of all the documentation provided by the parties and produced a report dated 7 July 2008. I have summarised the analysis and commentary of the report below.
- 4.3.3 In the view of the expert, the mode of the land movement was due to a combination of
- high artesian pressure at depth
  - removal of the knoll
  - high water table existing up to August 1996
  - land that was affected by shear movement at an angle to the toe heave at Lots 40 and 41.



- 4.3.4 The expert commented that in conjunction with the failure attributes, there was
- uncertainty of the actual level of the high water table existing up to August 1996 when the various analyses were carried out
  - a failure to investigate the west movement extension in relation to Lots 7, 8, and 11 Moore Place.

4.3.5 As to the on-going risk, the expert noted that efforts had been made to produce a more “robust” solution to the stability problem. Despite the uncertainty of the groundwater table, it was unlikely that any major future movement would occur if the artesian pressure within the failed mass remained in its 2005 relieved state. Monitoring over the years indicated that there had been minimum movement since the 1997 bore was installed. However, the risk remained because

- there was a potential for the bores to malfunction or become corroded
- there was the possibility that earthquake movement could break or block the bores
- apart from the counterfort drains to Lots 48 and 49, no measures had been considered to provide long-term stability
- if the bores became blocked or damaged, the area could become unstable.

4.3.6 The expert’s report noted that there was some confusion between the various documents produced by the applicant’s consultants over time and there was a lack of correction of those confusions as the reports were updated. He also noted that many of the relevant queries raised by Consultants E remained unanswered.

#### **4.4 The expert’s addendum report**

4.4.1 The expert’s addendum report (to the report) was provided on 7 December 2009. The addendum was based on additional information presented at the hearing and the subsequent discussions, together with later correspondence forwarded by the applicant.

4.4.2 The report noted that the risk issues relating to the potential blockage of the bores were in respect of

- the lack of maintenance
  - there is a need for the monitoring and identification of maintenance work and when this is to be carried out had been agreed
  - the establishment of a Monitoring and Maintenance Plan, with regular input from a suitably qualified engineer, would provide warning of potential instability and identify any maintenance and/or remedial works required
- corrosion of the bore pipes
  - while the life of bore pipes might exceed the 50 years required for structural elements, any deflection of the rounded shape would increase the corrosion and reduce this lifespan

- earthquake and movement of the failed land mass
  - should the bores be damaged or blocked by earth movement, these and any monitoring drains would need to be replaced quickly
  - it is likely that the time available for remedial works would be much less than the two years predicted for groundwater levels to recover.

4.4.3 The expert concluded that the relief wells could protect the land provided a plan for monitoring and maintenance was established and implemented. However none of the parties had accepted responsibility for funding the preparation of such a plan.

#### **4.5 The expert's comments about the proposed monitoring and maintenance plan**

4.5.1 I also requested the expert to comment on the information provided about the proposed monitoring and maintenance plan and the expert provided a report dated 18 May 2011. I forwarded to the expert the following additional information that had been supplied:

- the Draft Constitution of the Opito Bay Water Company Limited
- the Memorandum of Encumbrance
- the Ohinau Drive Subdivision - Monitoring and Maintenance Manual (“the Manual”)
- further submissions made on behalf of the applicants
- correspondence from the applicant and the authority

4.5.2 The expert described the background that identified the risk issues affecting the on-going stability of the land in question and made the following observations about the proposed monitoring and maintenance plan:

##### **Time frames**

- For the reasons listed, the time lag from blockages in the bores and their effects may not be as long as the two-year period indicated on behalf of the applicants.
- Accordingly, the statement that the “...large time period for remedial action prior to piezometric water pressures becoming dangerously high...” was not considered prudent and should be deleted.
- A much smaller time frame for remedial action should be incorporated in the Manual.

##### **Actions required for remedial works**

- The actions required to remedy blockages or damaged bores needed to be planned and described in detail. This would allow the Opito Bay Water Company Ltd to respond rapidly without undue delays.

## **The Manual**

- It was also recommended that the Manual be updated to include all the relevant Trigger Maximum Levels for earthquake, rainfall, inclinometers, piezometers, and bore drain flows. If these were repeated in the Constitution, then items 16.1.a.i and 16.1.b.ii of that document should also be made consistent.

## **5 The submissions**

5.1 Due to the quantity of information provided and the number of submissions made over time for this determination, I have summarised the using the following categories:

- **The stability of the land and the initial submissions**
- **The drainage system**
  - The applicant – submissions
  - The applicant – response to expert’s reports (refer to paragraphs 4.3 and 4.4)
  - The authority – submissions
  - The authority – response to expert’s reports (refer to paragraphs 4.3 and 4.4)
- **The hearing**
  - The drainage system
  - The monitoring and maintenance plan
  - Conclusion
- **The proposed monitoring and maintenance plan**
  - The applicant – submissions
  - The applicant – response to expert’s comments
  - The authority – submissions
  - The expert’s comments on the proposed monitoring and maintenance plan
  - The authority – response to expert’s report

### **5.2 The stability of the land and the initial submissions**

5.2.1 The applicant’s legal advisers made a submission on behalf of the applicant on 4 March 2008 objecting to the application of notices, based on the weight of expert evidence supporting the measures taken to stabilise the site and ensure no further movement would occur.

5.2.2 The authority provided copies of various documents from the authority’s files on 18 April 2008. A copy of the authority’s building file was received on 15 August 2008.

- 5.2.3 The owners of Lot 48 made a submission on 3 September 2008 that they were not sure why the authority was not ‘satisfied that adequate provision has been made to protect the land’, noting:
- there had been no further ground movement since 1997
  - the pine trees planted upslope of Lot 48 would have a major de-watering affect, which could release pressure on the artesian aquifer
  - the counterfort drains had also contributed to the lack of movement
  - other documents suggested the presence of an ancient slip and whether this negated the earthworks as a possible cause.

### **5.3 The drainage system**

#### **The applicant – submissions**

- 5.3.1 The applicant provided a “Land Stability Joint Report – Addendum” dated 15 September 2008 by Consultants A and updated the inclinometer and rainfall records. The conclusion of this report was that there had been no ‘differential movement at any depth’ nor any re-activation of the original failure plane.
- 5.3.2 The applicant’s legal advisers forwarded a submission to the Department dated 14 November 2008 and made the following comments:
- As the drainage systems traverse both private and public land, and operate by gravity alone, they should be vested in the authority, which should also monitor them.
  - In order for the authority to have access to the system, it was proposed that appropriate easements in favour of the authority be registered on all the affected titles and on those lots where a bore outlet is situated.
  - A memorandum of encumbrance be placed over lots 42 to 49 inclusive with an agreed rent to the authority. Lots 48 and 49 would have the alternative option of accepting a section 73 notice.
  - In recognition of the easements and encumbrances, the authority would undertake appropriate monitoring and report back to the landowners.
  - The ownership issues were not relevant to a determination as to whether a section 73 notice should be registered against a title. These are issues to be resolved between the parties.
- 5.3.3 There was a further submission from the applicant’s legal advisers to the Department dated 9 December 2008. The submission noted:
- The land is now stable as confirmed by the Department, following independent reports from specialist geotechnical engineers.
  - The drainage system would require periodic maintenance by its owner, as would be the case for a public stormwater drainage system.
  - The drainage works should naturally transfer to the authority’s ownership as part of the subdivision’s overall drainage.

- The drainage system, which is mainly situated within the legal road, was installed at significant cost to the applicant, and prevents damage to the subdivision, the authority's road, and the adjoining allotments outside the subdivision.
- The matter for determination should be whether there is a remaining natural hazard and whether a section 73 notice should be registered against the relevant titles. The issue of the ownership of the drainage system should be resolved between the applicant and the authority and should not be a matter considered in this determination.

#### **The applicant – response to expert's report**

5.3.4 In a submission to the Department dated 24 July 2008, the applicant's legal advisers questioned whether all the relevant documents had been forwarded to the expert. The submission also stated that the applicant's consultants had cooperated fully with the authority and that the reports and peer reviews were neither partisan nor lacking in verification. The other main issues raised in the submission can be summarised as:

- The water table at Bore 4 was lowered by 0.87 metres and not the 0.15 metres set out in the expert's report.
- The counterfort drains on lots 48 and 49 were installed to lower the water table in the upper area of the zone, rather than being part of a "more robust" solution. The second bore, which the applicant believed was installed on a previous recommendation by Consultants E, fulfilled the "more robust" requirement.

5.3.5 The applicant's legal advisers also attached a report from Consultants A dated 22 July 2008 and I summarise the main points from that report as being:

- The purpose of the expert's report should be to give a clear direction as to whether site instability had been stabilised in a manner that satisfied the section 71(2)(a) test. The authority's consultants had not provided any relevant evidence to support their doubts as to site stability.
- The expert's report did not discuss whether the test required by section 71(2)(a) had been met. The protective works would require ongoing observation and maintenance, which would ensure the viability of the bores, whose successful operation had eliminated the need to consider other methods.
- The claim by the authority that the applicant's documentation was "partisan" was disputed, as was the inferred "unheeding" of the authority's queries. The applicant's legal adviser also made reference to what was considered to be an unacceptably late response by Consultants E to the applicant's report intended for a joint October 2006 meeting.
- The 'slip scarps' are inaccurately described in the expert's report and no movement had been detected in Lots 7, 8, and 11 in Moore Crescent.
- No comment had been made in the expert's report as to the relevance of the data obtained from the piezometer readings regarding seasonal water levels and it was doubted whether Consultants E had objectively considered these.

- The counterfort drains could be considered as being a “separate stand-alone operation”. It was incorrect to infer that the inclinometers had failed to establish the plane of failure. Rather, they confirmed that no movement had occurred at that plane, irrespective of depth.
- Comment was made on the concerns raised by Consultants E that were noted in the expert’s report relating to factors of safety, the lateral extent of the 1996 failure, and the effect of high artesian pressure.
- For all Consultants Cs’ calculations, the least favourable ground conditions had been assumed. Sensitivity analyses had adequately reviewed possible variations to these conditions.
- The reducing extent of displacement made investigation into Lots 7, 8, and 11 irrelevant.
- While there is disagreement between the parties’ consultants, this was only relevant in terms of section 71(2)(a), and all the risk points identified in the expert’s report can be addressed and safely managed.
- The question of the application of a section 73 notice must depend on whether there is a continuing risk in terms of section 71(2)(a), having regard to all the engineering management techniques that are applied.
- The matters raised in the authority’s response of 22 July 2008 (refer paragraph 5.3.8) were not considered to be relevant to any decision made under section 71(2)(a).

#### **The authority – submissions**

- 5.3.6 The authority’s legal advisers made submissions on 14 November 2008 and 21 November 2008 about the drainage system; stating that the authority would not accept responsibility for the deep bore drains, nor would it monitor, maintain or replace them. It was also noted that the applicant had not answered the six questions posed in the advisers’ letter of 22 July 2008 (as set out in paragraph 5.3.9).
- 5.3.7 The submission also attached a copy of a letter from Consultants E to the authority, dated 12 November 2008, which responded to the “Land Stability Joint Report – Addendum” described in paragraphs 5.3.1. This report noted:
- while there had been no land movement and the drains are working effectively, the robustness of the stabilisation system and its margin of safety had not been demonstrated
  - it was not clear how the maintenance of the system was ensured
  - the lateral extent of the original failure was not clear, especially to the north and east
  - adequate provision for protection against slippage had not been demonstrated and there was still a degree of risk to the land.

### **The authority – response to expert’s report**

5.3.8 In a submission dated 22 July 2008 in response to the expert’s report, the authority’s legal advisers noted that the expert’s report had incorrectly stated that the authority would take responsibility for the bores and the monitoring of the site. The authority required the drains to remain in private ownership.

5.3.9 Also in response to the expert’s report, the authority noted the applicant had not provided answers to the following matters raised by the authority, and which the authority believed had to be answered before the determination could be made:

- The ownership of the drains.
- How the deep bore relief drains, in perpetuity, are to be monitored, maintained and replaced.
- How on-going monitoring is to be ensured.
- The nature and form of any required covenants and easements.
- The extent and nature of the securities required to ensure future performance and maintenance obligations and protection of the authority.

### **5.4 The hearing**

5.4.1 The applicant’s submission expressed their confidence that the land is stable providing that the drainage works remain functional. The agreement between the applicant and the authority that a PIM should be issued in respect of one of the allotments was sufficient to indicate a building consent limitation will apply to all buildings on the land. This would bring all the allotments within the Department’s jurisdiction in respect of the determination. The applicant’s submission also discussed various options regarding the ownership and permanent monitoring of the system.

5.4.2 The authority’s submission requested that the total land area affected by the land movement be considered holistically rather than limiting the determination to Lot 48. The submission went on to discuss the “likelihood” of future land movement, noting there needed to be a high degree of certainty that the drainage works will prevent slippage and subsidence. The submission also questioned some aspects of the installed system and its future monitoring.

#### **The drainage system**

5.4.3 The applicant’s consultants outlined the site conditions and the position of drillings and bore installations that have been undertaken. The history of the site investigation and remediation measures was also described.

5.4.4 From the information provided, I was able to confirm the following:

- The aquifer is not materially affected by rainfall although there have been high rainfall periods experienced at the site location.
- The initial water flow through the Bore 1 was 27,000 litres per minute (lpm) and this has declined to 2,400lpm since the two bores have been operating.

- The flow reduction over 2 years showed a gradual lessening after an initial high reduction of approximately 2,100lpm flows through Bore 2 and 300lpm through Bore 1.
- Bore 1 is formed from 75mm ID mild steel drill-stream piping and Bore 2 is formed from the same pipework but has been filled in and bored out. The end of Bore 2 has an unlined section bored into the rock.

5.4.5 I note that there was a general consensus that the system as installed is functioning adequately at present in reducing the water pressure of the aquifer under the land and also that the land movement had been stabilised up to the present time. However the authority expressed concerns regarding the reliance on two drains and the lack of as-built details relating to the pipe types and sizes. The authority also noted that it had not been involved during the construction of the system and that it required a high level of certainty regarding future risks.

5.4.6 The expert also questioned the effects of corrosion on the inclined bore pipework and the consequences of an earthquake that could destroy the bores. However, with regard to the latter consequence, there was a possibility that Bore 2 could be outside the movement zone.

5.4.7 There were differences of opinion as to what would be the response time limits in the event of a failure. The applicant's consultants had estimated a maximum time of 830 days for the artesian area to refill. This was based on an exact reversal of the emptying process date, namely a slow initial reaction that increased rapidly towards the end of the allotted period.

5.4.8 However, the expert and the authority's consultant considered that the reverse would be the case and that the initial filling would be the more rapid event. The expert was also of the opinion that the pressure increase was not related to the water volume if the drains became blocked. Full pressure could be experienced well before the void became filled with water.

#### **The monitoring and maintenance plan**

5.4.9 The applicant accepted that monitoring had been spasmodic, however a peer review had meant an acceptable monitoring process could now be implemented.

5.4.10 The applicant was of the opinion that the authority should take over responsibility for the monitoring and ongoing maintenance; the authority had the means and expertise to undertake this work and would always have a permanent presence, which a private arrangement could not. Costs could be met by a special rating or ownership agreement such as that which already existed for a local waste water disposal facility.

5.4.11 The authority was not convinced at this stage that the monitoring was adequate and that emergency work in the event of a failure would be carried out in time. The authority also considered that the burden described in 5.4.10 was disproportionate to the small area of land that was affected.



5.4.12 The various consultants and the expert considered that any monitoring and maintenance plan for the drainage scheme required

- the installation of a robust accessible monitoring system
- careful and regular monitoring
- an agreed system of measurement.

#### **Conclusion**

5.4.13 In response to the authority's concerns relating to details of the proposed monitoring and maintenance plan the applicant agreed to supply further details as follows:

- full as-built details
- proposed improved and modified monitoring system
- the comparison of the slip zone with the bore pipe locations.

5.4.14 The authority and the applicant also agreed to provide submissions regarding the agreement to issue a PIM in relation to Lot 48 and its relevance to the determination process in this instance

## **5.5 The proposed monitoring and maintenance plan**

### **The applicant – submissions**

5.5.1 The applicant's legal advisers forwarded a submission to the Department dated 13 November 2009, including copies of technical data, as-built plans, and a report from Consultants C on earthquake risk and assessment regarding Bore 2. In summary the submission noted:

- While geology and groundwater concerns are complex, the failure mechanisms are understood with an acceptable level of uncertainty.
- The independently reviewed geologic model is supported by results to date and inclinometer data has shown no further movement.
- It is safe to rely on a calculated margin of safety.
- Issues related to the robustness and maintenance of drainage works have been addressed.
- As-built plans for bores 1 and 2 and construction details have been provided.
- The proposed monitoring and maintenance plan will ensure that any potential problems arising will be quickly identified and remedied.
- While there is a risk the Opito Bay Water Company could cease to exist, the authority will be able to rely on the encumbrances attached to each certificate of title.

5.5.2 In discussing the scope of the determination, the applicant accepted that sections 71 and 72 should be approached sequentially where tests in section 71 are not met. However, it was submitted that sections 71(1) and 72 do not apply as the land is not likely to be subject to a natural hazard. In addition, the provisions for continued drainage and monitoring works satisfy the test set out in section 71(2)(a).

- 5.5.3 The applicant also submitted that the meaning of the word “likely” in terms of section 71(1) depended on the statutory context. Determination 2007/116 and various Court decisions were cited to support this contention. It was stated that the applicant’s consultants have sufficiently demonstrated that it is not reasonably probable that the site will be subject to a natural hazard.
- 5.5.4 Even if the findings of the applicant’s consultants that there are unlikely to be future site movements are not accepted, it was submitted that:
- Section 71(1) does not apply where there has been adequate provision made to protect the land from a natural hazard
  - Section 71(2) does not apply if there has been no damage to the land as a result of building work
  - Section 71(2)(a) applies because there has been adequate provision to protect the land from the original natural hazard.
- 5.5.5 In a letter dated 23 November 2009, the applicant described how the drilling process had been carried out, noted that the land had not moved since the groundwater pressure had been relieved and that the latest documentation and report from Consultant C was more relevant than information provided by the drilling operator.
- 5.5.6 A copy of a letter dated 3 November 2009 from a further consultancy firm (which was the corporate vehicle for a previous director of Consultants A) was forwarded by the applicant on 24 November 2009. Attached to the letter were plans showing inferred contours and as-built details of the Bores 1 and 2 and the relief bores.
- 5.5.7 In a letter to the authority’s legal advisers dated 8 July 2010, the applicant’s legal advisers noted that it was proceeding to review and finalise the monitoring and management plan, and was optimistic that the plan would satisfy the expert’s concerns. It was the applicant’s position that the determination should apply to all the subject allotments, and that it was essential that Lot 48 also be included. In addition, it was considered that the Department had the jurisdiction to make a broader determination on the basis of the PIM that was issued by the authority. The applicant intended to provide further submissions in respect of the monitoring and management plan.

#### **The applicant – response to expert’s comments**

- 5.5.8 An additional submission to the Department dated 7 February 2011 made on behalf of the applicant described the procedures undertaken in respect of the PIMs issued for the lots in question and the relevant legislation.
- 5.5.9 In addition to the correspondence regarding the PIMS, the submission described, in regard to the building consent for Lot 48, the progress that had been undertaken following the issuing of the draft determination and the Department’s expert’s report. Further testing had been undertaken, reports had been issued on behalf of the applicant, and the Manual had been further revised. The applicant was of the opinion that all the concerns raised in the second draft determination as to a natural hazard had now been resolved.

### **The authority – submissions**

5.5.10 The authority's legal advisers forwarded a submission dated 11 November 2009 which outlined that geology and groundwater conditions are complex and failure mechanisms not well understood, and there is a risk that the geologic model is incorrect and as a result it is unsafe to rely on a calculated safety margin. The authority outlined the following concerns with respect to the maintenance and monitoring plan:

- Issues relating to the robustness and maintenance of the drainage works were not addressed and whether the works were constructed to proper engineering standards
- There is a risk that the Opito Bay Water Company could cease to exist.
- Despite monitoring, there is still a degree of risk to the land such that the Chief Executive cannot be satisfied that the land, the building work and other property is adequately protected.

5.5.11 The authority's legal advisers also wrote to the Department on 20 November 2009 enclosing a copy of a report from Consultants E of the same date. In summary, the report noted that there was still uncertainty as to the precise position of the failure surface.

### **The authority – response to expert's comments**

5.5.12 In a letter to the Department dated 27 June 2011, the authority's legal advisers noted that it concurred with the expert's recommendations and requested that these matters be addressed before the determination was finalised:

- The reduced time frame for remedial action.
- The provision of draft sets of contract documents for the vertical pump option and for the maintaining, remediating, repairing, and upgrading of the works.
- The updating of the Manual in respect of all relevant trigger maximum levels.
- The establishment of the Opito Bay Water Company and execution of the Memorandum of Encumbrance.

## **6 Discussion**

### **6.1 Introduction**

6.1.1 I have taken the view that the matters to be determined are:

- whether the authority correctly exercised its powers when it proposed to impose a section 73(1) notification requiring an entry on the certificate of title on any future building consent to be issued in respect of Lots 42 to 47 and 49 to 51, and Lot 8 (refer to paragraph 6.3)
- whether the authority correctly exercised its powers when it issued a building consent subject to a section 73(1)(c) notification requiring an entry on the certificate of title for a house constructed on Lot 48 of the subdivision (refer to paragraph 6.4)

- whether any future building consent in respect of Lots 42 to 47 and 49 to 51, and Lot 8 should be subject to a section 73(1) notification requiring an entry on the certificate of title, given the proposed monitoring and maintenance plan

## **6.2 The application of section 177**

- 6.2.1 In the draft determinations, I took the view I was unable to determine the request described in paragraph 1.3, because of the section 177 that was current when the determination application was made.
- 6.2.2 Subsequent to the second draft determination, the applicant's and authority's legal advisers proposed that the determination be made in terms of the wording of the revised section 177, which is current from 7 July 2010. In effect, the revised sections 177(1)(b) and 177 (2)(a) broaden the powers of the Chief Executive by stating that the chief executive can now make a determination on the exercise or refusal to exercise, or proposed or purported exercise by an authority of any power or decision in respect of a building consent.
- 6.2.3 I am prepared to accept the proposition put forward on behalf of the applicant and the authority. Accordingly, I am of the opinion that I can now determine the matters in question as the "proposed exercise" by the authority of a power of decision (section 177(1)(b)) in respect of a building consent (section 177(2)(a)).

## **6.3 The proposed section 73(1) notifications**

- 6.3.1 The applicant applied for a PIM for the development of two storey dwellings on Lot 50, Lot 51, Lot 8, and single storey dwellings on Lots 42 to 47.
- 6.3.2 The authority issued a PIM dated 3 December 2007, and identified Lots 42 to 51 and Lot 8 as land affected by land instability and required any building consents issued in respect of these lots to be subject to sections 72 and 73, and required an acceptable report that any proposed work will not accelerate, worsen, or result in a natural hazard on the land on which the building work is to be carried out or on any other property.
- 6.3.3 In order to consider whether the authority correctly exercised its powers when it proposed to impose a section 73(1) notification on any future building consent, I have considered whether, in terms of section 71(1)(a), the land on which the building work would be carried out is subject (or is likely to be subject) to subsidence and slippage.
- 6.3.4 Based on the evidence provided by the consultants and the expert, and the uncertainty surrounding the drainage system at the time, I am of the opinion that the authority correctly proposed that a section 73 condition be placed on any future building consents.

#### **6.4 The building consent with the requirement for a section 73(1) notification for Lot 48**

- 6.4.1 At the time the authority made its decision to impose a section 73(1) condition on the building consent for the house constructed on Lot 48 (“the house”), the drainage system was not fully functional. If the stability of the site remained in question, I would be required to follow the “Building sites subject to hazards” process (refer to Appendix A) applied in determinations such as No 2008/82, which relate to natural hazards, before I could reach any final decision.
- 6.4.2 In the present circumstances, I have not been provided with any evidence that section 72(a) does not apply to the building work relating to the house. Accordingly, I am of the opinion that the house will not accelerate, worsen, or result in a natural hazard on the land on which the building work was carried out or any other property.
- 6.4.3 As I have already decided that the property at the time the building consent was issued, would be subject to subsidence or slippage, then it follows that section 72(b) applied.
- 6.4.4 Based on my decisions set out above, I am of the opinion that, taking into account the site conditions existing when it granted a building consent, the authority acted correctly when it issued the building consent in terms of section 72.
- 6.4.5 As I have decided that the authority was correct in granting a building consent in terms of section 72, it was also correct for the authority to issue the building consent subject to a section 73(1)(c) notification requiring an entry on the certificate of title.
- 6.4.6 I note that sections 74(3) and 74(4) provide for a territorial authority to notify the appropriate authorities if a section 72 entry is no longer required.
- 6.4.7 Therefore, once the applicant addresses the remaining concerns of the expert (as set out in the expert’s report dated 18 May 2011 and referred to in in paragraph 4.5 (specifically 4.5.2)), and the amendments required to the maintenance and monitoring plan and the Company’s Constitution set out in this determination (referred to in paragraphs 6.5.5) to the satisfaction of the authority, I am prepared to accept that adequate provision will be made to protect the land from the natural hazards of subsidence and slippage (in terms of section 71(2)(a)) and, consequently, the section 73(1) notification on Lot 48 may be able to be removed.

#### **6.5 The requirement for a section 73(1) notification on any future building consent, given the proposed monitoring and maintenance plan**

- 6.5.1 I have considered the expert’s report and the submissions of the parties regarding the measures undertaken to stabilise the ground. I note that these measures have virtually stopped any further movement of the ground for some time.
- 6.5.2 I agree with the applicant that the question of ownership of the drainage system is not a matter that I can determine. In the second draft determination, I was not convinced that the applicant’s proposed solution, together with the authority’s reluctance to participate, provide sufficient safeguards to ensure that in the future the systems will be given the attention that is required.

- 6.5.3 However, the expert has now accepted (as set out in paragraph 4.5) that, if the matters of concern listed by the expert are attended to, the drainage system would function effectively thus removing the ongoing risk posed by the current site conditions. I note that the authority now concurs with this view. Accordingly, I am now prepared to accept the conclusions of the expert as to this ongoing risk.
- 6.5.4 Having reached this decision, I find that, provided the applicant addresses these remaining concerns of the expert (as set out in the expert's report dated 18 May 2011 and referred to in paragraph 4.5) to the satisfaction of the authority, I am prepared to accept that adequate provision will be made to protect the land from the natural hazards of subsidence and slippage in terms of section 71(2)(a) of the Act. The result of this will be that a 73(1)(c) notification requiring an entry on the certificate of title will not be required in respect of any building consents for Lots 42 to 47 and 50 to 51 and Lot 8.
- 6.5.5 As to the on-going effectiveness of the drainage system, I note the following are required in regard to the proposed monitoring and maintenance plan and the Opito Bay Water Company:
- Each registered proprietor of a property will be subject to a memorandum of encumbrance and an easement that allows access to that property to maintain or rectify any drainage problems.
  - The proprietor is subject to a covenant that requires an annual rent charge in respect of the land to be paid to the company.
  - The Opito Bay Water Company has been incorporated to operate, manage, maintain, and administer the drainage system. The Company's Constitution contains some important restrictions that are intended to ensure the monitoring and management of the drainage system continues to be carried out in accordance with the Monitoring and Maintenance Manual:
    - the Company may only exercise its powers, own, operate, manage, maintain and administer, the water collection and disposal system;
    - the shareholders of the Company must be the owners of the land covered by DP66560. I note that clause 2.3 of the Constitution needs to be amended so shares can be held by the owner of Lot 8 DP26541.
    - shareholders may only transfer or sell their shares to a purchaser of their land;
    - the Company's Constitution requires the Company to carry out the monitoring and reporting obligations as set out in the Monitoring and Maintenance Manual.
    - in this respect, the Constitution should also be amended to include unrestricted access to Lots 38, 41, 48, and 49, in order to monitor the equipment that is part of the drainage system and which is situated on these properties. The applicant is responsible for obtaining this access to these properties, and agreement will need to be sought for encumbrances to be placed on these properties securing the rights of access for the company.

6.5.6 Finally, I am of the opinion that the drainage system is neither a NUO system<sup>5</sup> in terms of section 9, nor a system that is attached to a building structure in terms of section 8 (2)(a). Accordingly, I am not required to consider whether the drainage system itself is, or will be, code-compliant.

## **6.6 Additional considerations**

6.6.1 I note that the conditions relating to the operation of the drainage system are current as at the date of this Determination. Whenever the authority receives an application for a building consent the authority should check with the Opito Bay Water Company to ensure the drainage system is still operating in accordance with the Monitoring and Maintenance Manual. Any changes to the drainage system may require a reassessment as to whether the system is still adequately protecting the land from the natural hazards of subsidence and slippage. If the authority has concerns that the system is not functioning correctly or that the Opito Bay Water Company is not carrying out its responsibilities to the satisfaction of the authority, then the authority may need to consider the application of sections 71 to 73 to any application for a building consent.

6.6.2 In view of the importance of these considerations for ensuring current and future owners of the affected properties are protected from the natural hazards of subsidence and slippage, a copy of this Determination must be placed on the property file of each property so that all owners are fully aware of the importance of the continued operation of drainage system by the Opito Bay Water Company in accordance with the Monitoring and Maintenance Manual.

6.6.3 I note that in respect of any applications for building consents a modification of Clause B1.2 of the Building Code may be required in respect of the requirement that 'buildings shall withstand, the combination of loads that they are likely to experience during construction or alteration and throughout their lives'.

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<sup>5</sup> Refer to Appendix A Interpretation

## 7 The decision

7.1 In accordance with section 188, I hereby determine that the authority correctly exercised its powers:

- when it proposed to impose a section 73(1) notification on any building consent to be issued in respect of Lots 42 to 47, 49 to 51 DP66560, and Lot 8 DP26541
- when it issued a building consent subject to a section 73(1)(c) notification for a house constructed on Lot 48 of the subdivision.

7.2 I also determine that:

- (1) adequate provision will be made to protect Lots 42 to 47 and 49 to 51 DP66560, and Lot 8 DP26541 from the natural hazards of subsidence and slippage (in terms of section 71(2)(a))
- (2) that any future building consent in respect of Lots 42 to 47 and 49 to 51 and Lot 8 can be issued without a section 73(1) notification requiring an entry on the certificate of title

Provided that, to the satisfaction of the authority:

- the applicant to this determination addresses the remaining concerns of the expert (as set out in the expert's report dated 18 May 2011 and referred to in paragraph 4.5 (specifically 4.5.2)); and
- the applicant to this determination addresses the amendments required to the maintenance and monitoring plan and the Company's Constitution set out in this determination (referred to in paragraphs 6.5.5).

7.3 I direct that a copy of this determination be placed on the property file of each property.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 23 December 2011

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.

## APPENDIX B – Building sites subject to hazards

### Building Sites Subject to Hazards – Decision Tree

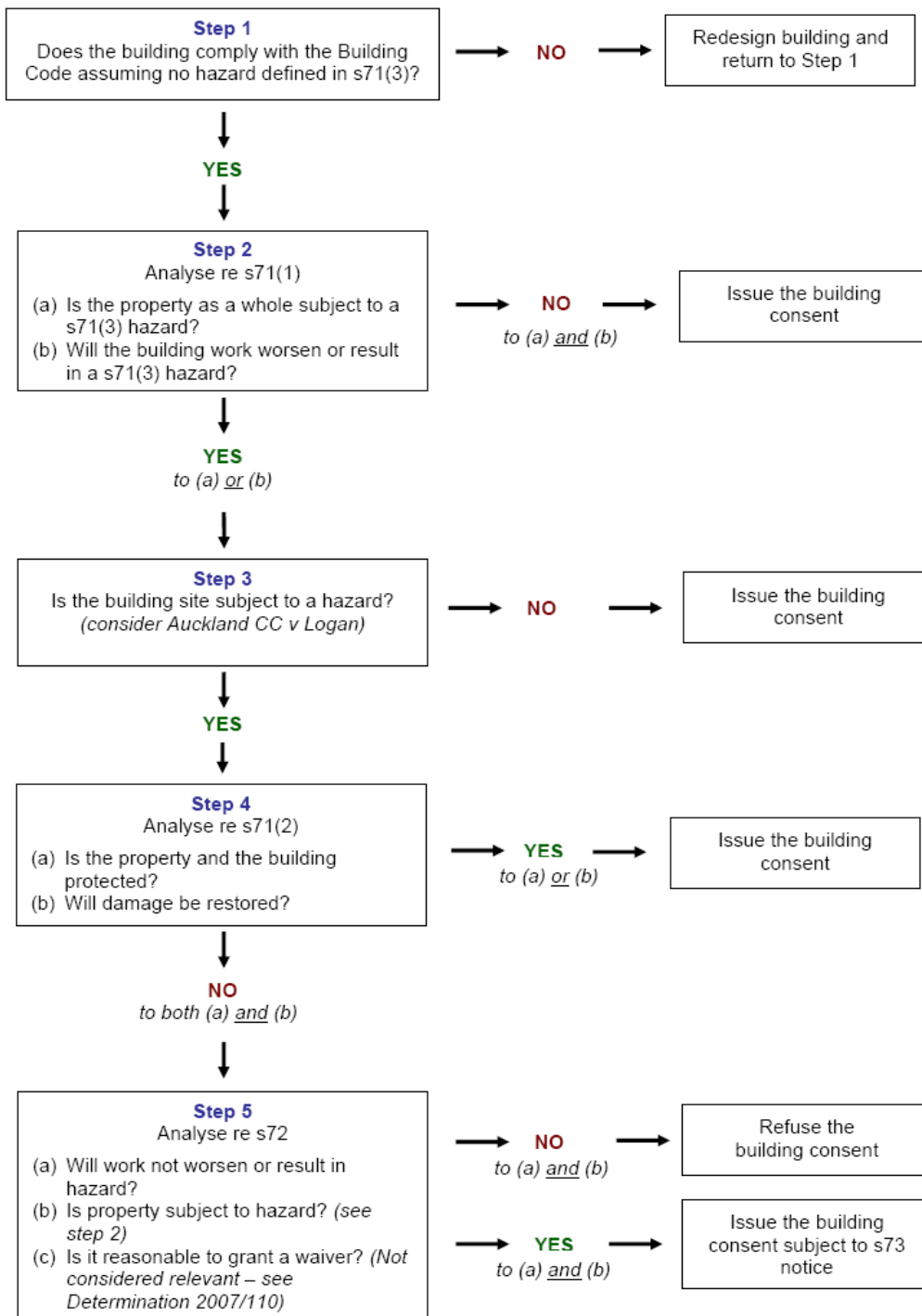


Figure 1: Building sites subject to hazards – the decision process described in the Building Act 2004