

Determination 2007/67

Retaining wall at 71 Beach Road, Waihi Beach, Western Bay of Plenty



1 The matter to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004 (“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. The applicant is the Overdale Family Trust (“the owner”), the other parties are the Western Bay of Plenty District Council (“the territorial authority”) and the Price Family Trust (“the neighbour”). The two contractors mentioned in 2.2.3 below and the consulting engineer mentioned in 2.2.4 below were sent the relevant documents and given an opportunity to participate in the determination process as persons whose rights, obligations, or interests might be affected by the determination in terms of section 27(1) of the New Zealand Bill of Rights Act 1990.

- 1.2 The application for a determination arises from the refusal of the territorial authority to issue a code compliance certificate in respect of a retaining wall constructed alongside the northern boundary of an allotment in connection with the removal of an existing house and the erection of a new wall (“the retaining wall”)¹. I have not been asked to consider various other retaining walls on the site, some of them incorporated into the new house. There is no dispute about the house itself.
- 1.3 The owner raised various issues, see 4 below, but I take the view that, in terms of section 177(b)(i), the matters for determination are:
- (a) Whether the retaining wall as built complies with the Building Code (the First Schedule to the Building Regulations 1992).
 - (b) The territorial authority’s refusal, before the building consent was amended, to issue a code compliance certificate in respect of the retaining wall as built.
 - (c) The territorial authority’s decision to issue an amendment to the building consent specifying alterations to the retaining wall as built.
- 1.4 Unless otherwise stated, references below to sections and schedules are to sections and schedules of the Act and to clauses are to clauses of the Building Code.

2 Background

2.1 Chronology

2.1.1 The chronology of the events described below was:

- | | |
|----------------|---|
| June 2005 | Building consent issued. |
| By August 2006 | House and retaining wall completed to current state. |
| August 2006 | Territorial authority inspects retaining wall. |
| October 2006 | Consulting engineer prepares plans and specifications for strengthening. |
| December 2006 | Owner applies for and territorial authority issues corresponding amendment to building consent. |
| February 2007 | Owner applies for determination. |
| March 2007 | Expert visits site and reports on retaining wall. |
| April 2007 | Consulting engineer withdraws plans and specifications for strengthening. |

¹ In this determination I refer to “the retaining wall” as a single structure for the reasons set out in 6.2.1 below. It was constructed in two stages, which I refer to as the lower and the upper parts. However, the expert referred to it as two retaining walls, which is equally correct.

- May 2007 General calculations prepared and draft determination copied to the parties, the two contractors concerned, and the consulting engineer.
- June 2007 Specific calculations prepared and copied to the parties, the two contractors concerned, and the consulting engineer.

2.2 The retaining wall

- 2.2.1 In June 2005 the owner applied for and obtained a building consent for the removal of an existing house and the erection of a new one. As shown on Figure 1, the plans and specifications supporting that application showed the retaining wall (and other retaining walls which I have not been asked to consider) on the site plan. However, the plans and specifications contained no other information about the retaining wall, although they did include full details of the house itself.

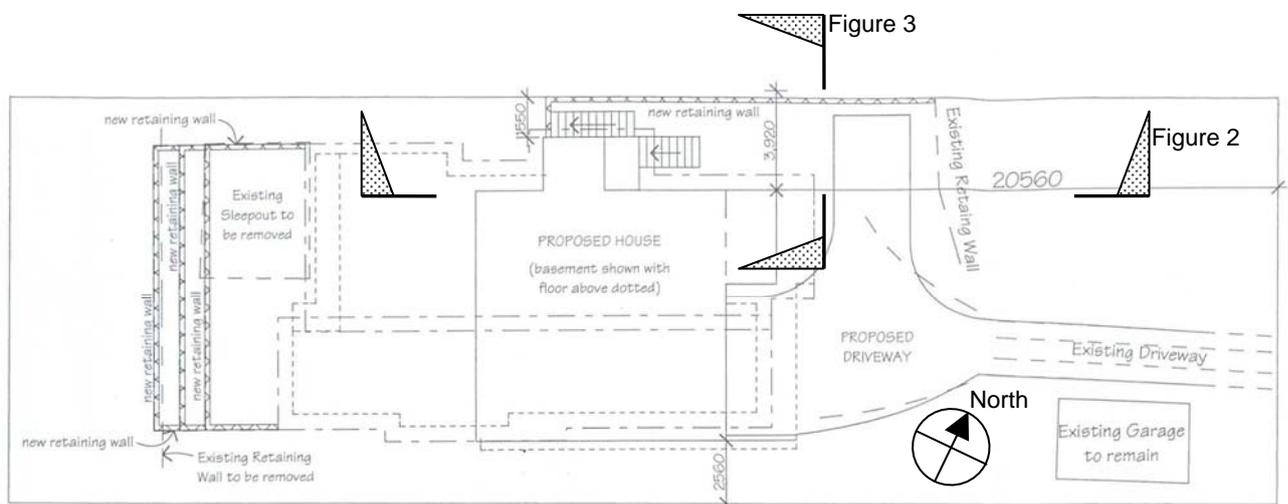


Figure 1: Site plan showing the position of the retaining wall along the north

- 2.2.2 The following description of the retaining wall is based on the expert's report mentioned in 2.3 below. The wall appears to have been constructed by contractors without any specific design and indeed without any plans and specifications.
- 2.2.3 The retaining wall as a whole is of varying height and retains a depth of between about 1.1 m and about 2.4 m as shown in Figure 2. It was constructed in two stages, the lower part first by one contractor and the upper part later by another contractor. As shown in Figure 3, both the lower and the upper parts consist of 125 mm x 125 mm posts (which the expert refers to as "poles" and which could also be referred to as "poles") at 1.1 m centres cast into concrete posthole footings, with 150 mm x 50 mm rails spanning horizontally between posts. The posts of the lower part are inclined at 5° off vertical towards the boundary, the posts of the upper part are vertical. The upper part is immediately behind the top of the lower part. The posts of the upper part extend above the retained soil.

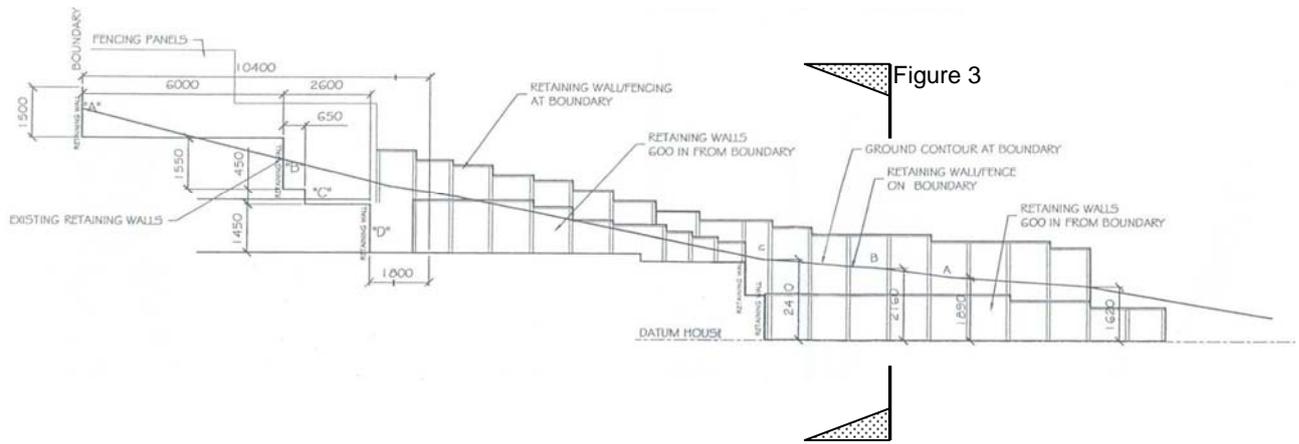


Figure 2: Ground profile along the north boundary showing height of soil retained (from the application for building consent with heights added)

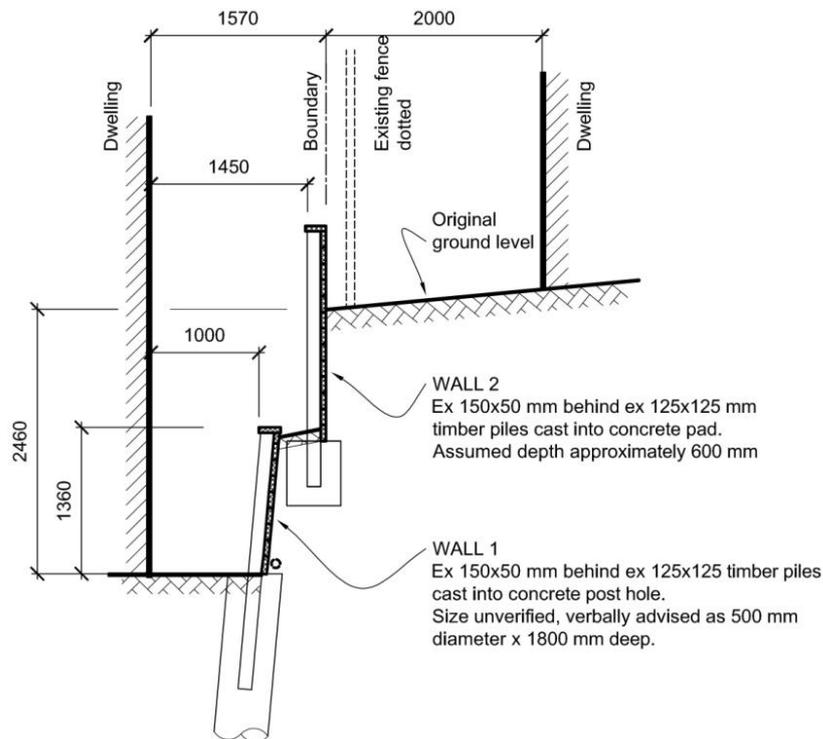


Figure 3: The retaining wall (taken from the expert's report).

- 2.2.4 The territorial authority did not make any specific inspections of the retaining wall in the course of its construction but did inspect it after construction. As a result of that inspection, the territorial authority discussed matters with the owner, who then applied for an amendment to the building consent to the effect that the retaining wall was to be strengthened in accordance with plans that had been prepared by the consulting engineer (“the consulting engineer”) who had been responsible for the design of structural parts of the house. The territorial authority issued an amendment to the building consent based on those plans.
- 2.2.5 The owner did not strengthen the retaining wall as required by the amendment to the building consent but instead applied for this determination on the grounds outlined in 4 below.

- 2.2.6 When the consulting engineer read the expert's report (see 2.3 below) and realised that, contrary to what he had understood, the retaining wall as built could not be assumed to have been constructed in accordance with good practice, he withdrew the plans and the accompanying producer statement.

2.3 The expert's report

- 2.3.1 I engaged an independent building consultant ("the expert") to visit the site and report on the retaining wall as built.

- 2.3.2 The expert reported that:

- (a) The retaining wall "appeared to be constructed using timbers treated to the appropriate hazard class for their purpose".
- (b) There was some evidence to the effect that the posts of the lower part were embedded in footings that were 500 mm in diameter and 1800 to 2000 mm in depth.
- (c) There was no such evidence in respect of the upper part, but there were some indications that the footings were no more than 600 mm in depth.
- (d) "Regardless of foundation sizes or embedment depths, the 125 x 125 timber piles are insufficient to resist the applied load of the retained ground."
- (e) Posts of the upper part "appear to be undergoing rotation" (i.e. are being forced out of the perpendicular by the retained soil).
- (f) The upper part of the retaining wall:
 - . . . relies on the [lower part] for support. Based on photographic evidence it is clear that some or all of the piles are not embedded into original ground but into the backfill material placed behind the [lower part]. This is considered to be a likely cause of the observed rotation in some of the piles.

- 2.3.3 The report also observed that the amendment to the building consent appeared to assume that the posts of the upper part of the retaining wall as built were embedded into concrete footings of the necessary depth. The expert could not confirm that assumption and doubted whether it was correct.

- 2.3.4 The expert's report also offered the following observations which I take to be based on the expert's general experience and to apply also to the retaining wall:

11.0 General Observation

We have observed both during the course of this investigation and others a general misunderstanding as to the requirements of the legislation under the Building Act 2004 and in particular.

- 11.1 A general misunderstanding of the exempt building work under schedule 1 section (c) as it relates to what may constitute a surcharge on the wall and thereby not be exempt form building works.

11.2 That regardless of whether or not a building consent is required, the work must still comply with the building code as required by section 17 of the Building Act 2004.

11.3 A general belief by construction contractors that they have the necessary ability to determine the construction requirements for retaining walls when in fact it is generally beyond their areas of expertise.

2.3.5 I copied the expert's report to the parties, the two contractors concerned, and the consulting engineer.

2.4 Calculations

2.4.1 Originally, I took the view that the major strengthening proposed by the consulting engineer on the basis of specific design calculations established that the retaining wall as built does not comply with the Building Code.

2.4.2 However, the consulting engineer has now withdrawn those calculations so that they can no longer be taken into account. Nevertheless, neither I nor the Referee engaged to assist me, close our eyes to the conclusion that the retaining wall as built is so significantly deficient as to raise safety considerations.

2.4.3 Accordingly, to avoid unnecessary delay, the Referee arranged for the "general" calculations referred to in 6.1.2 below, which were copied to those concerned together with the draft determination mentioned in 2.5 below. So that there could be no suggestion of partiality, I engaged an independent structural engineer to visit the site and, on the basis of his assessment of the actual soil properties, make the "specific" calculations referred to in 6.1.3 below, which were also copied to those concerned.

2.5 The draft determination

2.5.1 I prepared a draft determination ("the draft") to the effect that the retaining wall did not comply with the Building Code and confirmed the territorial authority's decision to refuse to issue a code compliance certificate for the retaining wall. I copied it to those concerned under a covering letter to the effect that if they did not accept the draft (subject to non-controversial amendments) then it would be necessary to hold a formal hearing.

2.5.2 Because of possible concerns about the safety of the wall, the draft was prepared with some urgency on the basis of the general calculations mentioned in 2.4.3 above. However, when the specific calculations came to hand they were also copied to those concerned.

2.5.3 The parties' responses to the draft were copied to those concerned. From those responses, outlined below, I considered that there was no request or need for a formal hearing. I accordingly amended the draft to produce this determination.

2.5.4 The territorial authority requested that the determination include additional guidance on certain procedural matters. That request is taken into account below.

- 2.5.5 The neighbour disputed certain statements in the draft. I accept that those statements could be seen as controversial, and in any case were not relevant to my decision, and I have therefore removed them.
- 2.5.6 The owner, through its solicitor, responded to the effect that the owner accepted the outcome of the draft. However, said the solicitor:
- . . . the real issues . . . are not within the jurisdiction of the DBH but are issues as between our clients and various other parties who played roles in the construction work on their property..
- . . . For your information, we are instructed to write a letter to all of the parties whom our clients believe (on our advice) contributed to the building of the wall . . . inviting them to participate in a pragmatic resolution of the problem.
- 2.5.7 In particular, the owner requested the addition of certain additional information about the relationships between those concerned. However, the neighbour disputed the findings of fact implicit in that additional information. I take the view that the additional information is controversial, and in any event is not relevant to my decision, and have not amended the draft in that respect.
- 2.5.8 The owner also requested the removal of certain comments as to what is to be done procedurally in the light of the determination. I accept that the comments concerned were not relevant to my decision and could be seen as controversial, and have accordingly removed them. On the other hand, in response to the territorial authority's request for guidance, I have added other comments that I consider to be non-controversial.
- 2.5.9 I have also removed from the draft the detailed results of the general calculations mentioned in 2.4.3 above, which have been replaced by the specific calculations also mentioned. The detailed results of those calculations are specific to the facts of this determination. Both sets of calculations were to the same effect, namely that the retaining wall as built does not comply with the Building Code. Both sets of calculations were copied to those concerned.
- 2.5.10 I have also removed from the draft certain references to loads imposed on the retaining wall by the neighbour's house, because the independent structural engineer who made the specific calculations said:
- Our site measurements indicate that the house foundations will not impose any surcharge load on the [retaining wall].
- 2.5.11 I have also made various other minor and non-controversial changes to the draft.

3 The Act and the Building Code

3.1 Relevant provisions of the Act are:

Section 7:

plans and specifications —

- (a) means the drawings, specifications, and other documents according to which a building is proposed to be constructed, altered, demolished, or removed; and

Section 17:

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.

Section 40:

- (1) A person must not carry out any building work except in accordance with a building consent. . . .

Section 41:

- (1) Despite section 40, a building consent is not required in relation to—
 - (b) any building work described in Schedule 1; or

Section 45:

- (1) An application for a building consent must—
 - (b) be accompanied by plans and specifications . . .

Section 49:

- (1) A building consent authority must grant a building consent if it is satisfied on reasonable grounds that the provisions of the building code would be met if the building work were properly completed in accordance with the plans and specifications that accompanied the application.

Section 94:

- (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; . . .

Schedule 1:

A building consent is not required for the following building work:

- (c) construction of any retaining wall that retains not more than 1.5 metres depth of ground and that does not support any surcharge or any load additional to the load of that ground (for example, the load of vehicles on a road):

- 3.2 Relevant provisions of the Building Code are (note that the neighbour's land, including buildings, is "other property"):

CLAUSE B1—STRUCTURE

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.

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.

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:

- (d) Earth pressure,
- (e) Water and other liquids,
- (f) Earthquake . . .

B1.3.4 Due allowance shall be made for:

- (a) The consequences of failure,
- (d) Variation in the properties of materials and the characteristics of the site . . .

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.

4 The owner's submissions and my responses

4.1 General

4.1.1 The owner's submissions included various allegations about the actions of the territorial authority, including that the territorial authority had entered the owner's property "without permission" and had "used bully tactic" to get the owner to sign the application for an amendment to the building consent.

4.1.2 The consideration of such allegations is outside my jurisdiction, which is limited to matters related to building technology. Any redress in respect of such allegations

must be sought through other channels. I must therefore proceed with this determination on the basis that, for whatever reasons, the owner did in fact apply for the amendment to the building consent and the territorial authority issued that amendment.

- 4.1.3 In formulating my responses to the owner's submissions I am conscious that the retaining wall is required not only to protect the owner's house against landslip and falling debris from the face of the excavations undertaken by the owner (see clause B1.3.1), but also to protect the neighbour's house and land against removal of support as a result of that excavation (see clause B1.3.6(b)).

4.2 Submission that the amendment to the building consent should be withdrawn

- 4.2.1 As mentioned in 4.1.1 above, the owner alleges that the territorial authority improperly obtained the owner's application for the amendment to the building consent. I make no comment on that allegation, which is outside my jurisdiction.

- 4.2.2 The amendment added the retaining wall to the building work covered by the building consent, see 4.4 below.

- 4.2.3 However, the amendment was based on plans and specifications which the consulting engineer has now withdrawn. Accordingly, and for that reason only, I consider that it is appropriate for me to reverse the territorial authority's decision to issue the amendment. As discussed in 4.4 below, with the amendment withdrawn, the building consent covers the house itself but not the retaining wall. Accordingly, the territorial authority can now issue a code compliance certificate for the house (provided that it is satisfied that it complies with the building consent).

4.3 Submission that the retaining wall complied with the Building Code

- 4.3.1 The owner submitted in effect that the retaining wall complied with the Building Code because a report and calculations by the consulting engineer that had accompanied the application for building consent and been accepted by the territorial authority "was the final seal of approval required and was confirmation that the building code was being met".

- 4.3.2 The report referred to did not mention the retaining wall but was confined to structural details of the house itself, including certain concrete block retaining walls. The details of those walls bear no resemblance to the retaining wall. I consider that the report concerned is irrelevant to this determination.

- 4.3.3 On the other hand, both the expert's report and the calculations mentioned in 2.4 above leave me in no doubt that the retaining wall does not comply with the Building Code, see also 6.1 below.

4.4 Submission that the retaining wall complied with the original building consent

4.4.1 The owner said:

[The owner] met all council approved requirements while building their home and undertaking the landscaping, they therefore believe that a code of compliance should be issued. If council had any issues prior to all permits being signed off then these issues should have been raised . . . at the time -- not three months after [the owner] had completed the project. . . .

On the house plans it is evident that a retaining wall is to be constructed but its design, height etc is not documented and was never commented on in fact retaining walls were inspected and passed on 11 November 2005 [see the territorial authority's relevant building inspection report].

4.4.2 I take that to be a submission to the effect that the retaining wall complies with the original building consent and that therefore section 94 requires the territorial authority to issue a code compliance certificate.

4.4.3 The question, therefore, is whether the retaining wall does indeed comply with the original building consent (as distinct from the Building Code).

4.4.4 As mentioned in 2.2 above, the plans and specifications in respect of which the original building consent was issued do not show any details of the retaining wall. In other words, the application for the original building consent was not accompanied by any documents in accordance with which the retaining wall (as distinct from the house itself) was proposed to be constructed.

4.4.5 Retaining walls can be constructed of so many different materials and in so many different ways that it is unacceptable to claim that a building consent was issued for a retaining wall without any details as to its "design, height, etc" having been included in the plans and specifications.

4.4.6 As to the alleged inspection and approval of the retaining wall, I am satisfied that the inspection report related only to the concrete block retaining walls incorporated in the house.

4.4.7 I conclude that the original application for building consent did not include the retaining wall. In terms of section 49, therefore, the original building consent did not cover the retaining wall.

4.4.8 The retaining wall as built clearly does not comply with the amended building consent, and in any case the amendment is to be withdrawn as discussed in 4.2 above.

4.4.9 I therefore conclude that the retaining wall does not comply with the building consent.

4.4.10 In terms of section 94, therefore, the territorial authority had no grounds on which it could issue a code compliance certificate in respect of the retaining wall (as distinct from the house), see 4.2.3 above.

- 4.4.11 The plans and specifications for the house do not include specific levels but do indicate that significant excavation would be undertaken, see Figure 2. I note that the plans and specifications do not include any detailed provisions to protect the house and other property from ground instability. I also note that the territorial authority does not appear to have raised the matter when considering the application for building consent.

5 Other submissions

- 5.1 In response to the application for a determination, the neighbour asked that the consulting engineer's designed strengthening should be undertaken so that the neighbour's property would have "the safety, it had before the excavation digging began".
- 5.2 The neighbour also:
- (a) Pointed out that the area experienced heavy rainfall that could cause problems with excavations.
 - (b) Disputed the owner's statement as to the original ground levels.
 - (c) Described the sequence of events with which the neighbour had been involved.
- 5.3 No other submissions were received in response to the application for a determination.

6 Discussion

6.1 Does the retaining wall comply with the Building Code?

- 6.1.1 Retaining walls of the type concerned are cantilever structures which rely on the interaction of the embedded poles with the surrounding soil. I am advised that key features of an acceptable design approach should include:
- (a) A reasonable assessment of soil properties, based on tests, and experience of conditions on the site.
 - (b) Concrete (or other) encasement to the embedded poles being proportioned to limit lateral pressures applied to the ground, and displacement of the ground.
 - (c) Use of an appropriate load factor (typically 1.5 or more) applied to the lateral pressure calculated as being applied to the back face of the wall.
 - (d) Recognising that the encasement will normally be non-structural, and that the maximum bending in the cantilevered poles will normally exceed that calculated at the top of the encasement.

- (e) Recognising that for an active pressure design case, there will be horizontal and vertical movement in the retained soils behind the wall, and that movement may have impact on buildings supported on the ground behind the wall.

6.1.2 As mentioned in 2.4.3 above, the Referee arranged for the “general” calculations to be made to show the required pole sizes for a vertical timber pole wall retaining various depths of soil on the basis of simplified assumptions as to soil properties. The results of those calculations were incorporated in the draft. Those general calculations have been replaced by the “specific” calculations made by an independent engineer on the basis of his assessment of the actual soil properties on site. Both sets of calculations were copied to those concerned, who did not object to or comment on the calculations. The calculations were prepared for the purposes of this determination and do not amount to structural designs for any replacement wall.

6.1.3 Both sets of calculations indicated that the retaining wall as built has only a fraction of the structural capacity required for compliance with clause B1. I therefore conclude that the retaining wall as built is inadequate to a significant degree and does not comply with the Building Code.

6.2 Does the construction of the retaining wall need a building consent?

6.2.1 Schedule 1(c) provides that a building consent is not required for a retaining wall that retains not more than 1.5 m depth of ground and that does not support any surcharge. A surcharge is any feature such as sloping ground, or a road, or another building which adds to the load on the wall over and above the load imposed by the depth of soil retained. Accordingly, it is acceptable for a cut to be retained by a series of 1.5 m retaining walls above each other provided that no higher wall imposes a surcharge on a lower wall. That means that there must be a certain horizontal distance between the walls, depending on the particular soil properties of the site. In this case, the distance is insignificant, see Figure 3, and the upper part imposes a load (“surcharge”) on the lower part.

6.2.2 Accordingly, I regard the retaining wall as a single structure in which the lower and upper parts act together to retain the full height of the cut. The lower and upper parts cannot be regarded as separate and independent structures because the upper part depends on the lower part for support and stability.

6.2.3 Even if the lower part were considered on its own, although it is less than 1.5 m high it supports not only the soil immediately behind it but also a surcharge in the form of the loads imposed on it by the structural actions of the upper part and by the soil behind the upper part. Accordingly the construction of the lower part is not exempted from the need for a building consent under clause (c) of Schedule 1.

6.2.4 If the upper part were considered on its own, arguably it comes within Schedule 1(c) and is therefore exempted from the need for building consent. However, even if it does come within Schedule 1(c) it must still comply with the Building Code, see section 17, and for the reasons set out in 6.1 above I consider that it does not comply with the Building Code.

7 What is to be done?

- 7.1.1 It is not for me to decide how the retaining wall is to be brought to compliance with the Building Code. That is for the owner to propose and the territorial authority to approve, preferably by way of an application for a new consent for the strengthening or replacement of the retaining wall.
- 7.1.2 I have not been asked to consider the other retaining walls on the site and have been given no information on them. I therefore do not know whether they suffer from the same deficiencies as the retaining wall that I have considered. However, I urge the territorial authority to consider those walls in the light of this determination.

8 Decision

- 8.1 In accordance with section 188 of the Act, I hereby:
- (a) Reverse the territorial authority's decision to issue the amendment to the building consent.
 - (b) Determine that the retaining wall as built does not comply with the Building Code.
 - (b) Confirm the territorial authority's decision to refuse to issue a code compliance certificate in respect of the retaining wall as built.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 26 June 2007.

John Gardiner
Manager Determinations