TONKIN & TAYLOR **REPORT**

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EARTHQUAKE & WAR DAMAGES COMMISSION

RESEARCH PROJECT 91/62

LANDSLIP CLAIM REVIEW

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EXECUTIVE SUMMARY

The automatic cover for landslip damage has been included in the Earthquake & Damage Act since 1970. Tonkin and Taylor Ltd has undertaken a review of the engineering advice given to EQC during this period in assessing landslip and land damage. This includes:

- definition of failure as a landslip in terms of the Regulations
- cause of landslip failure
- future risk of instability
- recommendations on reclassification.

The study has included review of the history of the development of EQC landslip cover and an assessment of over 2000 claims of which some 70 claims containing Engineers reports were analysed.

From this review draft guidelines have been developed for engineers investigating claims for landslip and land cover. Issues affecting future policy of the EQC have also been identified.

EARTHQUAKE & WAR DAMAGES COMMISSION

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LANDSLIP CLAIM REVIEW

CONTENTS

1.0 INTRODUCTION

It is now 22 years since automatic cover for landslip was included (1970) in the Earthquake & War Damage Act, and 36 years since Regulations were first introduced (1956) to provide voluntary cover for landslip. Following a review of the Earthquake & War Damage Act and Regulations by the Commission of Enquiry into the Abbotsford Landslip Disaster, new Regulations were introduced in 1984 which included land cover.

This report, commissioned by EQC on 8 May, 1991, summarises the results of research into the history of claims for landslip and land damage. The primary objective of this research has been to develop guidelines for those authorised by EQC to assess claims for landslip and land damage.

In order to prepare guidelines for future claims, it is important that the background to landslip cover is fully appreciated, and a brief history of EQC landslip cover is set out in Section 2.

To determine precedents which have been established by the rejection or acceptance of claims, over 2,000 Landslip (LS) and land (L) claim files were reviewed to identify how claims have been handled by the EQC, the assessors, and the engineers. In addition to the files held by Tonkin & Taylor covering 1970 to 1992, EQC Landslip claims were accessed from EQC archives covering the period before and after the Abbotsford Landslip Disaster (78 LS 161-217, 79 LS 0-150, 80 LS 50-460); for two years after the introduction of the 1984 Regulations (85 LS 0-106, 85 L 0-211, 86 LS 0-159, 86 L 1-361) and all landslip and land cover claims for 1989 (89 L 1-231, 89 LS 0-119) and 1991.

The experience of EQC over the past 22 years has been that, in assessing claims arising from landslip, it is essential that the "landslip expert" has an intimate knowledge of the Act and the Regulations. The guidelines presented in Section 3 set out and discussed the relevant sections of the Act & Regulations.

Interpretation of the sections and specific words are also presented based on Parliamentary debates at the times of legislative changes as recorded by Hansard; the report of the Commission of Inquiry into the Abbotsford Landslip Disaster which included in its Terms of Reference a critical review of the Earthquake & War Damage Act & Regulations and the role of the Commission (EQC); and based on precedent from case histories and literature distributed by EQC.

From this review, draft guidelines have been developed for engineers investigating claims for landslip or land cover, and these are set out in Section 3.

In preparing these draft guidelines, issues have been identified which we consider EQC may need to address in establishing future policy, including potential amendments to the Regulations.

In determining the responsibility and potential future liability exposure of EQC to landslip claims, it is important that the responsibilities of consenting and permitting authorities are also clearly established. In Section 4, the responsibilities of consenting/ permitting authorities are set out, together with recommendations which will enable EQC to minimise its exposure to claims for landslip in future.

2.0 BRIEF HISTORY OF LANDSLIP COVER

The War Damage Act, 1941 came into being because of the threat of invasion during the second world war. This scheme was essentially to compensate for tangible property losses arising from the activities of war, whether by enemy action, allied action in defence or as a result of measures to mitigate the spread of hostilities in this country (Gill, 1974).

Since the Napier earthquake in 1931 there had also been pressure on the Government to compensate property owners for earthquake damage and in 1944, with the end of hostilities in sight, the War Damage Act 1941 was repealed and the Earthquake & War Damage Act 1944 introduced.

In 1949, as a direct result of the 1948 Frankton Junction tornado, cover under the Act was extended to include extraordinary disaster damage defined as:

> "Damage occurring as the direct result of storm, flood or volcanic eruption (excluding damage caused by landslip, subsidence of earth or rock, or erosion by the sea) where the storm, flood, or volcanic eruption is of an abnormal and unforeseen nature and is of extraordinary effect."

Although landslip was excluded from automatic cover under the Act, insurance cover against a landslip risk could be effected with the EQC under the 1956 Regulations but at a higher premium. When questioned in Parliament about the high premium for landslip cover, the Minister in Charge of the EQC at the time (Hon. Mr Eyre) stated that:

> "It would be inequitable if citizens paying low premiums for earthquake and war damage risk were penalised through the odd person insuring against landslide, resulting in a high premium on account of the greater risks" (Hansard, 9 October 1956, p-2309).

However, by 1969, there was mounting political pressure on EQC to provide automatic cover for landslip, with the general feeling that "if it was good enough to pay out for flood damage, there was surely a case for paying out for damage caused by landslip." (Hansard, 2 September 1969, p-2448).

Amending regulations to provide automatic landslip insurance cover under the Earthquake & War Damage Act became effective from 16 July 1970. These regulations were designed to provide cover on a basis very similar to that which had been provided for earthquake damage and extraordinary disaster damage.

On 8 August 1979, a landslip occurred at Abbotsford which involved 81 Ha of land and destroyed 69 homes. As a direct result of the recommendations of the Commission of Inquiry into the Abbotsford Landslip Disaster, new Regulations were introduced in 1984 which included land cover.

3.0 REVIEW OF CLAIMS

A review of landslip claims from 1971 to 1991 has been undertaken by reference to the more than 2000 EQC records. 71 claims containing engineers reports were studied.

The most striking factor is the variability of scope and the nature of the reports ranging from detailed and lengthy technical tomes to short letter reports. While this clearly reflects the wide range of landslip failures investigated, it also indicates a diversity of appreciation of EQC requirements with respect to detail and presentation formats. The latter made it difficult to assess the consistency of advice given to EQC. However, the following notes provide a summary of significant features of the reports and issues raised within them. The information has also been used to develop guidelines for assessing claims presented in Section 4.

- Conclusions need to be definite. All engineers reports need to provide a clear recommendation on whether the damage shall be defined as a landslip in terms of the Regulations and whether reclassification of the property should be considered. It is essential that the Engineer has an intimate knowledge of the Act and Regulations.

- Future risk needs to be identified in reports to permit EQC to determine classification and assess options for contracting out. The potential for works to satisfactorily stabilize the landslip needs to be stated in reports.

- The responsibility to advise District Authorities is not clear, particularly if evacuation of the property may be necessary when there is imminent danger of collapse of structures.

- Liability of the Engineer needs to be clarified in Conditions of Engagement, particularly where preliminary advice is provided to the property owner to assist in mitigating against further damage.

- The transition from creep to landslip movement of the ground mass is not well defined. In assessing responsibility of the property owner to arrest creep to ensure that movement does not develop into landslippage raises a number of complex issues.

- Engineers engaged by others may not be able to avoid conflict of interests when requested by EQC to identify issues that determine if the development has been carried out using sound principles, or whether neglect or carelessness and other matters may have contributed to the damage.

- A guideline is required on providing advice on neighbouring properties considered to be at high risk of damage. Present practice of recommending property owners contact EQC is considered appropriate but the Commission's interests in mitigating against further claims may, on occasion require immediate advice.

Information obtained from the files have been used to develop the detailed recommendation and guidelines developed for assessing claims in Section 4.

4.0 GUIDELINES FOR ASSESSING CLAIMS FOR LAND AND LANDSLIP DAMAGE

4.1 General

Until now there have been no formal guidelines for "engineers" reporting to the Commission upon assessing claims arising from landslip. At the time of major events the Commission do not have the time to assimilate large volumes of technical data which may not even be directly relevant to their administration of the claims arising from landslip (or any other natural hazard). Accordingly, it is imperative that the "engineers" be succinct, and to do this effectively, they must know the Act and Regulations, and be familiar with how EQC interpret the various clauses.

There are only two parties involved in claims - the claimant and the Commission. Because natural events such as earthquakes and landslips are random in time, the Commission does not employ sufficient full time resources to handle claims internally. When claims arrive, the Commission uses expertise available in the marketplace to assist it in assessing claims.

At present, the Commission uses, as a first point of contact, an approved (insurance) Assessor. In determining the quantum of the claim, the Assessor will usually require assistance from a building contractor (in the case of landslip damage) and a land valuer (in the case of damage to land). If the Assessors requires technical assistance, they may directly seek advice or can recommend this support from EQC who may refer the Assessor to an approved Engineer. Accordingly, although engaged by, and acting as an agent of, the EQC, in most cases the approved Engineer will be briefed by, and report back to, the approved Assessor.

The claims process is shown as a flow diagram in Figure 1. Each party involved in the claims process has a specific role, and this section deals with the role of the approved engineer. In essence the role of the approved Engineer is to provide yes or no answers to up to six or seven questions, the result of which will determine whether or not the

CLAIMS PROCESS DIAGRAM

Figure 1

CLAIMANT	EQC	ASSESSOR	ENGINEER	CONTRACTOR	VALUER
1 Lodges claim with EQC	2 Instructs Assessor to evaluate claim	3 Visits the claimant's property	10 Visits the claimant's property	19 Visit claimant's property	23 Visits claimant's property
34 Receives notice of classification	8 Approves request, supplies assessor with list of engineers	4 Determines if the claimant is insured	11 Determines if it is a landslip	20 Puts a $ value on damage	24 Puts a $ value on damage
5 Carries out remedial work	22a Appoints VNZ	5 Determines if the event occurred within 30 days of claim to EQC	12 Determines probable cause	21 Reports to the Assessor	25 Reports to the EQC
6 Obtains Engineers report	25a Receivers VNZ report	6 Assesses the claim	13 Determines if it is landslip damage		
7 Forwards to EQC for re-classification to "A"	25b Copy VNZ report to assessor	7 Requests permission of EQC to engage an engineer	14 Determines if it is in imminent danger of total loss		
	27 EQC evaluates report	9 Assessor engages an engineer	15 Makes recommendations to mitigate further loss		
	28 EQC settles claim	18 Engages Contractor to quantify building damage	16 Assesses future risk to property from landslip		
	29 if engineer recommends classifications EQC advises claimant	22 Advises EQC to appoint Valuer to quantify land damage	17 Reports to EQC, copy to assessor. Report includes: • recommendation for classification • identifies contributing factors: - poor construction practices - irresponsible action by owner - actions by other parties		
	30 Classification recommended to EQC Board	26 Assessor reports to EQC			
	31 Board accepts/ rejects classification				
	32 Claimant notified of classification				
	33 Notice to DLR to register classification on title				
	38 Considers Engineer's report and recommends re-classification to Board				
	39 Board acepts/ rejects re-classification				
	40 Notice sent to claimant				

claim is accepted, and to highlight actions required by either the claimant or EQC. These questions are set out in a flow diagram shown on Figures 2 and 3, and guidance in providing answers to these questions is set out in the following sub-sections (4.2 to 4.9). It should be noted that the present system does not provide for feedback to the Assessor or Engineer on the final outcome of a claim.

4.2 Is it a Landslip?

Landslip was defined in the 1956 Regulations as:

> "Landslip" means the sudden slipping from any hill, mound, bank, slope, cliff, or face of earth or rock, of a substantial mass of earth or rock which before slipping formed an integral part of the hill, mound, bank, slope, cliff or face; but does not include any subsidence of earth or rock."

This definition lead to some confusion with respect to the term "subsidence" and was re-defined in 1967 under Regulation 3:

> Meaning of "landslip" - Regulation 2 of the principal regulations is hereby further amended by omitting from the definition of the term "landslip" in subclause (1) the word "sudden" and also the words "but does not include any subsidence of earth or rock."

to arrive at:

> "Landslip" means the slipping from any hill, mound, bank, slope, cliff, or face of earth or rock, of a substantial mass of earth or rock which before slipping formed an integral part of the hill, mound, bank, slope, cliff or face."

Landslip was re-defined again in 1970 to the present definition in Regulation 2 of the Earthquake & War Damage Regulations 1984, as:

> "Landslip" means subsidence of a substantial land mass other than by settlement, soil shrinkage, or compaction; and includes the movement from any hill, mound, bank, slope, cliff, or face of earth or rock, or of a substantial mass of earth or rock, which before movement formed an integral part of the hill, mound, bank, slope, cliff or face.

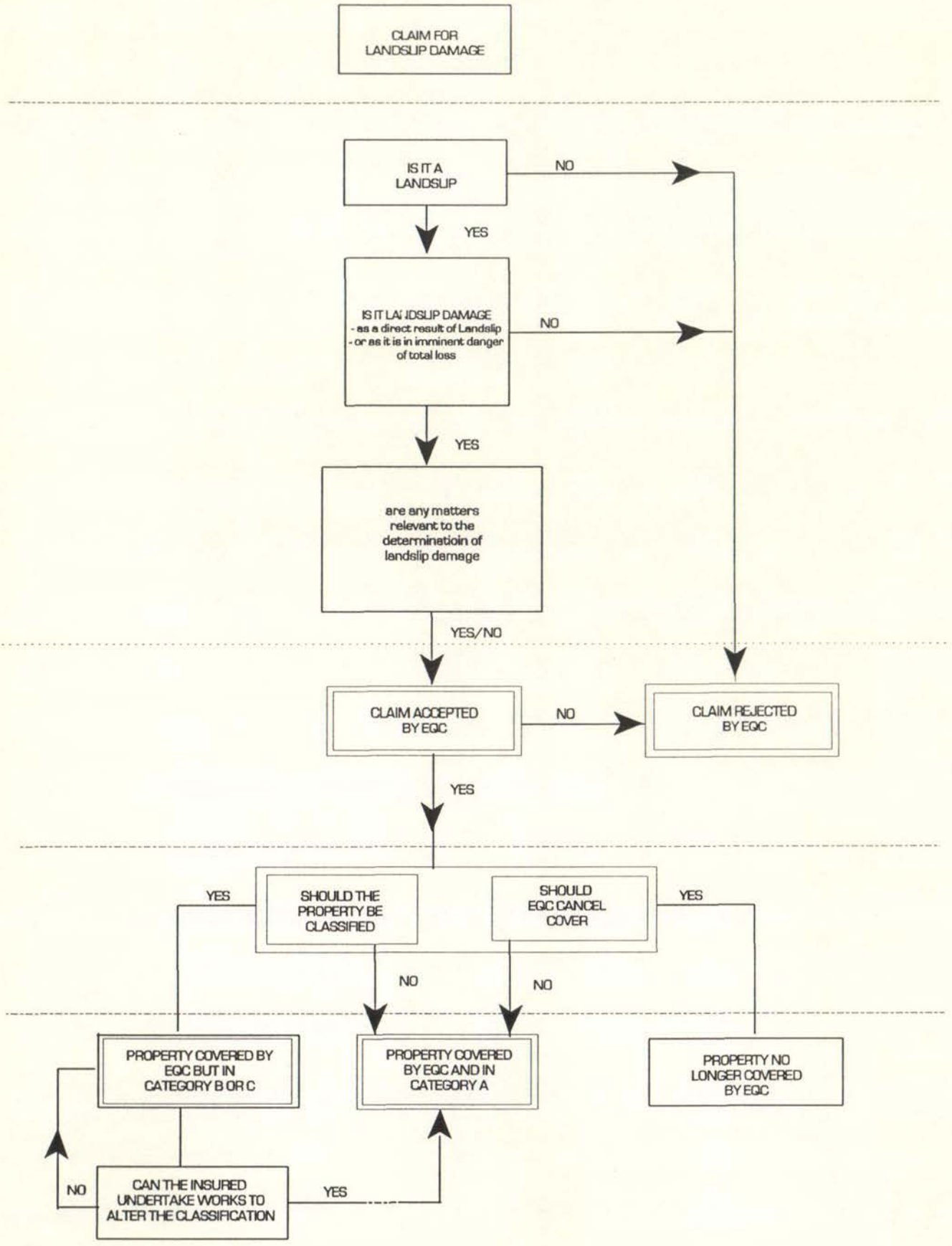

FIGURE 2 : FLOW DIAGRAM FOR LANDSLIP DAMAGE

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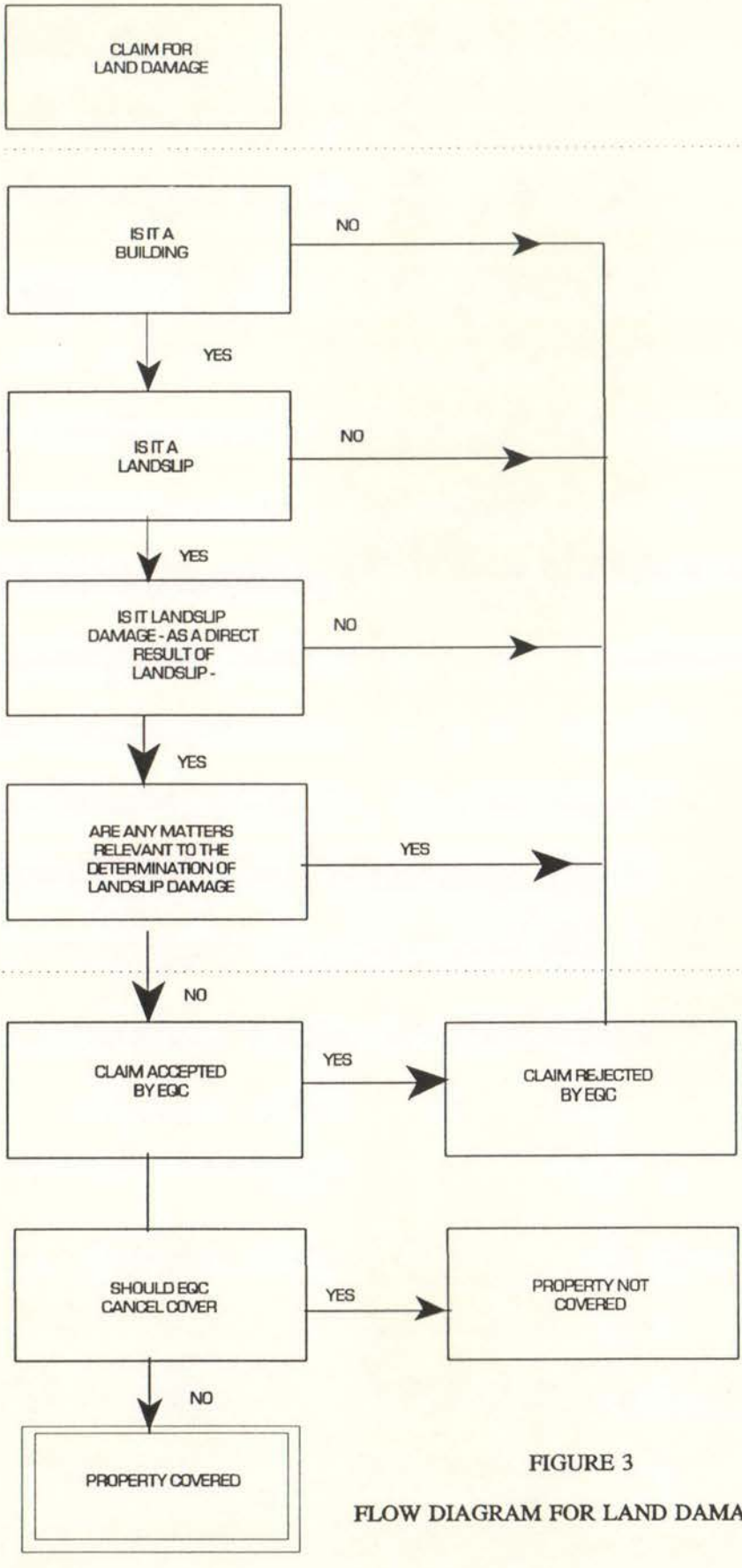


FIGURE 3

FLOW DIAGRAM FOR LAND DAMAGE

The problems of interpretation with the current EQC definition of landslip were appreciated at the time it was introduced in 1970. In Parliament, Dr Finlay said that "in the definition of landslip in the original regulations of 1956 "any subsidence of earth or rock" was specifically excluded, whereas in last year's regulations landslip was defined as a subsidence. As he understood it, a subsidence was just what a landslip was not. A subsidence was the sudden dropping away of a substrata, as for instance when a mining shaft collapsed and caused the whole of the surface of the land to fall almost vertically downwards, whereas a landslip or a landslide - the two words were almost synonymous - very often consisted of the top portion of an area sliding down in a saucerlike motion, which was the very antithesis of a subsidence. That being the case, would the Minister state exactly what sort of damage was intended to be covered? Was it just a sudden drop of the surface of the soil?" (Hansard, 22 September 1970, pp: 3429-2430).

> The Hon. J. Rae (Minister in Charge of the Earthquake & War Damage Commission) replied that: "In regard to the drafting of the regulations, as Minister he was in the hands of the Law Draftsman. The regulations were intended to cover subsidence which could affect most people's property, but they were not intended to cover the normal settling down process which occurred in many houses. The movement of floors or cracks which had been caused by shrinkage did not come within the definition of a landslip. A substantial movement of the earth did. Movement caused by a greasy back which had been affected by water would be covered. By building on papa rock people helped to contribute to their landslips, but the regulations were intended to cover such a happening."

> Landslip is a technical term, and is synonymous with landslide. Landslip is the word usually used in New Zealand and England; Landslide is the word more common in the United States.

The Dictionary of Geological Terms prepared under the direction of the American Geological Institute defines landslip as:

> "**landslip** Landslide, q.v. 1. A portion of land that has slid down in consequence of disturbance by an earthquake, or from being undermined by water washing away the lower beds which supported it. 2. A portion of a hillside or sloping mass which becomes loosened or detached, and slips down. 3. The slipping down of a considerable mass of earth or rock on a mountain or any steep slope; also the mass that slips down."

Probably the best technical definition of landslip, and one which best fits the EQC interpretation, is that described by Varnes (Ref 16):

> "the term "landslide" denotes downward and outward movement of slope-forming materials composed of natural rock, soils, artificial fills,or combinations of these materials. The moving mass may proceed by any one of three principal types of movement: falling, sliding, or flowing, or by their combinations. Parts of a landslide may move upward while other parts move downward. The lower limit of the rate of movement of landslide material is restricted (in this book) by the economic aspect to that actual or potential rate of movement which provokes correction or maintenance. Normal surficial creep is excluded."

Land need not move far for it to be landslip - indeed, as soon as movement resulting in slope failure has occurred, so has landslip as defined by the Act. Recognition of the early signs of landslip, or limited displacement landslippage, is sometimes even difficult for an experienced engineer, and should not be expected of a loss adjustor. It is unfortunate that many claims have been declined on the (unsubstantiated) basis that it is not landslip, where landslip was clearly evident (e.g. 90 L 85). In such cases, the claimant is left with a false sense of security (the claim is rejected, so it is not landslip, therefore I'm OK), and does not therefore undertake any measures to mitigate against further damage. Yet it is precisely at this early stage that the best chances are afforded for mitigating against, or at least minimising, further damage.

The most publicised case history was the rejection of Mr Patterson's possible claim by the Commission (EQC) in 1972. It has since been shown that, on the balance of probabilities, Mr Patterson's claim heralded the beginning of the Abbotsford Landslip Disaster.

Over the past 22 years, EQC had adopted a liberal interpretation of what constitutes landslip, including land movement as a result of coastal or river bank erosion (e.g. 85 L 145). There are many types of landslip, and good reference texts include Varnes (Ref 16) and Schuster (Ref 15). A variety of common types of landslips are shown on Figures 4, 5 & 6. What landslip is not, is soil shrinkage or settlement.

With the word "sudden" taken out of the landslip definition, the main terms requiring clarification are substantial and integral.

Substantial has been previously accepted by EQC as greater than one cubic metre (1 m^3) of a land mass (79 LS 16). In reality, the current determination of whether the land mass is substantial or not is governed by the excess provisions of the landslip and land cover. Accordingly, if the quantum of the claim exceeds the excess, then the subsidence of the land mass can be deemed to be substantial.

Fill has generally been accepted by EQC to have formed an integral part of the hill, provided it has been in place for a reasonable period of time and a high standard of the work was achieved. The original understanding of whether fill was intended to be covered is provided by the Hon. J. Rae (Minister in Charge of the Earthquake & War Damage Commission) who in 1969 stated in Parliament that: "Regulations were being drafted under which those who had built on natural land which had remained stable for 5 years, and those who had built on filled or compacted land which had remained stable for 10 years, would be covered against damage to their dwellings caused by landslips. If the land had remained stable for those periods, then the insured was entitled to believe that it was not subject to landslip and would not seek voluntary cover under section 15 of the Act." Provided that the claimant has not recently placed the fill, fill placed as little as one year previously has been accepted as landslip by EQC.

4.3 What Caused the Landslip?

The determination of the cause of the landslip is important if EQC is to exercise its rights of subrogation. The matter of subrogation by EQC was reviewed by the Commission of Inquiry into the Abbotsford Landslip Disaster, which determined that:

TYPE OF MOVEMENT	TYPE OF MATERIAL			
	BEDROCK		SOILS	
FALLS	ROCKFALL		SOILFALL	
SLIDES — FEW UNITS	ROTATIONAL: SLUMP	PLANAR: BLOCK GLIDE	PLANAR: BLOCK GLIDE	ROTATIONAL: BLOCK SLUMP
SLIDES — MANY UNITS		ROCKSLIDE	DEBRIS SLIDE	FAILURE BY LATERAL SPREADING
FLOWS	ALL UNCONSOLIDATED			
	ROCK FRAGMENTS	SAND OR SILT	MIXED	MOSTLY PLASTIC
DRY	ROCK FRAGMENT FLOW	SAND RUN	LOESS FLOW	
WET		SAND OR SILT FLOW	RAPID EARTHFLOW — DEBRIS AVALANCHE — DEBRIS FLOW	SLOW EARTHFLOW — MUDFLOW
COMPLEX	COMBINATIONS OF MATERIALS OR TYPE OF MOVEMENT			

Landslide—The term "landslide" denotes downward and outward movement of slope-forming materials composed of natural rock, soils, artificial fills, or combinations thereof.

Landslides move along surfaces of separation by falling, sliding, and by flowing. Parts of a landslide may move upward while other parts move downward. The lower limit of the rate of movement of landslide material is restricted in this book by the economic aspect to that actual or potential rate of movement which provokes correction or maintenance.

Nomenclature of the parts of a landslide

(see drawing at right)

MAIN SCARP- A steep surface on the undisturbed ground around the periphery of the slide, caused by movement of slide material away from the undisturbed ground. The projection of the scarp surface under the disturbed material becomes the surface of rupture.

MINOR SCARP- A steep surface on the disturbed material produced by differential movements within the sliding mass.

HEAD- The upper parts of the slide material along the contact between the disturbed material and the main scarp.

TOP- The highest point of contact between the disturbed material and the main scarp.

FOOT- The line of intersection (sometimes buried) between the lower part of the surface of rupture and the original ground surface.

TOE- The margin of disturbed material most distant from the main scarp.

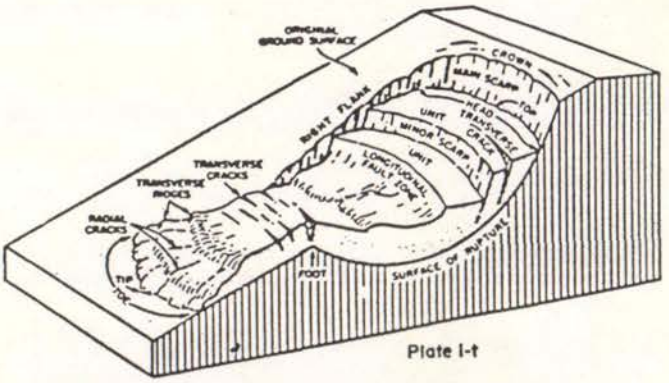


Plate I-t

TIP- The point on the toe most distant from the top of the slide.

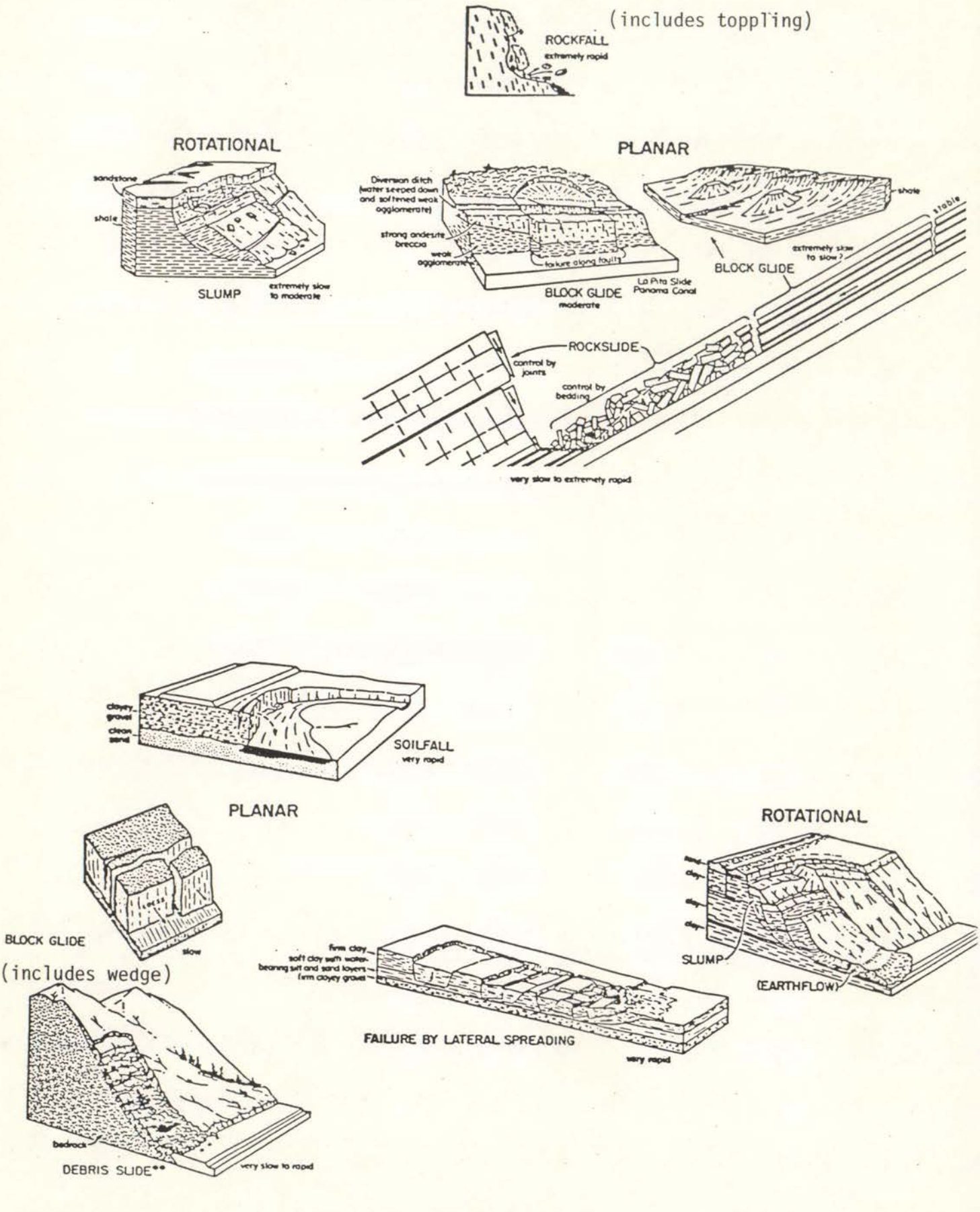
FLANK- The side of the landslide.

CROWN- The material that is still in place, practically undisturbed, and adjacent to the highest parts of the main scarp.

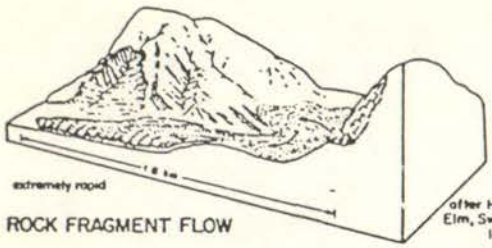
ORIGINAL GROUND SURFACE- The slope that existed before the movement which is being considered took place. If this is the surface of an older landslide, that fact should be stated.

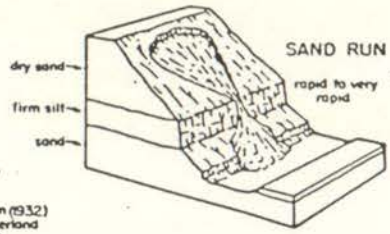
LEFT AND RIGHT- Compass directions are preferable in describing a slide, but if right and left are used they refer to the slide as viewed from the crown.

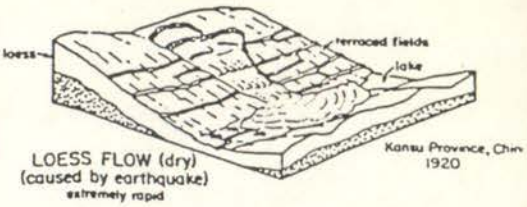
TYPES OF LANDSLIDE Figure 4

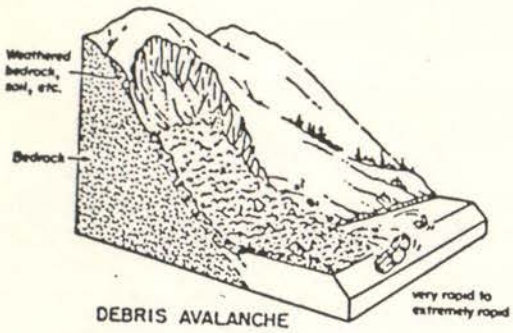


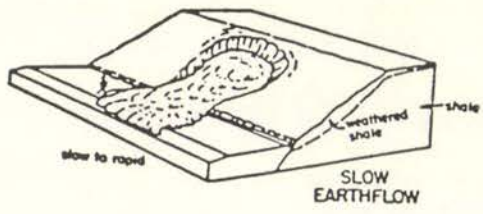
TYPES OF LANDSLIDE (CONTD) Figure 5

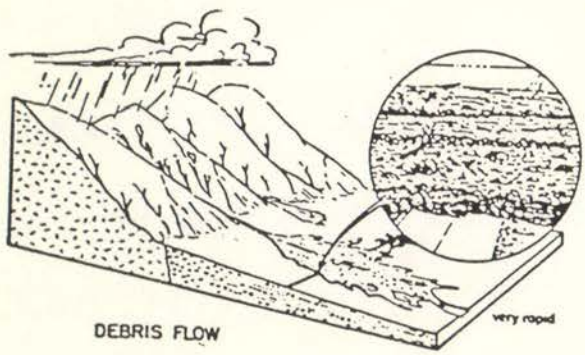


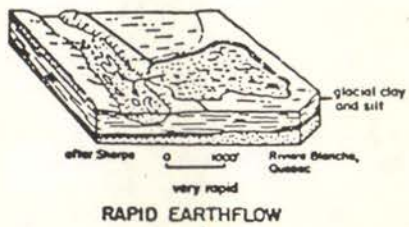




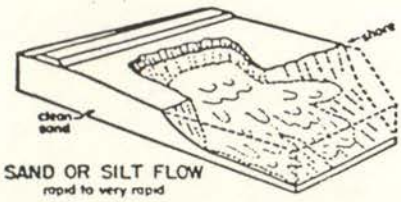








MUDFLOW



TYPES OF LANDSLIDE (CONTD) Figure 6

> "The Earthquake & War Damage Commission must also retain its right of subrogation particularly in respect of such risks as landslide, and sea erosion, and should be encouraged to vigorously pursue this right. The exercise of the right of subrogation, is of great importance. The attitude of the Earthquake & War Damage Commission and its willingness to exercise its rights against for instance subdividers or local authorities who may have been negligent will be an important means, in the absence of the right to contract out, of ensuring that adequate standards of construction, engineering, design and performance are maintained. This will be a vital social and legal control."

Most landslips in New Zealand are triggered by rainfall or seismic events, and are seldom attributable to a single cause. Rather, some of the factors which affect the stability of ground may, in individual cases, play a more major part in causing landslippage than others. The aspect of whether or not the particular landslip was a so-called "act of God" or an "act of man", and if the latter who was responsible (e.g. claimant, neighbour or Local Authority), is discussed in Section 3.7.

4.4 Is the Land Damaged?

Under Regulation 3 of the Earthquake & War Damage Regulations 1984, "land" does not include improvements as defined in Section 2 of the Valuation of Land Act 1951.

Under Regulation 5, Extension of insurance to cover land:

(1) Notwithstanding regulation 4 of the Earthquake & War Damage Regulations 1984 but subject to the provisions of the Act and these regulations, where any building is for time being insured against earthquake damage, disaster damage (as defined in regulation 2 of the Earthquake & War Damage Regulations 1984) and landslip damage under or by virtue of the Act or the Earthquake & War Damage Regulations 1984, the following property situated within the land holding on which the insured building is lawfully situated shall also be deemed to be insured under these regulations against earthquake damage, disaster damage (as defined by regulation 2 of these regulations), and landslip damage:

(a) The land on which the insured building in situated

(b) All land within 8 metres, in a horizontal line, of the insured building

(c) That part of the land holding which:

(i) Is within 60 metres, in a horizontal line, of the insured building; and

(ii) Constitutes the main access way or part of the main access way to the insured building from the boundary of the land holding:

(d) All water supply, drainage, and sewerage services, and structures appurtenance thereto:

(i) Serving the insured building or surrounding land; and

(ii) Situated within 60 metres, in a horizontal line, of the insured building; and

(iii) Owned by the owner of the insured building or land holding

(e) All bridges and culverts situated within any area specified in paragraphs (a) to (c) of this subclause

(f) All retaining walls and their support systems within 60 metres, in a horizontal line, of the insured building.

(2) Subject to regulation 6 of these regulations, the insurance of any property under sub-clause (1) of this regulation includes:

(a) The removal of the debris of that property and of other debris from that property; and

(b) Where practicable, the cost of resiting on the affected property of the building by virtue of which the property destroyed or damaged is insured under the said subclause(1).

This provision arose as a direct result of the Commission of Enquiry into the Abbotsford Landslip Disaster, which recommended that:

> "cover be afforded in respect of loss of use of land, and that such cover should be afforded on a compulsory basis to all landowners with premiums being collected through the local authority rating mechanism based on the unimproved value of land, and in accordance with the principles set out in more detail in the body of our report."

The Earthquake & War Damage Amendment Bill was introduced on 9 August 1983. When questioned in Parliament about the inclusion of land cover, the Hon. K.R. Allen (Minister in Charge of Earthquake & War Damage Commission) said that:

> "The Government had carefully considered the recommendations about loss of the use of land and had come to a satisfactory solution. Cover for loss of land would be written in as an extension of the present cover afforded by the Earthquake & War Damage Commission and would cover the whole country. The amount of land to be compensated for would be the land around a house that was needed to give reasonably full enjoyment of the use of the house, and would probably be the minimum size of a section as decided by the local body. It would not cover a whole farm."

The definition of damage to land has to date remained difficult to quantify, and has been generally accepted by EQC to encompass all land involved in landslip within the areas defined by Regulation 5(a),(b) and (c), based on a legal opinion obtained by EQC for the first claim record for land damage (85 L 1). It is not land loss, but land damaged by landslip, (i.e. land use may still be possible).

This is contrary to the recommendations of the Commission of Enquiry into the Abbotsford Landslip Disaster which reported that:

> "What is really required to be insured, or more accurately the loss in respect of which indemnity is sought, is loss of use of land, land being something which in the legal sense is neither created or destroyed. When a landslip occurs or some types of action of the sea, erosion, volcanic activity, or similar occurrence take place, the owner or occupier of land may be effectively and permanently deprived of its use."

"The concept of "loss of use of land" requires more detailed explanation. It must be explained within the context of two related questions namely:

(a) When does a claim arise?

(b) When a claim has arisen, how is the question of compensation to be determined?

As to the first of these questions, a claim will arise when a landowner has been effectively and permanently deprived of the use of his land unless stabilizing measures are undertaken and the land made good. Use means, use for a purpose. The scheme might compensate for any loss of use occasioned by the direct physical impact of any of the specified risks mentioned above, or alternatively the purpose could be the building purpose for which the land was formerly used or for which it was actually genuinely and presently contemplated that it would be used.

As to the second question of compensation:

(a) The maximum level of payment should be the unimproved value of the land in respect of which use is lost, calculated at its value on the day before the date of occurrence of the event of loss, ignoring all factors in respect of or arising out of the circumstances giving rise to the loss.

(b) Payment should be made only in respect of loss, which means effective and permanent deprivation of use. <u>It is not intended to compensate for damage</u>. i.e. Cost of full reinstatement.

(c) If it is decided that compensation should be provided for any loss of use occasioned by the direct impact of the specified risk, rather than just for loss of use for a building purpose, then the measure of loss would be quantified by comparing the value of the land, taken as a whole both before and after the event of loss and providing an appropriate apportionment."

In the event of major landslips where the failed material mostly or completely vacates the slope, the delineation of the area of land damaged and covered under the Earthquake & War Damage (Land Cover) Regulations 1984 is relatively easy. In many cases, however, the precise extent of failed, and hence damaged, land can only be estimated by extrapolating tension cracks and scarps across and down a slope. In these cases, the assessment requires an expert in landslip assessment.

4.5 Is it Landslip Damage?

The main definition of landslip damage has remained unchanged since 1956, and is defined under Regulations 2 of the Earthquake & War Damage Regulations 1984 to be:

> "Landslip damage" means:
>
> (a) Damage occurring as the direct result of landslip
>
> (b) Damage occurring (whether accidentally or not) as the direct result of measures taken under proper authority to avoid the spreading of, or otherwise to mitigate, the consequences of any such damage -
>
> and includes damage which is imminent as the direct result of landslip if, in the opinion of the Commission, the likely result is total loss of the property concerned; but does not include any damage for which compensation is payable under any enactment other than the Act and these regulations.

The last section of (b) was added as a direct result of the Abbotsford Landslip Disaster, and is discussed in Section 3.6 below.

4.6 Is the Property in Imminent Danger of Total Loss?

The Abbotsford Landslip Disaster vividly demonstrated that it was patently ridiculous to have to wait for a building to be totally destroyed before payment, or salvage, could be effected.

5 years prior to Abbotsford, Gill (Ref 6) considered that: "It would not appear unreasonable for the Commission to be granted some discretionary power in certain circumstances to carry out emergency measures where property is placed in dire peril of damage and this would remove some of the frustration now being experienced under landslip claims. Exercising discretion in administering legislation can prove dangerous however as invariably small inconsistencies creep in and in time are regarded as the law itself."

In terms of urban landslips, however, Abbotsford was atypical. Most landslips occur with little if any warning. In 99 out of 100 cases, most if not all of the property damage arises from the initial event, with little subsequent damage occurring. Houses in "dire peril" are relatively rare.

More usual is the case where a house is left in a precarious position; where even some damage to the house is imminent as a direct result of landslip; where the owners voluntarily evacuate the house or are ordered out by the Local Authority; but where in the opinion of the Commission the likely result is not total loss of the property concerned. The dilemma in this case is that the house is not considered to be habitable by the claimants, but not considered to be a total loss, (and in some instances not yet even a valid claim), by the Commission.

4.7 Is it Landslip Damage Having Regard to All Matters

In determining whether any damage is disaster damage or landslip damage, under Regulation 3(1) of the Earthquake & War Damage Regulations 1984, the Commission shall have regard to the following matters:

> "(a) In the case of damage to any building, or to the contents of any building, whether the building complied with the requirements of any applicable New Zealand standard model bylaw relating to the foundations declared or continuing in force under the Standards Act 1965:

(b) Whether the basis principles of site investigation have been observed, and the construction of foundations and earthworks have been properly supervised

(c) The standard of repair and maintenance of the insured property

(d) Any neglect or careless of the insured person

(e) Any other matter of any kind whatever the commission considers relevant in the circumstances of the particular case"

These matters are unchanged from those set out in the 1967 amendment to the 1956 regulations.

The intention here is to differentiate between so called "acts of God" and so called "acts of man", and limit the exposure of EQC to the former.

This aspect has always concerned the Commission, as the inclusion of automatic cover for landslip in 1970 was, in part, due to the perception that, like floods, landslips were acts of God (Hansard, 22 September 1970, p-3428). In 1969, prior to the inclusion of automatic landslip cover, the Hon. J. Rae (Minister in Charge of Earthquake & War Damage Commission) stated in Parliament (Hansard, 2 September 1969, p-2450) that "the Commission had given a great deal of thought to landslip insurance. It had been alleged that landslips were an act of God, but a great many were the result of action by man."

These discretionary powers have, probably more than any others, been responsible for inconsistency in dealing with claims. The problems with these discretionary powers were recognised in 1970, and in Parliament, Dr Finlay asked (Hansard, 22 September 1970, p-3430):

> "Could the Minister also say what advice he had acted on in framing the regulations in that way seeing that they gave the commission a very wide discretion in determining what claims would be met. Under the 1970

regulations the commission had to have regard to a number of matters, but it was by no means bound by them, whereas they were binding on the persons whose property was affected. For instance, the commission had to have regard to the way in which a building that was damaged complied with the standard model building by laws, whether adequate regard had been had to foundation design, and the standard of repair and maintenance of the property."

"Looking at the regulations, no one could really say whether or not he would have a claim. The whole matter was so uncertain and so much in the discretion of the commission that no one could predict whether the extension of the cover would in fact apply to any given property. He welcomed the extension, but it seemed to him to be so vague an extension that it was rather unsatisfactory."

In his 1974 paper (Ref 6) Mr Gill, Secretary to the EQC explained that:

"The regulations provide safeguards whereby the Commission can be relieved of liability in certain circumstances but it was not the intention home owners with no control over instability problems be adversely selected against and denied a right to landslip insurance protection.

The various factors the Commission is required to take into consideration when determining a claim are designed to ensure there is not a reduction in the standard of care necessary to minimise the risk of landslip on residential lots. Cover was not to be available to those in a position to avoid or prevent landslip damage. A homeowner who had no control over developing the site or building the dwelling is not denied indemnity for failure due to earthworks or foundation inadequacies. The success of a claim could however, be prejudiced if it is found landslip resulted from some neglect or injudicious act by the homeowner."

Using this criteria, the Commission has used Regulation 3 to decline claims (e.g. 85 LS 92), but has also accepted claims where the owner has been responsible, but not in their opinion negligent or careless (e.g. 79 LS 9).

4.8 Should the Property be Classified A, B or C?

Under Part IV(3) of the Schedule to the Earthquake & War Damage Regulations 1984, properties are classified as follows:

(3) For the purposes of this clause the Commission, after causing a survey to be made of any property to determine its susceptibility to damage from landslip, may classify that property into any one of the following classes:

Class A:	Property not particularly susceptible to damage from landslip
Class B:	Property fairly susceptible to damage from landslip
Class C:	Property very susceptible to damage from landslip

(4) Every such classification of a property shall remain in force until it is altered by the Commission notwithstanding:

(a) The subsequent renewal of the contract of fire insurance covering the property; or

(b) The subsequent issue of a new contract of fire insurance covering the property; or

(c) A subsequent change in the person in whom is vested the insurable interest to which the classification relates.

(5) Until the Commission has classified any property under this clause, that property shall be deemed to be classified in Class A.

Provided that if any unclassified property is contained in a building classified in Class B or Class C that property shall be deemed to be classified in the same class as the building.

(6) Where the property insured is classified in Class A, the amount of the excess shall be computed by reference to the amount of the loss or damage (to the extent to which it does not exceed the amount of the insurance) and in accordance with the following scale:

	Excess
Not over $20,000	$200
Over $20,000	1 percent of the amount of the insured loss or damage

(7) Where the property insured is classified in Class B or Class C, the excess shall be such amount as the Commission from time to time determines, either generally or in any particular case, but not exceeding in any case 25 percent of the amount of the insurance."

The Commission of Enquiry into the Abbotsford Landslip Disaster determined that the Earthquake & War Damage Commission must also have the right to load premiums in respect of either individual risks or specified areas.

The classification process provides a useful method of providing consistency in regard to how the Commission limits its future exposure after paying out on an initial claim. Properties classified B have typically had their excess revised to $5,000 (85 LS 62, 90 L 366)), or $10,000 (90 L 305) and properties classified C raised to $5,000 (90 L 178), or 25% of the claim (72 LS 43).

The classification process provides the Commission with an assessment of the susceptibility of the property to damage from landslip. Gill (Ref 6) considered that:

> "After causing a survey to be made the Commission may classify property according to susceptibility to damage from landslip thus increasing the amount of franchise to be borne by the claimant. Normally property is classified with an increased franchise only after a loss of the insured been implemented. In such a case the Commission would classify until preventive measures such as

retaining a cut, planting a slope or providing for safe disposal of stormwater had been carried out. Where preventive measures are not within the control of the home owner concerned, classification would seldom be considered."

4.9 Should EQC contract out?

Under Clause 4 Part 1 of the Schedule to the Earthquake & War Damage Regulations 1984, the Commission can cancel or reduce the amount of cover.

Gill (Ref 6) explained that:

> "Landslip insurance can be cancelled by the Commission in its discretion at any time. The normal policy of the Commission is to contract out of further Act liability in respect of a particular site only after a total loss settlement has been made and there is evidence to believe the site is no longer suitable for housing."

The Commission of Enquiry into the Abbotsford Landslip Disaster specifically highlighted that the right of the EQC to "contract out" generally in terms of Condition 4 of the Schedule to the Regulations should be removed.

Although historically EQC has contracted out after total loss, in such an event it is important that the engineer state whether or not the site is suitable for building on and whether or not the Local Authority is likely to issue a building permit on the property, in future.

4.10 Recommended Format

In order to ensure that EQC receive a brief report containing all the essential information, we have developed a summary report form, set out in Figure 7.

In many cases, we consider that this summary form will suffice in place of a more comprehensive report. A recent report is presented as Appendix A (names and places deleted), together with a summary using the recommended format.

LANDSLIP COVER SUMMARY REPORT SHEET **EQC REF** _____

Name of Claimant: _____
Address: _____
_____

1. Is it a landslip? YES ☐ NO ☐
If yes, state the likely cause(s) _____
_____
If no, state the nature of the problem _____
_____

2. Is it landslip damage?
(a) as a direct result of landslip YES ☐ NO ☐
(b) in imminent danger of total loss YES ☐ NO ☐
If Yes to (b), state reasons why _____
_____

3. Are other matters relevant to the determinations of landslip damage? YES ☐ NO ☐
If yes, state matters: _____
_____

4. Could remedial works be undertaken to mitigate or minimise further damage? YES ☐ NO ☐
If yes, state remedial works & estimated value of work.
_____
_____

5. Should the property be classified? YES ☐ NO ☐
If yes, should the property be category B ☐ or C ☐

6. Future risk, should EQC contract out of further cover? YES ☐ NO ☐
If yes, state reasons: _____
_____

7. Comments and recommendations for further work necessary to establish type and cause of damage.
_____
_____

8. Company _____ Engineer _____

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Figure 7

5.0 RESPONSIBILITIES OF CONSENTING/PERMITTING AUTHORITIES

5.1 General

In late 1979, as a direct result of the Abbotsford Landslip Disaster, Section 641 of the Local Government Amendment Act was enacted which gave the Local Authority the power to refuse a building permit if, in the opinion of the Council:

> "The land, or any part of it, is subject to erosion or subsidence or slippage, or inundation by the sea or by a river, stream, or lake or by any other source; or
>
> The erection or alteration is likely to accelerate, worsen, or result in erosion or subsidence or slippage, or inundation by the sea or by a river, stream, or lake, or by any other source, of other land, - the council shall refuse to grant a permit to erect the proposed building or to make the alteration, unless the council is satisfied that provision has been made or is to be made for the protection of the land from erosion or subsidence or slippage or inundation."

Section 274 of the Local Government Amendment Act was similarly enacted to enable the Local Authority not to permit subdivision where ...

> "The land or any part of the land in the subdivision is subject to erosion or subsidence or slippage or inundation by the sea or by a river, stream, or lake or by any other source; or
>
> The subdivision of the land is likely to accelerate, worsen, or result in erosion or subsidence or slippage or inundation by the sea or by a river, stream, or lake, or by any other source, of land not forming part of the subdivision."

In November 1980, the Commission of Enquiry into the Abbotsford Landslip Disaster officially reported, (Gallen et al). In their examination of local government responsibilities with regard to development they concluded:

> "we do not consider any change should be made to local government powers in respect of land subdivision and development and building construction until there has been sufficient time to assess the effect of the Local Government Act 1974 and the Local Government Amendment Acts of 1978 and 1979."

In making recommendations they stated:

> "we do not recommend any change to the law relating to the liability of local authorities in respect of the control of subdivision development and building construction."

However, on 23 October 1981, an amendment to the Local Government Act was enacted which gives the Local Authority the power to issue a building permit where the land is subject to erosion, subsidence, slippage or inundation and not be under any civil liability.

Under Section 641(A):

> Council may issue a building permit for the erection of a building that is designed to be relocatable on any land or any part of land that is or will be subject to erosion, subsidence, or slippage, if it is satisfied that the building can be relocated from that site.
>
> If a building is, or within its useful life likely to be, subject to damage arising directly or indirectly from the erosion, subsidence, or slippage, of the land on which it is erected or any other land, or inundation arising from such erosion, subsidence, or slippage the council may issue a building permit for the alteration or re-siting of that building on the allotment on which it is situated, for the erection of any other building on the same allotment consistent with the use and occupation of the existing building, or for the restoration of any damage suffered by that building.

Provided that in issuing such permits council has notified the District Land Registrar accordingly, then if the building or alteration to which the permit relates later suffers damage arising directly or indirectly from erosion, subsidence, or slippage, or inundation arising from such erosion, subsidence, or slippage, the council and every member, employee or agent of the council shall not be under any civil liability.

Part XX (Subdivision and Development of Land) of the Local Government Act has been repealed, and a local authority now has powers and duties as a consent authority under the Resource Management Act, 1991.

Section 106 of the Resource Management Act, 1991 states that:

(1) A consent authority shall not grant a subdivision consent if it considers that either:

(a) Any land in respect of which a consent is sought, or any structure on that land, is or is likely to be subject to material damage by erosion, subsidence, slippage, or inundation from any source; or

(b) Any subsequent use that is likely to be made of the land is likely to accelerate, worsen, or result in material damage to that land, other land, or structure, by erosion, subsidence, slippage, or inundation from any source.

unless the consent authority is satisfied that sufficient provision has been made or will be made in accordance with subsection (2).

(2) A consent authority may grant a subdivision consent if it is satisfied that the effects described in subsection (1) will be avoided, remedied, or mitigated by one or more of the following:

(a) Rules in the district plan:

(b) Conditions of a resource content, either generally or pursuant to section 220(1)(d):

(c) Other matters, including works.

Sections 641 and 641A (Part XXXVI) of the Local Government Act have now been repealed by the Building Act 1991. Under S.36(2) of the Building Act 1991,:

> "Where a building consent is applied for and the territorial authority considers that:
>
> (a) The building work itself will not accelerate, worsen, or result in erosion, avulsion, alluvion, falling debris, subsidence, inundation, or slippage of that land or any other property; but
>
> (b) The land on which the building work is to take place is subject to, or is likely to be subject to, erosion, avulsion, alluvion, falling debris, subsidence, inundation, or slippage; and
>
> (c) The building work which is to take place is in all other respects such that the requirements of section 34 of this Act have been met -
>
> the territorial authority shall, if it is satisfied that the applicant is the owner in terms of this section, grant the building consent, and shall include as a condition of that consent that the territorial authority shall, forthwith upon the issue of that consent, notify the District Land Registrar of the land registration district in which the land to which the consent relates is situated; and the District Land Registrar shall make an entry on the certificate of title to the land that a building consent has been issued in respect of a building on land that is described in subsection (1) (a) of this section.
>
> Where the territorial authority determines that the entry referred to in subsection (2) of this section is no longer required, it shall send notice of the determination to the District Land Registrar who shall amend his or her records accordingly.

Where -

(a) Any building consent has been issued under subsection (2) of this section; and

(b) The territorial authority has notified the District Land Registrar in accordance with subsection (2) of this section that it has issued the consent; and

(c) The territorial authority has not notified the District Land Registrar under subsection (3) of this section that it has determined that the entry made on the certificate of title of the land is no longer required; and

(d) The building to which the building consent relates later suffers damage arising directly or indirectly from erosion, subsidence, avulsion, alluvion, falling debris, inundation, or slippage, or from inundation arising from such erosion, subsidence, avulsion, alluvion, falling debris, or slippage -

the territorial authority and every member, employee, or agent of the territorial authority shall not be under any civil liability to any person having an interest in that building on the grounds that it issued a building consent for the building in the knowledge that the building for which the consent was issued or the land on which the building was situated was, or was likely to be, subject to damage arising, directly or indirectly, from erosion, subsidence, avulsion, alluvion, falling debris, inundation, or slippage or from inundation arising from such erosion, subsidence, avulsion, alluvion, falling debris, or slippage."

5.2 Issues

The main issue arising from a review of the responsibilities of consenting/permitting authorities is:

If consenting/permitting authorities consider that the landslip risk is so high that they contract out of their liability at the time of issuing a building permit, should EQC remain exposed.

5.3 Discussion

In the Earthquake & War Damage (Land Cover) Regulations, 1984, a building is defined in Regulation 2 as:

> "Building" means any structure, whether permanent or temporary, which, if it were to be constructed or erected otherwise than by the Crown after the commencement of these regulations, would require the grant by a territorial authority of a building permit but does not include:
>
> (a) Any relocatable building in respect of which a permit has been granted under Section 641A(1) of the Local Government Act 1974:
>
> (b) Any pole, tower, fence, or wall:

Accordingly, it has already been determined that, in terms of land cover, EQC may not remain exposed where a Consenting/Permitting Authority has determined the landslip risk to be high and has contracted out of its own liability.

With respect to damage to buildings, dwellings, or property, however, EQC is presently exposed even where building permits have been issued under S.641.A. of the Local Government Act, or after 1 July 1992 where building permits have been issued under S.36(2) of the Building Act.

"Property" is defined in the Earthquake & War Damage Act 1944 to mean "any real or personal property situated in New Zealand", and in S.14(7) if the property is a dwelling, dwelling means "any building or part of a building that is occupied solely as a private residence; and includes every building, structure, or improvement appurtenant to a dwelling and used for the purpose of the household of the occupier of the dwelling."

In the debates leading up to the inclusion of automatic landslip cover in 1970, it was recorded (Hansard, 2 September, 1969 pp 2446-2450) that, at the request of the Government, EQC was "investigating the possibility of devising an acceptable scheme to cope with landslip, particularly where it could not reasonably have been foreseen."

The tenet of the "unforeseen event" is very much part of the rationale for EQC cover. Where damage is clearly able to be foreseen at the outset, such as occurs with building permits under Section 641A and Section 36(2) (and entered on the certificate of title), then we believe "caveat emptor" should apply. EQC should not, in our opinion, provide landslip cover for such properties.

6.0 RECOMMENDATIONS

1. The meaning ascribed to "building" in the Earthquake & War Damage (Land Cover) Regulations 1984 be also incorporated into the Earthquake & War Damage Regulations 1984, and amended to cover S.36(2) of the Building Act 1991.

2. The EQC initiate use of the Landslip Cover Summary Report Sheet for Engineers reporting for a trial period of 1 year with a review at the end of this period.

3. Issues of liability and the extent of the Engineers brief to provide advice to mitigate against further damage are clarified.

4. The EQC establishes a method by which feedback on the outcome of claims is provided to Assessors and Engineers.

REFERENCES

1. Earthquake & War Damage Act 1944 (and all Amendments)

2. Earthquake & War Damage Regulations 1956 (and all Amendments)

3. Earthquake & War Damage Regulations 1984 (and all Amendments)

4. Earthquake & War Damage (Land Cover) Regulations 1984 (and Amendments)

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6. Gill, J.L. (1974): "Risks, Legalities and Insurance of Slope Stability" in Proceedings of the Symposium on "Stability of Natural Ground", New Zealand Geomechanics Society, NZIE Volume 1 Issue 5(G), pp: 2.1-2.7

7. Hansard, 9 October 1956

8. Hansard, 2 September 1969

9. Hansard, 22 September 1970

10. Hansard, 21 September 1979

11. Hansard, 25 September 1979

12. Hansard, 2 October 1979

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15. Schuster, R.L. 1978): "Introduction", in "Landslides - Analysis and Control", edited by R.L. Schuster & R.J. Kriezek, National Academy of Science, Transport Research Board Special Report, 176 pp:1-10, Washington DC, USA

16. Varnes, D.J. (1958): "Landslide Types and Processes", in "Landslides and Engineering Practice", by the Committee on Landslide Investigations, Edited by Edwin B. Eckel, Highway Research Board, Special Report 29, pp: 20-47 NAS-NRC Publications 544, Washington DC, USA

APPENDIX A

LANDSLIP COVER SUMMARY REPORT SHEET EQC REF 91 LS 23

Name of Claimant: _____
Address: _____
_____

1. Is it a landslip? YES ☑ NO ☐
If yes, state the likely cause(s) Heavy rainfall, fill slope, stormwater runoff and waste water disposal
If no, state the nature of the problem _____
_____

2. Is it landslip damage?
(a) as a direct result of landslip YES ☑ NO ☐
(b) in imminent danger of total loss YES ☐ NO ☑
If Yes to (b), state reasons why _____
_____

3. Are other matters relevant to the determinations of landslip damage? YES ☐ NO ☑
If yes, state matters: _____
_____

4. Could remedial works be undertaken to mitigate or minimise further damage? YES ☑ NO ☐
If yes, state remedial works & estimated value of work.
Fill cracks, control s/w runoff, check septic tank and redirect effluent waste water

5. Should the property be classified? YES ☑ NO ☐
If yes, should the property be category B ☑ or C ☐

6. Future risk, should EQC contract out of further cover? YES ☐ NO ☑
If yes, state reasons: _____
_____

7. Comments and recommendations for further work necessary to establish type and cause of damage.
1. Check on stormwater pipe leakage required.
2. Review of completion certificate of fill placement recommended.

8. Company _____ Engineer _____

1093\2NWR.FIG

Figure 7

TONKIN & TAYLOR LTD. CONSULTING ENGINEERS, SURVEYORS, PLANNERS
PO BOX 5271 AUCKLAND NEW ZEALAND
19 MORGAN STREET NEWMARKET AKL 1
TELEPHONE (09) 771 865 FAX (09) 307 0265

Our Ref: 11062
Your Ref: W/EQ 15391
28 May 1991
EQC Ref 91 LS 23

Earthquake & War Damage Commission

Attention:

Dear Sir,

RE:

As requested we inspected the above property on 24 May 1991 in order to evaluate geotechnical engineering aspects of the claim for land loss.

SITE DESCRIPTION

The subject road front property encompasses an area of moderately to steeply sloping ground which faces east. A level building platform has been created on the slope by excavating into the hillside, and the excavated material has been placed downslope of the building platform to create additional level ground.

A two-storey building with an elevated timber deck adjoining three sides was built on site by the claimants 11 years ago. Building permit and drainage permit details are shown on the building plans prepared by Sheets 1 to 5 dated May 1979. A 4 m high cut slope behind the house is supported by a concrete crib retaining wall, which we understand was designed by a neighbour and registered engineer, .

To the east of the house there is about a 4 m width of level ground in lawn, beyond which the land falls steeply down to the roadway ( ) below. This slope is terraced and variously planted in shrubs and lawn. To the north-east of the house the steeply sloping fill slope is supported by a timber 'crib' wall. An overland flow path is situated along the northern boundary of the subject property at the toe of the fill. The property is not serviced by stormwater or sanitary sewer, and is therefore reliant upon ground injection techniques for the disposal of roof stormwater runoff and septic tank effluent waste water.

On or about 6 May 1991, following a period of heavy rain, a section of hillslope to the north-east of the house failed, instigating the current claim for land loss. The site is shown in diagrammatic form on Sketch Drawing 11062-1.

NATURE AND CAUSE OF LANDSLIPPAGE

The subject slope failure is essentially a rotational slump.

Although the majority of the movement to date occurred very recently, there is considerable evidence that horizontal displacements (possibly only temporary) and hence cracking of the brittle ground, occurred during the Edgecumbe Earthquake of 2 March 1987. Minor vertical displacements, probably permanent, also appear to have occurred at about that time also. A minor displacement at about the position of the present landslip headscarp was certainly noted by the owners in late 1990 and early 1991. In April 1991 the stormwater drain from the north-east roof gutter downpipe was found to be broken, and this pipe was disconnected and relocated to the north to discharge into the overhead flow path.

Most of the stormwater runoff and all of the effluent waste water from the subject property is directed either into or over the steep hillslope to the east of the house. Accordingly, whilst the landslip was probably triggered by rainfall of high intensity and/or prolonged duration, the likely contributing causes of landslippage would appear to be:

(a) Disposal of roof stormwater runoff into and over the slope
(b) Disposal of effluent waste water into the slope
(c) Placement of filling over the slope
(d) Ground displacement due to strong ground motion resulting from the Edgecumbe earthquake of 2 March 1987

EARTHQUAKE AND WAR DAMAGE REGULATIONS (INCLUDING LAND COVER) 1984

On the evidence available we determine the slope failure evident to be "landslip" as defined by the Act. Although predominantly fill, the failed ground was properly landscaped and for all practical purposes formed an integral part of the hillslope prior to failure.

Although the landslip has been largely caused by factors associated with development, the main contributory causes were permitted by the Local Authority. In addition, whilst we understand that the retaining wall supporting the fill slope was neither designed nor permitted, slope failure has not resulted from inadequate ground retention. Rather, the apparently natural ground upon which the retaining wall is reliant upon for support has failed (albeit due partly to the fill loading).

Overall we find no evidence that the claimants have been the authors of their own misfortune, and as such determine that the loss of land and damage to services and retaining walls to be "landslip damage" as determined by the Regulations.

The house is supported on shallow spread footings. From an inspection of the house and deck we could find no evidence of any damage as a result of the subject landslip. Although the landslip has encroached to within 3 m of the structure (deck), we do not consider the house to be in "imminent danger of total loss".

The area which is presently affected by ground movement will, however, almost certainly be subject to further movement in future. However, at this stage we consider that, even if the present landslip fails completely, vacates the slope and flows out onto the roadway below, the house is unlikely to be adversely affected provided the house is founded on unfailed natural ground.

Should major movement of the landslip occur we would expect some retrogressive failure of the hillslope, particularly the fill, and as such classify the property as "Class B - Property fairly susceptible to damage from landslip".

REMEDIAL WORKS OPTIONS

Whilst on site on 24 May 1991, the owners were instructed to undertake the following remedial and/or mitigating works.

(a) All cracks to be sealed with clay to minimise ingress of stormwater runoff from upslope areas.

(b) No additional filling to be placed on or over the steep slope.

(c) All stormwater drains to be checked and action taken to ensure they are discharging away from the area of the landslip.

(d) Septic tank overflow to be checked, and blocked off if necessary, to ensure that effluent waste water is not discharging into the area of the landslip.

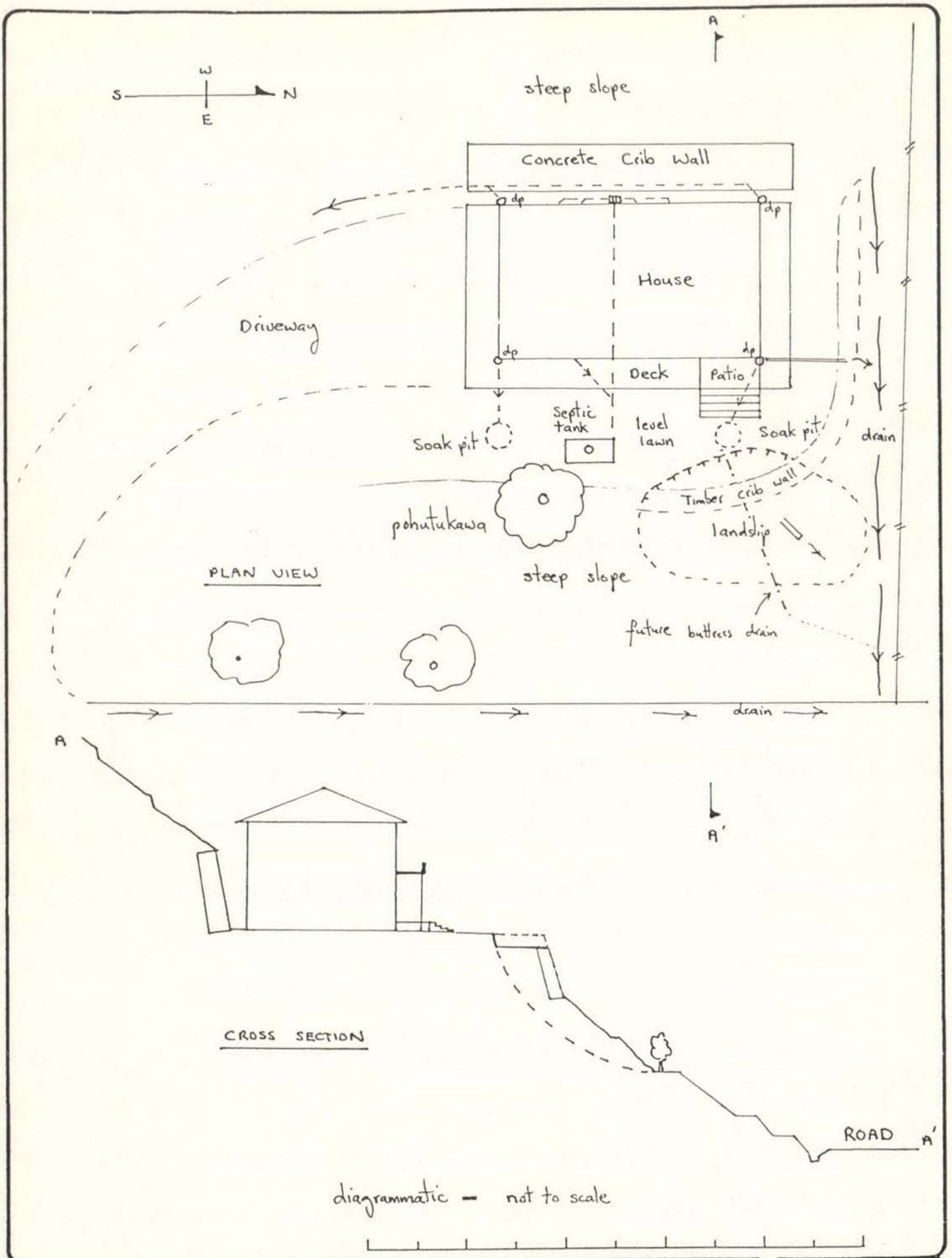
The above works should assist in minimising the possibility of major slope failure in future, but are unlikely in themselves to stabilise the slope. Although major ground retention works are technically feasible to ensure long term stability, accessibility into the lower slope areas is difficult and in addition such works would probably be prohibitively expensive. Should the claimants desire a level of protection above that which the abovementioned works would afford, then we recommend the excavation into the failed section of hillslope of a single buttress drain, in the approximate location shown on Sketch Drawing 11062-1.

We also recommend that the claimants seek confirmation that the house is indeed founded on unfailed natural ground. If permit drawings and inspection records fail to confirm this, then a pit could be excavated alongside the north-east corner of the house to expose the strip footing. If the footing is founded on fill, then it would be prudent to consider underpinning the north east corner of the house down into natural ground as soon as possible.

Yours faithfully,
TONKIN & TAYLOR LTD

N.W. Rogers
DIRECTOR

Prepared by: N.W. Rogers



TONKIN & TAYLOR
CONSULTING ENGINEERS,
SURVEYORS, PLANNERS

Drawing No	Rev.
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Date MAY 1991	
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