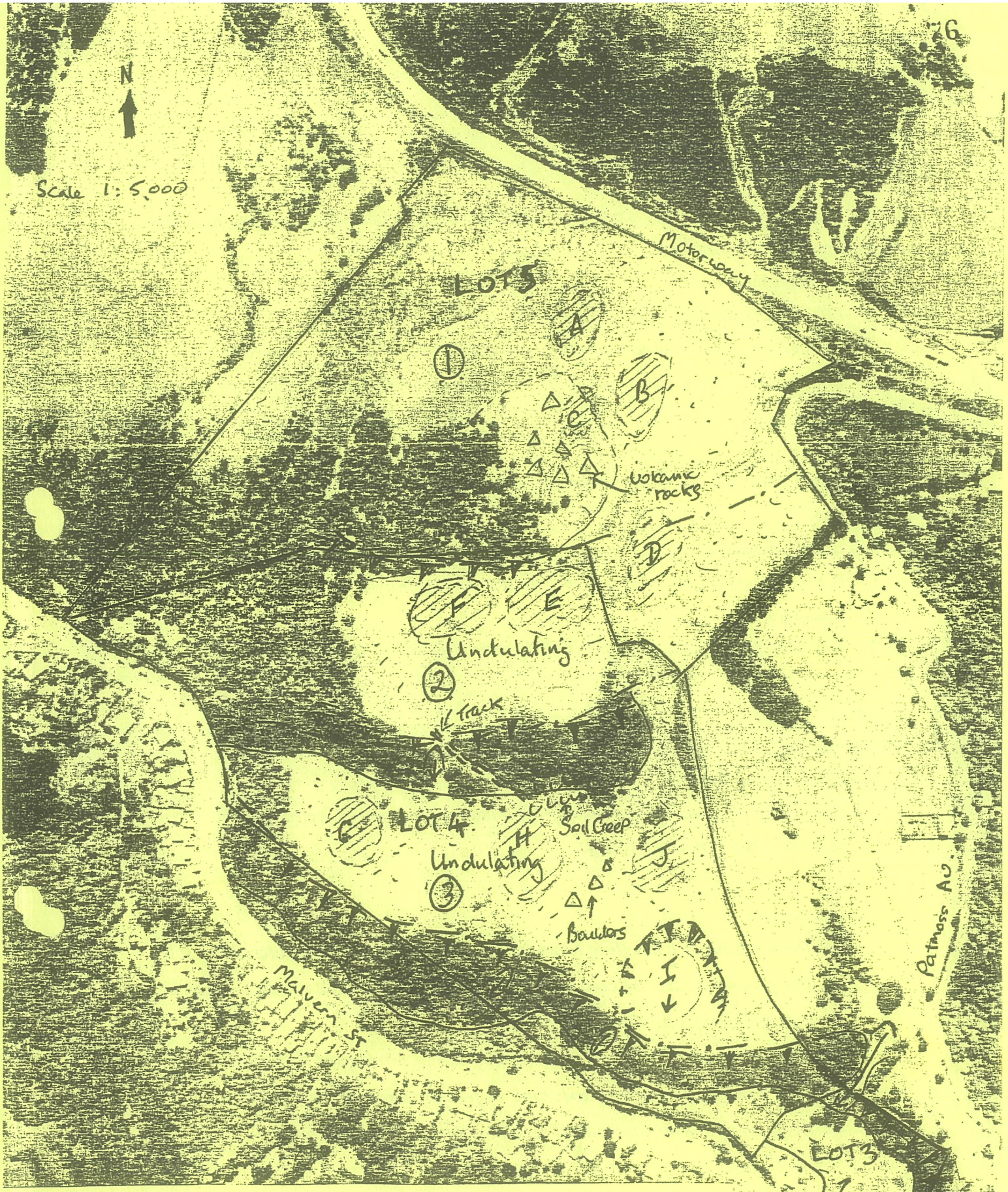

LEGEND

Volcanic colluvium & landslide debris	Debris slide/slump
Loess over coluvium (brown sandy clay)	Slump
Edge of lava flow	Property boundry
Scarp	Building sites B

6. Management Issues.

Lot 3 .

The scarp along the boundary is potentially unstable and the small valley above the wool shed contains a recent debris flow.

It is recommended that –

1. *The drainage ditch along the base of the scarp is maintained.*
2. *A buffer zone is established below the scarp and planted in suitable trees and shrubs.*
3. *Foundations are raised above any possible flooding from the Leith Stream.*

Lot 4 .

The scarps above and below the two terraces containing the building sites are potentially unstable.

It is recommended that –

1. *The scarps on the Lot are fenced, encouraging the regrowth of natives and restricting future landslides.*
2. *Any runoff from buildings or access tracks to be directed into a natural watercourse.*

Lot 5 .

The main issues here would be runoff and associated erosion.

It is recommended that –

1. *Care should be taken that any runoff from buildings or tracks is directed into safe watercourses and not onto scarps.*

7. Conclusions.

1. ***The location of a dwelling house at the proposed sites is considered feasible.***
2. ***The proposed sites are considered stable and the possibility of any major geological mass movement minimal.***
3. ***The threat of landsliding on the scarps can be minimised by siting houses at least 30 metres from their toes and by fencing and tree growth.***
4. ***Disposal of stormwater runoff should not be over any scarps.***

Report prepared for GEOLINK by Mike Robins BSc Hons Geology Dip Water & Soil.

Mass movement. The scarps above and below the sites are prone to debris slides/flows. These occur on the steep, colluvial slopes and are associated with wet periods and/or removal of vegetation.

The recent debris flow from the track, between the two terraces ,is the result of the laying of a telecom cable.

Site I .

This is situated in a well-defined ***slump*** *at the edge of the lava flow and* ***considered not suitable.***

RECOMMEDATIONS.

1. **ANY BUILDING SITES BE LOCATED AT LEAST 30 METRES FROM A SCARP.**
2. **STORMWATER RUNOFF TO BE DIRECTED TO NATURAL WATER WAYS AND NOT OVER SCARP.**
3. **SITE I IS CONSIDERED NOT SUITABLE.**

Sites E and F are located on the upper terrace.

They are similar to G and H and therefore considered stable. the same recommendations apply to these sites .

LOT 5.

The proposed building sites are located on a stable volcanic bench comprised of hard phonolite rock (As mapped by Benson .)

Site C .

Located on top of hill with large , tabular rock outcrops.

Site stability on stable , hard insitu rock.

Mass movement. None.

Foundations. Good.

Sites A , B and D.

Gently sloping , smooth slopes .

Site stability shallow loess on colluvium over hard insitu phonolite.

Mass movement. None.

5.Engineering geology of the proposed building sites.

The possible geotechnical limitations of the sites may be summarised as –

(i) Possible large-scale geological failure in the lava benches.

(ii) Landslides along the scarp areas.

LOT 3. The proposed building sites are located on the flood plain of the Leith Stream. A steep scarp forms the north-west to south-east boundary with a small valley running down from Patmoss Avenue , behind the wool shed.

Site stability. Located on alluvium and gravels of Leith flood plain. Stable site.

Mass movement. The scarp above the sites is reasonably stable with outrops of hard, insitu volcanic rock. However some old scars of small debris slides/ flows were noted.

A recent debris flow from the small valley, running up to Patmoss Avenue, had deposited debris behind the wool shed.

Flooding. The sites may be prone to floods from the Leith Stream.

RECOMENDATIONS.

1. ALL BUILDING SITES TO BE AT LEAST 30 METRES FROM NORTH-EASTERN PROPERTY BOUNDARY. (Beyond runout from mass movement from scarp and valley.)

2. BUILDINGS ABOVE POSSIBLE FLOOD LEVELS.

LOT 4.

The proposed building sites are located on two terraces.

Sites G and H are located on the lower terrace. (+1)

Site Stability. The sites are located on a possible ancient landslide. The collapse and fracture of the lava flow would have occurred many millions of years ago and there is no record of similar cases in recent times. No evidence was seen for recent, active, large-scale geological mass movement.The site is cnsidered stable.

Foundations. 3 metres light brown sandy,clay colluvium.

Few basalt boulders on hard insitu basalt.

(i)Surficial Mass Movement.

All recent mass movement has occurred in the slope deposits of the scarps. An inspection of the scarps revealed a number of small **debris slides and flows** hidden beneath the scrub. Some were quite old (40 years ?) and others very recent.(fresh displaced material).

Soil creep and terracetting is evident on grassed areas.

A **debris flow** below the track linking the two terraces on Lot 4 is the result of the recent laying of a Telecom cable. It occurred in deep , sandy colluvium when runoff entered the cut made by a tyne.

A small valley runs down from Patmoss Avenue above Lot 3 and recently a debris flow occurred in the head of the valley with the debris tail extending onto Mr Walker's property.

On inspection from Patmoss Avenue the head of the valley comprised of fill material which had failed during heavy rain resulting in a **debris flow**.

A classical slump feature was noted on the southern end of Lot 4 at the edge of the scarp.It was very old and probably surficial.

(ii) Geological mass movement.

The benching and scarps on the property raise the question of large scale **slumping** within the lava flows. The two terraces on Lot 4 contain some features that may indicate ancient landsliding.Such features are the uneven topography and the backward tilting areas. The two terraces may be separate lava flows or the lower terrace may be the result of an ancient collapse of the edge of the lava flow.

A study of the scarps showed no evidence of any recent movement involving large scale **geological collapse.** It is the opinion of the author that these are separate lava flows although some collapse probably occurred some time after the initial eruptions. The terraces are therefore considered to be stable in present times.

1. Survey methods.

These involved an engineering geology survey of the property.

Stereoscopic air photo interpretation. (1958 1: 20,000)

Benson's 1: 50,000 Dunedin District Geology Map.

2. Physical description.

The proposed subdivision comprises of 5 Lots and lies between Malvern Street, in the Leith Valley, State H ighway 1 to the north and Patmoss Avenue to the east. Lots 1 and 2 are to be retained by the owners. Lot 3 forms the remainder of the alluvial flats, adjacent to the Leith Stream. Lots 4 and 5 are situated on a series of terraces or benches above the Leith Valley. Rapid downcutting of the Leith Stream has produced very steep valley sides and cliffs in the hard volcanic rock. Above the Leith Valley the terraces or benches are evident. The scarps are covered in a mixture of scrub and native bush.

3. Geology.

Volcanic rocks of the Dunedin Volcanic Complex form the geology of the area. These are represented by a series of lava flows that were laid down over the other producing the step- like effect or benching evident in the topography. Two and possibly three flows were identified in the upper area of the property (Lots 3& 4). A series of scarps mark the edge of each successive lava flow.

The uppermost lava flow was mapped by Benson and consists of **phonolite** , a very hard rock characterised by large tabular blocks seen outcropping on the top of the hill in Lot 5. The lower flows consist of fine-grained **basalt.**

The flats comprising Lots 1,2.and 3 are formed of flood plain alluvium from the Leith Stream. The benches are overlain by shallow loess and colluvium ,while the scarp slopes by volcanic colluvium and landslide debris.

4. Mass movement.

This can be looked at in two contexts-

(i) Recent surficial mass movement.

(ii) Geological mass movement.

Contents.

GEOTECHNICAL REPORT FOR SUBDIVISION

Part Lot 1 DP 613 & Pt Secs 2 of 71 & 706R
& Pt Closed Road Block XI North Habour &
Blueskin S.D.

J T &GB Walker.

228 & 236 Malvern Street, Leith Valley.

GEOLINK LAND INVESTIGATIONS