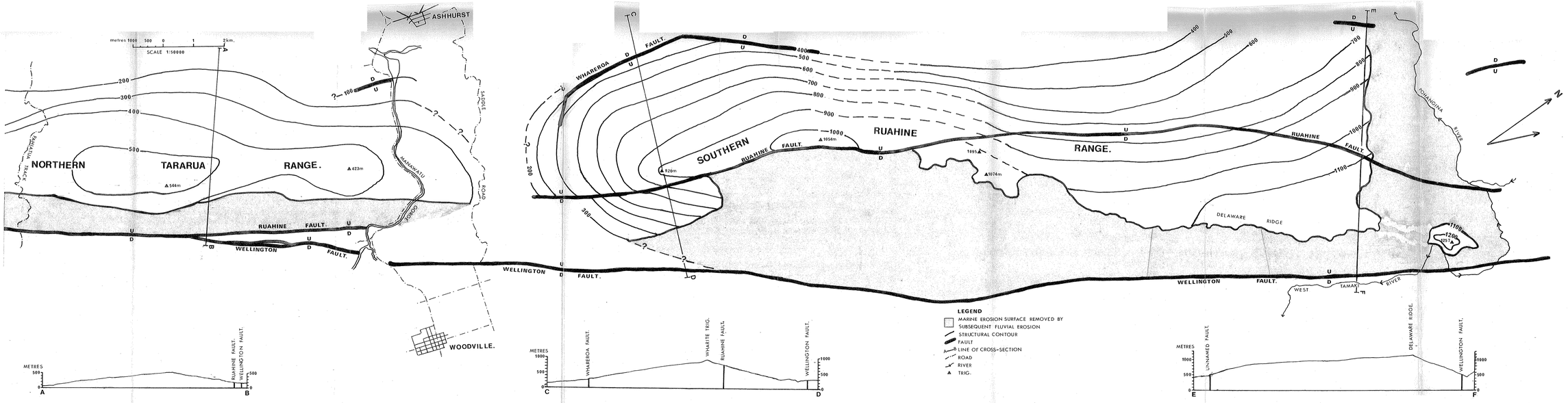
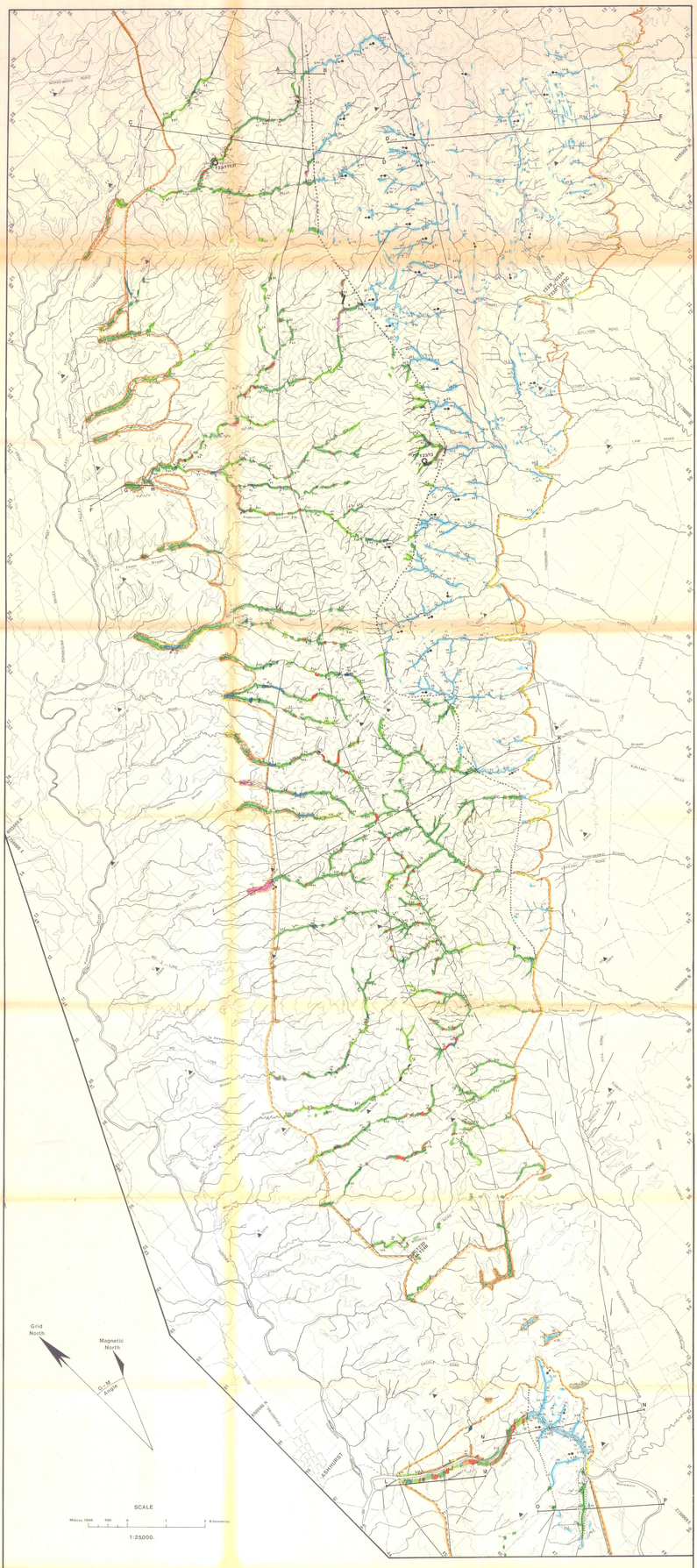


FIGURE 8·1: STRUCTURAL CONTOUR MAP OF MARINE EROSION SURFACE PRESERVED IN THE SOUTHERN RUAHINE AND NORTHERN TARARUA RANGES.



TOPOGRAPHICAL REFERENCE

Road
Railway
Vehicle track
Trig station
River
Stream
Contour, vertical interval 100 metres

STRUCTURAL DATA

Strike and dip of inclined bedding
Strike and dip of inclined foliation
Vertical attitude of bedding
Vertical attitude of foliation
Overturned bedding (where younging direction is known)
Younging direction - certain
- uncertain
Fault trace
Faulted monocline

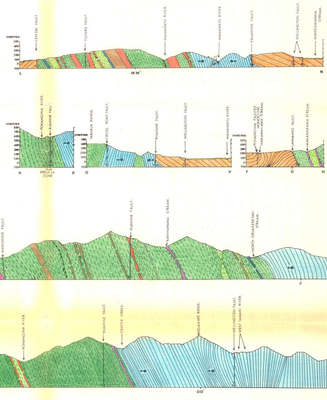
GEOLOGICAL CONTACTS

Contact between Torlesse Supergroup bedrock and Plio-Pleistocene marine deposits - certain
- uncertain
Contact between Wharite Lithotype and Tamaki or Western Lithotype
- certain
- uncertain

LITHOLOGICAL CONTACTS

Contacts between lithozones - exposed
- concealed

GEOLOGICAL CROSS-SECTIONS



LITHOLOGICAL DATA

Plio-Pleistocene marine deposits adjacent to Torlesse bedrock contact
Terrace alluvium adjacent to Torlesse bedrock contact
No exposure of Torlesse bedrock

WHARITE LITHOTYPE

Foliated Lithozone-
Sandstone dominated sequence
Argillite dominated sequence
Sandstone Lithozone
Diamictite Lithozone
Chert Lithozone
Graded-Bedded Lithozone
Volcanic Lithozone
Argillite Lithozone

TAMAKI LITHOTYPE

Graded-Bedded Lithozone

WESTERN LITHOTYPE

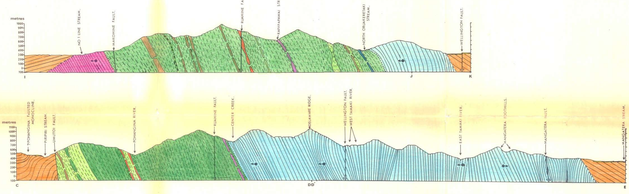
Graded-Bedded Lithozone

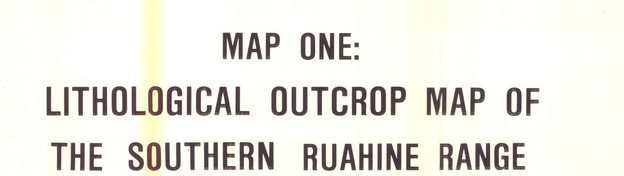
CROSS-SECTIONS ONLY

Structural attitude of foliated strata
Structural attitude of bedded strata

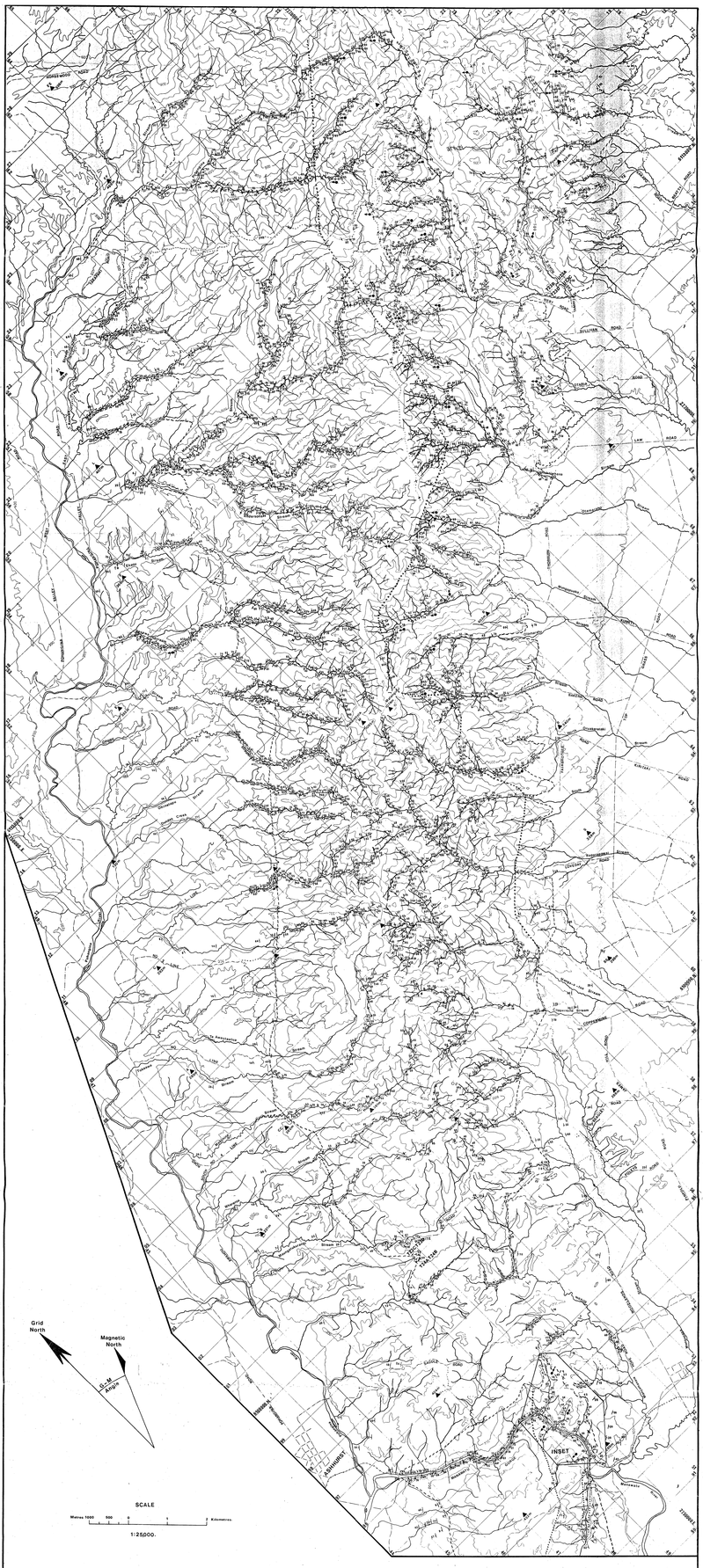
SYMBOLS

ac	autoclastic chert breccia
as	autoclastic sandstone breccia
cc	calcareous conglomerate
ch	chert breccia
cl	clastic breccia
cn	clastic conglomerate
cs	calcareous siltstone
ct	chert
lb	fissor/lenticular bedding
ls	limestone
pl	pillow lava
pm	pebbly mudstone
ra	red argillite
rg	red and green argillite
sp	spilite
th	Thin-Bedded Association
tk	Thick-Bedded Association
vth	Very Thin-Bedded Association
vtk	Very Thick-Bedded Association
	fossil locality
A—B	line of cross-section





MAP ONE: LITHOLOGICAL OUTCROP MAP OF THE SOUTHERN RUAHINE RANGE



TOPOGRAPHICAL REFERENCE

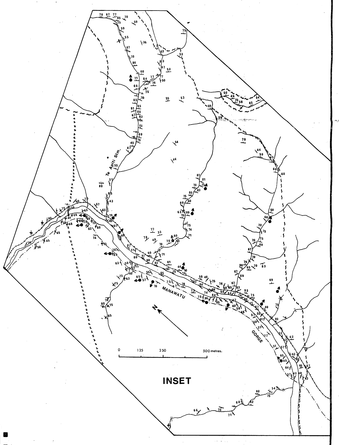
Road
Railway
Vehicle track
Trig station
River
Stream
Contour, vertical interval 100 metres

STRUCTURAL DATA

Strike and dip of inclined bedding
Strike and dip of inclined foliation
Vertical attitude of bedding
Vertical attitude of foliation
Overturned bedding (where younging direction is known)
Younging direction - certain
- uncertain
Inclined joint surface
Vertical joint surface
Inclined fault plane
Vertical fault plane
Fault plane with gouge
Fault crush zone
Fold axis (plunge direction and amount indicated where known)

GEOLOGICAL CONTACTS

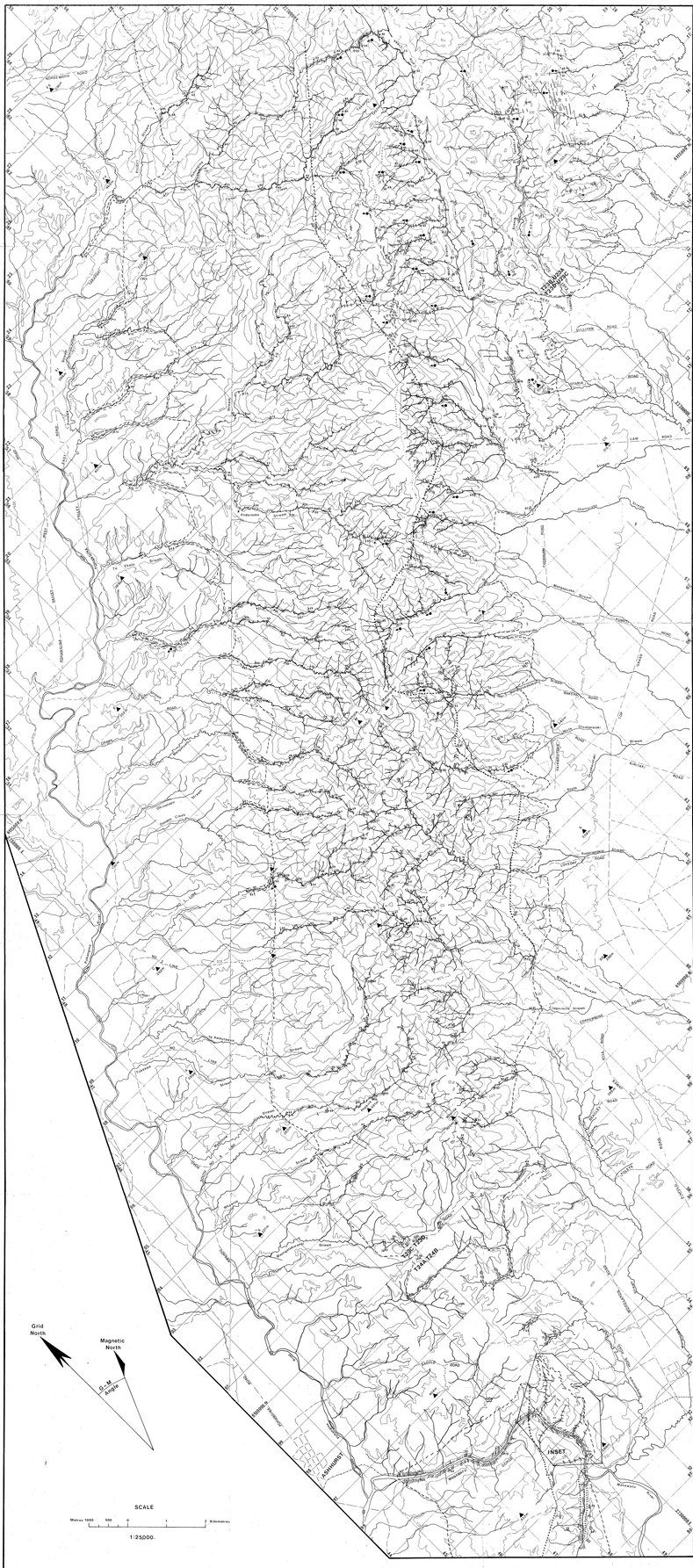
Contact between Torlesse Supergroup bedrock and Plio-Pleistocene marine deposits - certain
- uncertain
Contact between Wharite Lithotype and Tamaki or Western Lithotype
- certain
- uncertain



MAP TWO:

FIELD OBSERVATION MAP OF THE SOUTHERN RUAHINE RANGE

Massey University Library



TOPOGRAPHICAL REFERENCE

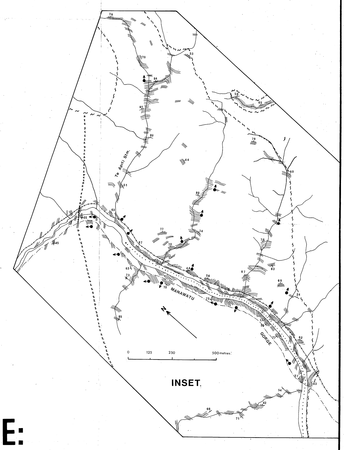
Road
Railway
Vehicle track
Trig station
River
Stream
Contour, vertical interval 100 metres

STRUCTURAL DATA

Form lines approximately 25 metres apart
Strike and dip of inclined bedding
Strike and dip of inclined foliation
Vertical attitude of bedding
Vertical attitude of foliation
Overturned bedding (where younging direction is known)
Younging direction - certain
- uncertain
Fold axis (plunge direction and amount indicated where known)
Approximate position of axial plane trace of steeply plunging isoclinal fold

GEOLOGICAL CONTACTS

Contact between Torlesse Supergroup bedrock and Plio-Pleistocene marine deposits - certain
- uncertain
Contact between Whanke Lithotype and Tamaki or Western Lithotype
- certain
- uncertain

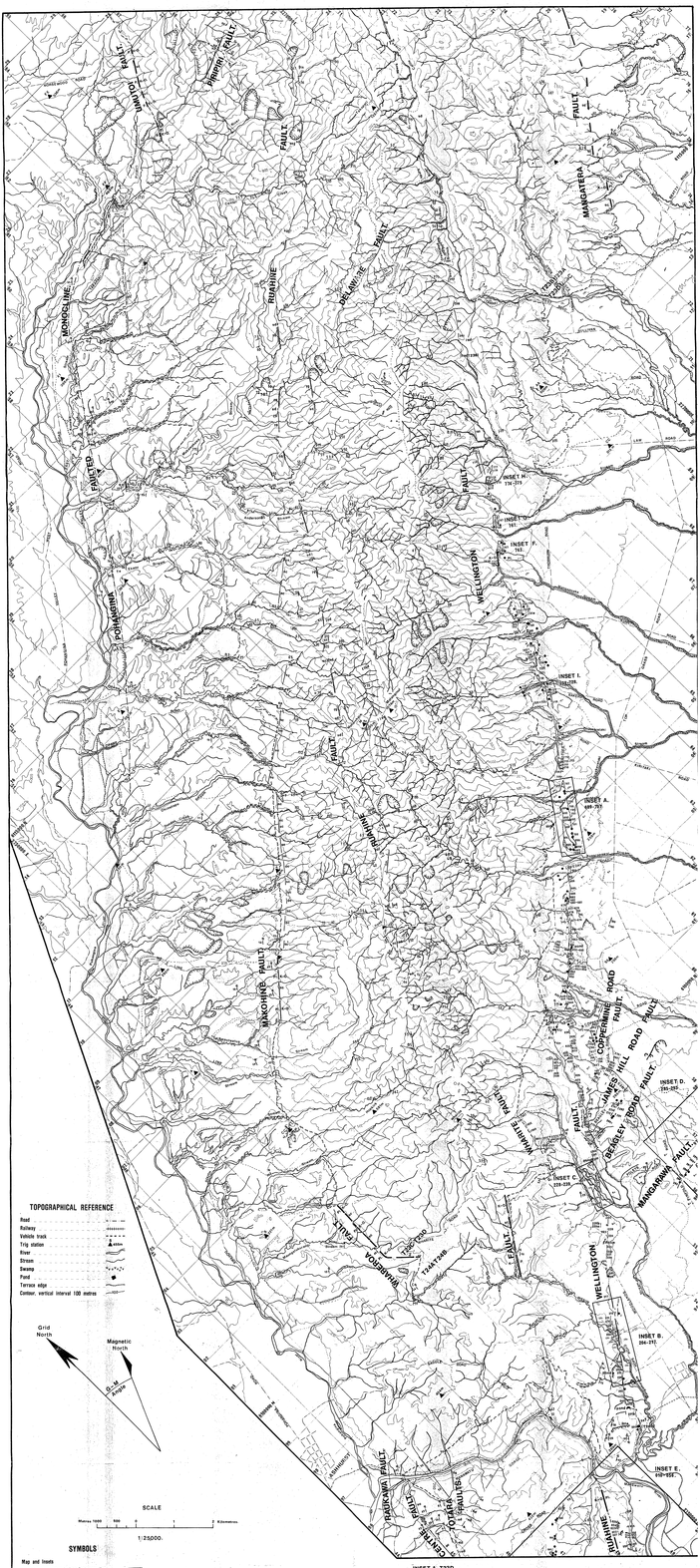


MAP THREE:

STRUCTURAL INTERPRETATION MAP OF THE SOUTHERN RUAHINE RANGE.

MAP FOUR:

LATE QUATERNARY TECTONIC MAP OF THE SOUTHERN RUAHINE RANGE.



TOPOGRAPHICAL REFERENCE

- Road
- Railway
- Vehicle track
- Trig station — S ▲455m
- River
- Stream
- Swamp
- Bush
- Terrace riser
- Terrace extent
- Contour, vertical interval 100 metres — 500

SYMBOLS

Mass movement features
- Ridge-top depressions — 43
- Ridge-top scarps — 9
- Ridge-top benches — 19
- Outline of slump
- (for details of mass movement features see Appendix VI)

Surficial erosion scars
(debris slides, debris avalanches, rock slides)
- Rock fall — r/f
- Debris fall — d/f
- Slump topple — s/t

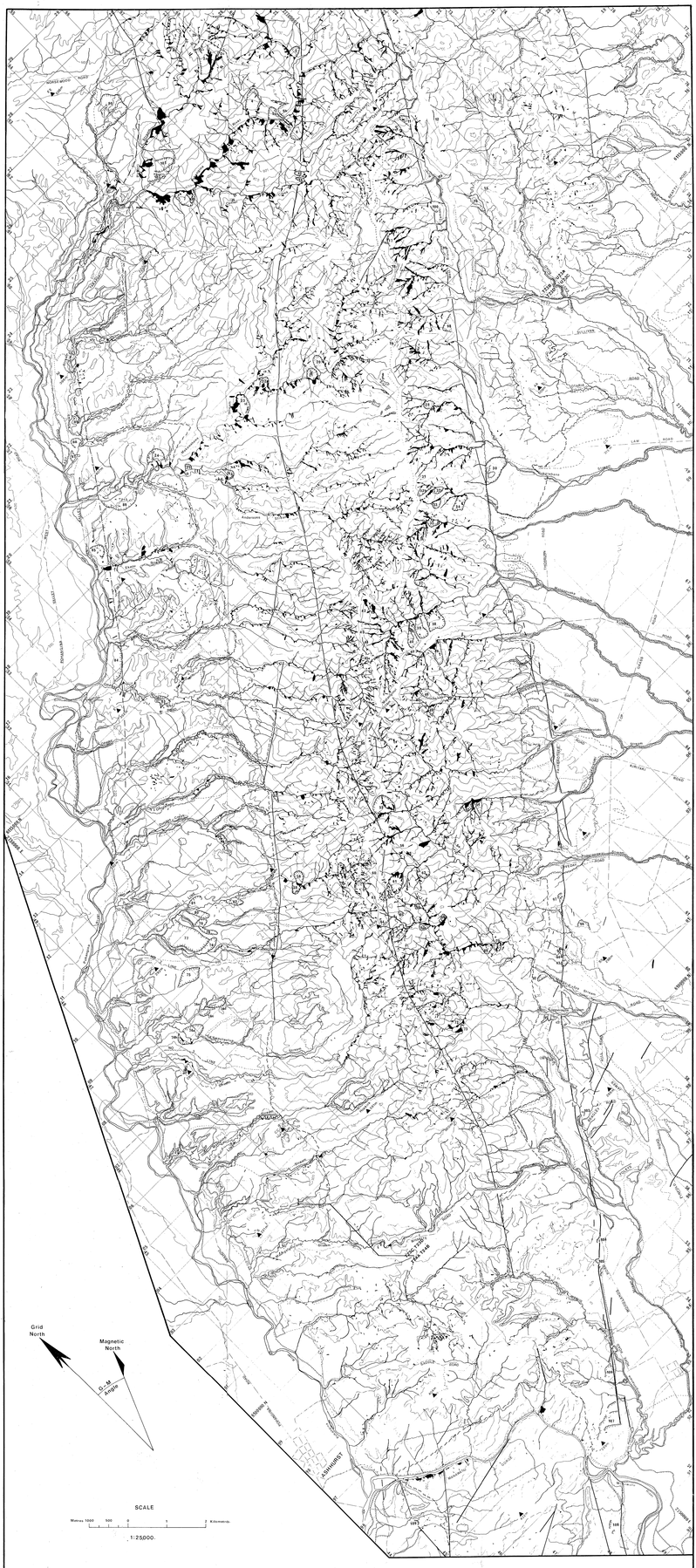
Geological contact – certain
– uncertain

Fault trace

Faulted monocline

MAP FIVE:

DISTRIBUTION OF SURFICIAL EROSION SCARS AND MASS MOVEMENT FEATURES – SOUTHERN RUAHINE RANGE IN THE YEARS 1946 TO 1949.



TOPOGRAPHICAL REFERENCE

Road
Railway
Vehicle track
Trig. station
River
Stream
Swamp
Bush
Terrace riser
Terrace extent
Contour, vertical interval 100 metres — 500 —

SYMBOLS

Mass movement features
- Ridge-top depressions — 43 —
- Ridge-top scarps
- Ridge-top benches — 18 —
- Outline of slump
- (for details of mass movement features see Appendix VI)

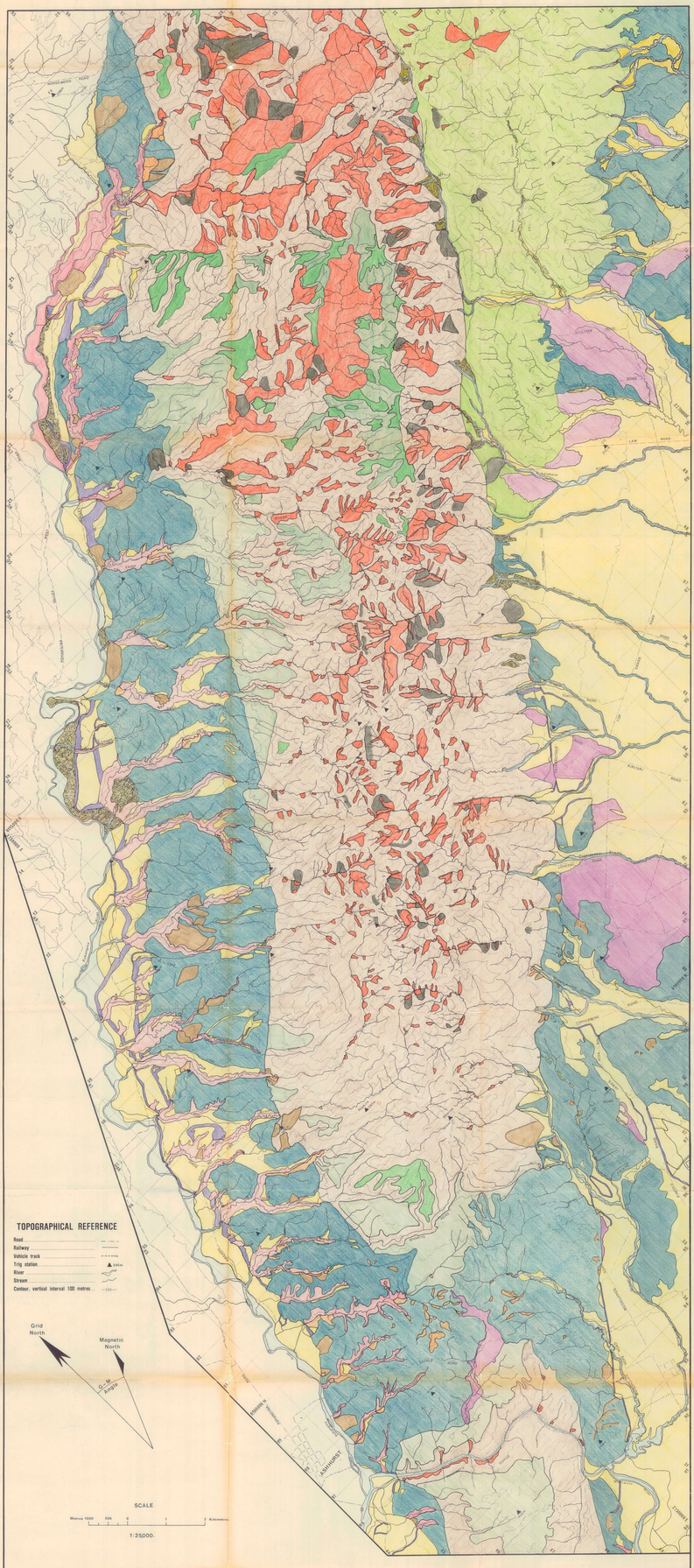
Surficial erosion scars (debris slides, debris avalanches, rock slides)
- Rock fall — r3 —
- Debris fall — d3 —
- Slump topple — s3 —

Geological contact - certain
- uncertain

Fault trace
Faulted monocline

MAP SIX:

DISTRIBUTION OF SURFICIAL EROSION SCARS AND MASS MOVEMENT FEATURES - SOUTHERN RUAHINE RANGE IN THE YEARS 1974 TO 1978.



DESCRIPTION OF MAP UNITS

Areas of highest stability

These are areas of very low potential for downslope movement of material. Nearly flat to gentle slopes (0°).

Alluvial terrace and fan surfaces, excluding very low level surfaces within active stream channels. Surfaces vary in age from late Pleistocene to Holocene. Terrace surfaces comprise a thin veneer of gravel, sand, silt and clay. Fan surfaces comprise scree deposits. Fan surfaces are restricted and of small areal extent within upper catchment reaches. Extensive coalescing fan surfaces occur along the base of the eastern flank of the Range. Terrace edges are susceptible to streambank undercutting where they adjoin drainage channels.

Remnant surfaces of a plane of marine erosion of pre-Waitotarian age eroded across Torlesse Supergroup bedrock (greywacke). These areas represent the highest parts of this plane where preservation is most nominal or absent and relief is very subdued. Such areas, in general correspond with ridge-top locations. All areas are densely vegetated with either podocarp hardwood forest (> 900 m altitude) or shrubby leatherwood and snowgrass (> 900 m altitude).

Areas of high stability

These are areas of low potential for downslope movement of material. Stability is enhanced where such areas are forested. Slopes are of gentle to moderate steepness (5–20°).

Includes uppermost catchment areas perimeter to ridge-top 'flats' where stream dissection is minor and slopes are subdued. There is little sign of slope instability. Also includes lower altitude remnants of the plane of marine erosion. These areas are characterized by stream dissection and stream density have produced short, moderately steep valley slopes. There is little sign of slope instability. To the south and west of Wharite Trig these areas have been cleared of their forest vegetation and are pastured. All remaining areas are densely clothed with leatherwood or forest vegetation. These areas occur within the confines of the Range and are underlain by Torlesse Supergroup bedrock.

Areas of predominantly gentle slopes but with local areas of moderately steep slopes adjacent to shallowly inclined drainage channels. Slope instability is negligible. These areas represent remnants of a mature landform surface. All surfaces are underlain by Plio-Pleistocene marine deposits and are pastured.

Areas of moderate stability

These are areas of moderate potential for downslope movement of material.

Foothill area to the east and at the base of the main Range. The entire area is underlain by Torlesse Supergroup bedrock. Valley slopes vary between 20–30°. Predominantly pastured but some areas are covered with scrub. Slopes are of the Range. Altitude of foothills increases from 400 m in the south to 800 m in the north. Very little sign of slope movement except in high altitude area at north of map. Area susceptible to debris slide and debris avalanche activity.

Moderate to steep slopes (10–20°) at lowland areas adjacent to the base of the Range. Materials are weakly to moderately consolidated Plio-Pleistocene marine deposits comprising siltstone, sandstone with minor conglomerate, limestone, lignite and pumice. Moderate drainage density with variable stream dissection ranging between shallowly to deeply incised. Slopes are susceptible to shallow movements such as debris slides, and earth slides and also deeper-seated movements such as earth slides and earth slumps.

Terrace risers between successive terrace surfaces and fault scarps along active fault traces within unconsolidated Plio-Pleistocene marine deposits and Holocene marine deposits and/or fluvial alluvium. Slope of scarps and risers varies between 45–60°. These slopes are susceptible to localised slumping and widespread debris slide and earth slide activity.

These are areas of former large-scale, deep-seated mass movements. Details of location, classification and state of activity (history of movement) of these features are shown on Maps 5 and 6. Details of the nature of the mass movements and their activity are shown on Maps 5 and 6. Sources of material involved in these movements is presented in Table 11.8. Earth (mud) flows and debris (rock) flows are likely to result from the collapse of these features where they occur adjacent to major stream channels. The low slopes of many of these movements are actively eroding as a result of streambank undercutting. Rock slumps coincide with extensive areas of fault brecciated bedrock along major fault zones.

Areas of low stability

These are areas of high potential for downslope movement of material. They are areas of very steep valley slopes (35–50°) with steeper (55–90°) slopes occurring adjacent to stream channels.

Upper catchment slopes along deeply dissected valleys within the Range. Drainage density is high and gullying is common. Materials comprise Torlesse Supergroup bedrock. Altitude varies from 400 m in the south to 1200 m in the north. Slope instability is characterized by rock translational sliding of soil and colluvium at the bedrock-colluvium contact to form rockslides and rock translational slides. Rock slides occur in areas where discontinuities (particularly bedding planes and joint surfaces) dip at less than or equal to the steepness of topographic slope and where dip direction is towards the free face of valley slopes. Rock falls and topples are of minor importance. These slopes are in part densely vegetated with either podocarp-hardwood forest or leatherwood scrub. However, a large proportion of these slopes show signs of former slope instability in the form of revegetated erosion scars.

Lower catchment slopes along deeply incised stream channels in pastured foothill areas adjacent to the base of the Range. Materials comprise Plio-Pleistocene marine deposits into which numerous streams have incised to depths of up to approximately 30 m. High-level terrace risers are near vertical and are susceptible to earth slumps and earth flows. Lower terrace risers are steep and are susceptible to earth slumps and earth flows. Slopes of valley slopes are steep (35–50°) and are susceptible to earth slides, earth slumps and shallow earth slides. Many slope movements are the result of streambank undercutting which appears to be restricted to stream reaches downstream of the present day nick-point. The nick-point is located at a marked change in the gradient of the streambed. All but the largest streams in zones westward of the Range display this characteristic whereas streams draining eastward of the Range appear to have reached base level.

Areas of streambank undercutting along edges of riparian alluvial terrace and fan deposits adjacent to stream channels. Debris falls and debris slides are the dominant type of movement occurring at such localities.

Areas of lowest stability

These are areas of very high actual and excessively high potential downslope movement of material. Where physiographic, climatic and seismic factors, together with factors of human origin, severely affect slope stability.

North- and west-facing slopes are potentially more unstable than south- and east-facing slopes. The increased instability of these slopes is considered to be due to the influence of the Wharite Fault. Slopes are of the Range. Materials comprise Torlesse Supergroup bedrock and colluvium, with which increased slope instability has been associated in the past, approach this area from the northwest. Many such areas of active erosion coincide with extensive outcrops of fault brecciated material (particularly bedrock), occur in overdeepened headwall and lateral scarp areas around slump movements or occur at the toe slope of such movements where disrupted materials are susceptible to streambank undercutting and gullying.

This area is not part of the study area.

Symbols

Areas of extensive fault brecciation (in Torlesse Supergroup bedrock only).

Small areas of rock fall and rock topple involving massive (unbedded) jointed sandstone. Rock fall activity is restricted to areas where the strike of joint systems parallels outcrop faces and is facilitated by (but not dependent upon) streamward dipping joint surfaces.

Small areas of earth fall, earth topple and slump topple along steep bluffs of Plio-Pleistocene marine deposits adjacent to stream channels. Failure is often initiated by streambank undercutting.

Small areas of debris fall along steep faces of high-level alluvial terrace or fan surfaces. Failure is often initiated by streambank undercutting.

Direction of movement of ridge-top features most of which have an indefinite downslope boundary.

MAP SEVEN:

MAP OF RELATIVE SLOPE STABILITY, SOUTHERN RUAHINE RANGE.