1976/21. Investigation of proposed Forestry Commission roads near St Marys

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At the request of the Forestry Commission, the Department of Mines has investigated two proposed alternative road routes near St Marys (fig. 1). A brief inspection was made of each route to determine whether geological and geomorphological factors would adversely affect road construction.

Route A is about 7 km in length and by-passes St Marys township and St Marys Pass. Route B is about 20 km long and closely follows an existing coastal track between Falmouth and Chain of Lagoons.

ROUTE A

GENERAL COMMENTS

No problems are envisaged on the southern 4 km of this route through Irish Town to the Tasman Highway at Elephant Pass (fig. 1). The 3 km long northern section through Whites Gully to the gravel pits at St Marys Pass (fig. 2) was examined in detail as problems were expected in this area. The slopes in this area are very steep, with slope angles generally between 30° and 35° and locally up to 40°. This section of the route lies entirely in adamellite granite of Devonian age and passes along the western side of Whites Gully, apart from one area where it detours westwards around the head of a large tributary valley. The route crosses about 9 small ephemeral streams and one major creek. It should be stressed that whilst the small streams are ephemeral, large quantities of water are carried during the periods of high intensity short duration rainfall, to which the surrounding area is prone. The swath of flattened vegetation on either side of one stream is up to 15 m in width and is indicative of the rapidity of flow and volume of water carried during periods of peak stream discharge. Small bridges or large diameter pipes will be required to carry such large volumes of water in these areas. It is largely the underdesign of these features that has caused the failure of the roadway at St Marys Pass. Where the route crosses the large tributary flowing into Whites Gully a 10 m bridge will be required due to the large volume of water, granite boulders and pebbles carried by the stream during peak floods. The nature of the material carried by the stream can be seen by the many tonnes of boulders and pebbles which have been deposited where it is crossed by the existing track from the gravel pits.

NOTES ON SECTIONS OF THE ROUTE

D TO E

No problems are envisaged in this section. The granite crops out as large, smooth exfoliated surfaces and does not appear to be deeply weathered. Slope angles are moderate, steepening to 25-30° in the northern half of this section. The head of one stream is crossed near E but there is little debris in the stream channel and smooth granite surfaces are exposed. There is no evidence of the stream carrying large volumes of water other than that flow contained by the channel.

E TO F

The overall slope of this section is between 30° and 35° and locally up to 45°. The stream crossed at point F is similar to the one described at E above, and no problems are envisaged. The slope is largely covered by granite scree composed of large angular blocks of granite with little matrix. The

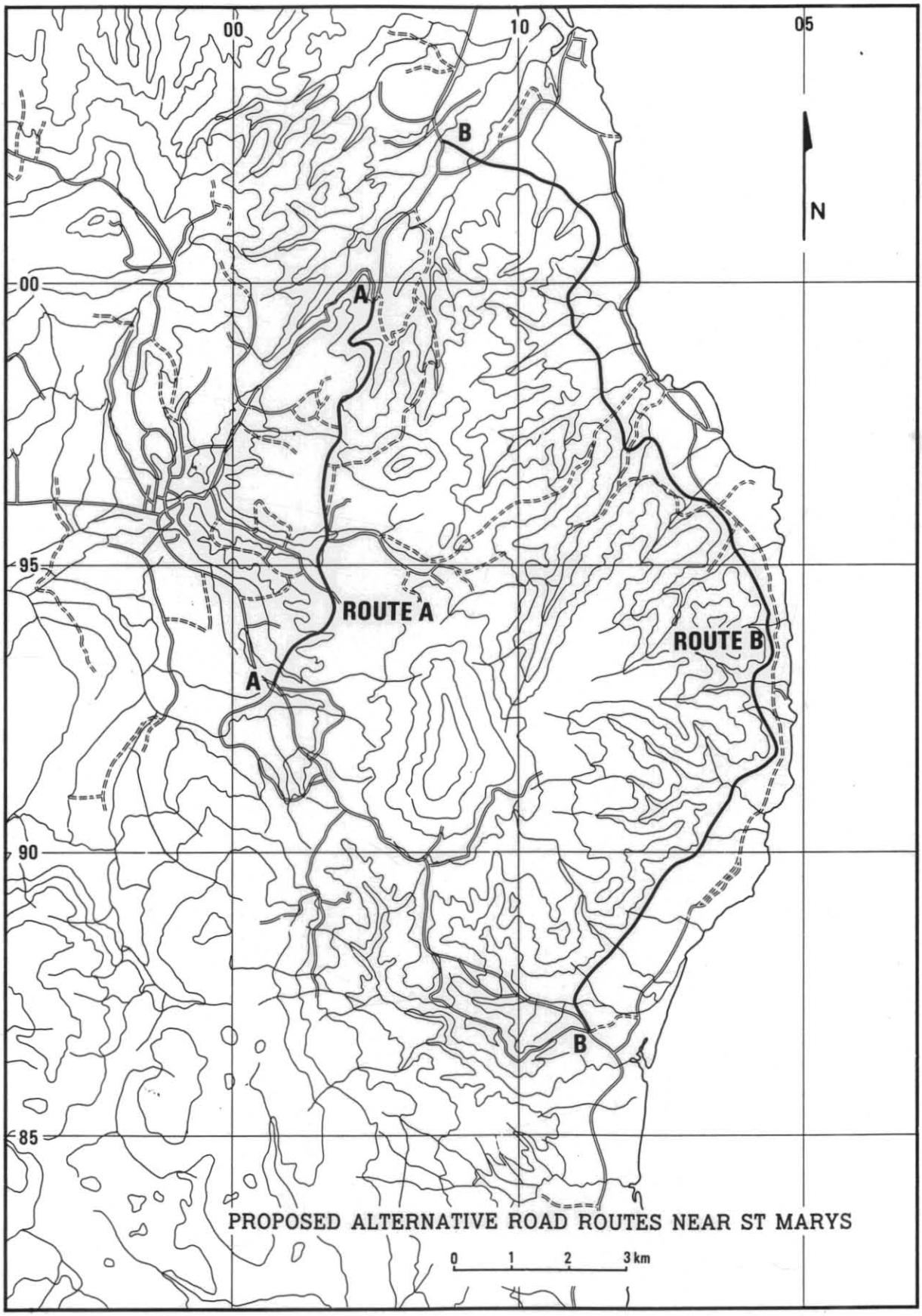
00
10
05
N
00
95
90
85
A
B
ROUTE A
ROUTE B
A
B
PROPOSED ALTERNATIVE ROAD ROUTES NEAR ST MARYS
0 1 2 3 km

Figure 1.

5 cm

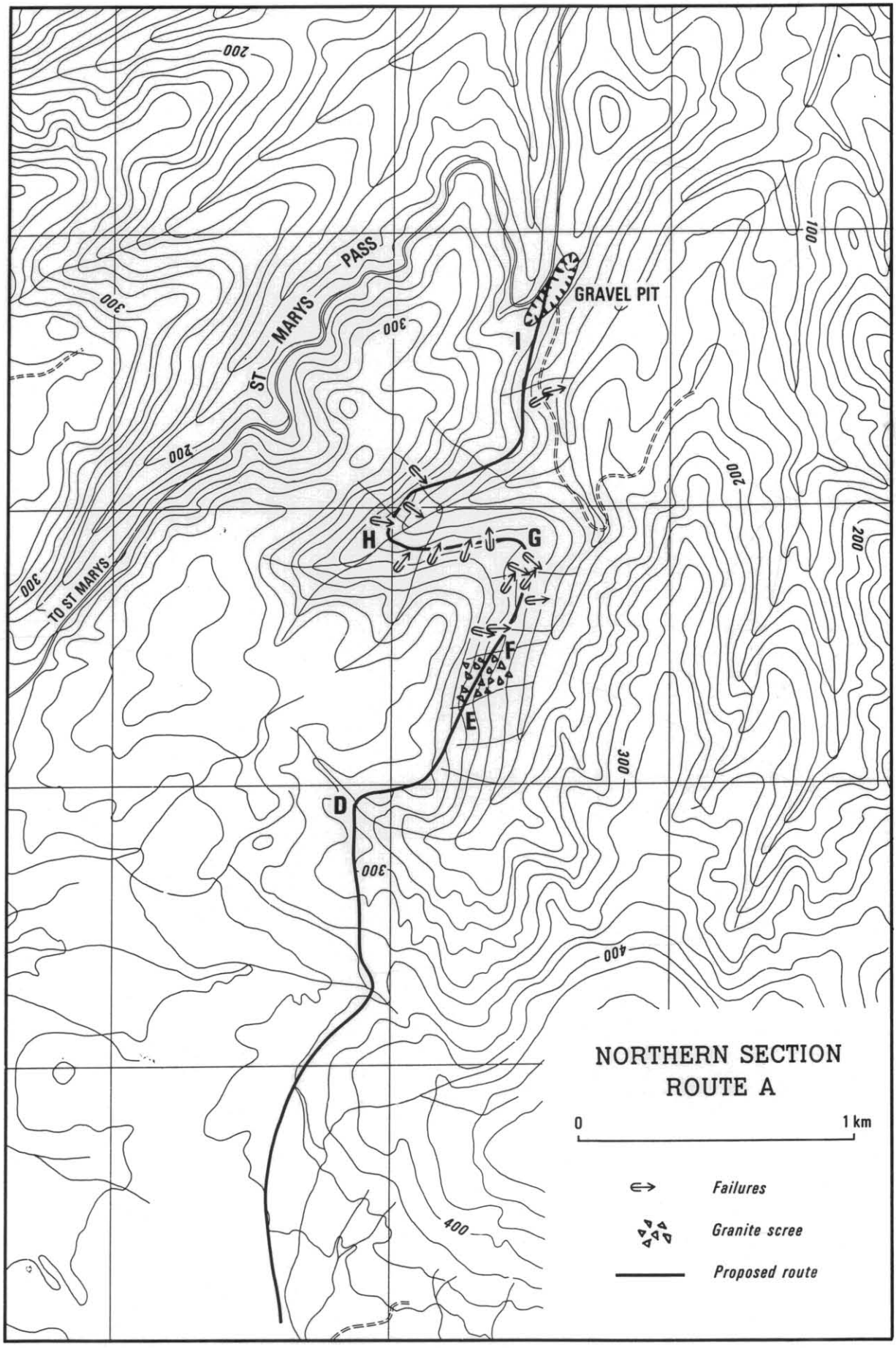
200
300
ST MARYS PASS
GRAVEL PIT
I
H
G
F
E
D
TO ST MARYS
100
200
300
400
NORTHERN SECTION
ROUTE A
0
1 km
Failures
Granite scree
Proposed route
5 cm

Figure 2.

blocks are unweathered and unusual for this type of country. The depth of this scree material could not be determined. The slope is reasonably unstable with some creep movement evident from bowed vegetation. This scree would have to be removed from the upslope side of any road constructed in this region.

F TO G

In this section the granite appears to be more deeply weathered, as outcrops are largely absent. The first creek north of F has a channel slope of 32° and although the channel is not very incised, large quantities of water have been carried in the past. This is indicated by the debris channel and flattened vegetation up to 6 m on either side of the stream. Two failures, up to 7 m in width occur upslope from the proposed route. These indicate that the granite is deeply weathered, as a 1-2 m head scarp exposes granular weathered granite material with a few rounded weathered granite corestones. These failures are not strictly landslips or washouts but could originate from subsurface movement of water possibly associated with the weathered granite/solid granite interface. A road in this area will be affected by this type of failure as artificial oversteepening of the slope must occur during construction, compounding this problem. Further north the route passes around the head of a small stream originating in a well defined amphitheatre. Five failures are present in this region, all occurring just below the break of slope at the top of the ridge and all are of a similar type to those described above. Their location appears to confirm the origin described above and each exhibits a wash out channel below, in which weathered granite material has been deposited. The more deeply weathered granite in this section is associated with the failures and washout channels observed.

G TO H

This section passes along the southern side of the large tributary to Whites Gully. Slope angles are around 30° and the granite is weathered. Several failures were observed and in one place a swath of vegetation 13 m wide has been flattened where water has flowed downslope.

It should be noted that there is often no well defined channel or depression associated with some of these washouts or washaways. These are recent features and are likely to have occurred last winter. These features present problems in road construction as destruction of any road will occur if they are not anticipated. There is, however, a problem in defining such areas.

H TO I

This section is similar to section G-H. The second stream to the north has a large, 10 m wide, well defined and eroded channel which has previously carried large quantities of water and debris. Most observed failures occur towards the head of the main tributary where slope angles are up to 40°. The remainder of the route lies in weathered granite which is closely jointed in exposures below the gravel pits. This close jointing is responsible for the deep weathering of the granite in this region. The granite hillside slopes at about 25°. Failure has occurred above and below the present track extending to the south of the quarry.

ROUTE B

GENERAL COMMENTS

The proposed route (fig. 1) from Falmouth to Chain of Lagoons approximates in general to the break of slope at the rear of St Peter's Foreland,

a narrow gently sloping strip of coastal farmland about 1 km wide. The Foreland slopes gently seawards and is dissected by many creeks radially draining the Mt Elephant-St Patricks Head uplands.

The entire route is underlain by blue massive coarse-grained Devonian adamellite granite. The rock crops out at sea level along the coast, along the flanks of the hills and in many of the larger creeks. Massive granite is probably present at shallow depth beneath the Foreland, which is covered with a thin veneer of sand, coarse quartz grit, and granite talus deposits. The break of slope at the rear of the coastal strip probably occurs where the talus deposits wedge out against the rising granite basement.

NOTES ON VARIOUS PARTS OF THE ROUTE

Devils Creek Bridge - Hopkirk's Pinnacle

Massive granite occurs at shallow depth beneath a thin veneer of sands, grits and river gravels (on the flood plains of Devils and Salters Creeks) and talus deposits. Salters Creek is deeply incised in river deposits and carries large flows of water during floods and would need to be adequately bridged. The degree of weathering of the granite is unknown, but cuttings will be small and no problems are generally expected.

Hopkirk's Pinnacle - Four Mile Creek township

Massive, probably unweathered granite occurs at a shallow depth, and the rock is exposed in creek beds. Lumera, Banticks and Four Mile Creek all carry large amounts of water during flood, and are all actively incising gravel and boulder deposits in their lower reaches. No problems are expected, although adequate bridging of these creeks would be needed.

Four Mile Creek

This is the largest creek in the area. It is deeply incised and has massive fresh granite exposed along much of its course. The area receives a high rainfall, and is heavily timbered. Slope angles near the proposed route are high, and track cuttings and gravel pits along the southern bank of creek indicate that the granite is finely fractured and deeply weathered in places. Conditions are similar to the Lower Marsh Creek area and road cuttings on either side of Four Mile Creek will be inherently unstable. A substantial bridge would be required to span the creek.

Four Mile Creek - Little Marsh Creek

Generally, no problems are anticipated, although some of the creeks carry large amounts of water at times. Part of the route between Ironhouse Hill and Wardlaws Point occurs on relatively steep granite talus slopes. Depending on the degree of weathering of the granite, care may be needed in cuttings to avoid downhill mass movement of material. It may be judicious to re-route the road some 100 m downslope.

Lower Marsh Creek area

Massive outcrops of solid granite, interspersed with deeply weathered material, occur close to part of the proposed route. The weathered granite is presently used for road fill. The route lies uphill from the break of slope on steeper ground, and it may be advantageous to re-route it some distance downslope. Along the northern side of Lower Marsh Creek where a logging road is under construction, small scale incipient slope failures have occurred on near vertical enbankments of weathered granite.

CONCLUSIONS

ROUTE A

Problems will be encountered in constructing and maintaining a road for the 3 km south of the gravel pits. Failures which have occurred along St Marys Pass on the existing road may be repeated on this section of the proposed route. Problems are associated with weathered granite and stream discharge during periods of high intensity rainfall. Failures and washaways have occurred under natural slope and vegetation conditions and artificial deforestation and oversteepening of slopes during road constructions are expected to compound the problem. The proposed route passes over angular granite scree material at several locations and this will need to be excavated to solid bedrock.

ROUTE B

Generally, no serious geological problems exist along most of the proposed route. The granite is however, deeply and sporadically weathered in places producing a white, pink or brown-red clayey quartz grit often interspersed with relict spheroidal kernals of less weathered or fresh blue granite. Such material is generally considered stable in an undisturbed state, but a combination of cutting, insufficient drainage and deforestation greatly increases its instability. This is the main problem affecting and construction on this route, the two areas of main concern being along the northern side of Lower Marsh Creek, and near Four Mile Creek.

[22 April 1976]