DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
ENGINEERING AND SOILS GEOLOGY SECTION

REPORT ON SITE INVESTIGATION

PROPOSED HOUSING SUBDIVISION, STONEYFELL

Sections 905, 907 and 1083 Hd. Adelaide

by

R.D. Steel
Assist. Senior Geologist

and

J.A.C. Painter
Geologist

Rept. Bk. 60/84
G.S. 3131
D.M. 138/65

65/4
60/84

23rd April, 1965

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Sections 905, 907 and 1085 Hd. Adelaide

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DEPARTMENT OF MINES
SOUTH AUSTRALIA

REPORT ON SITE INVESTIGATION

PROPOSED HOUSING SUBDIVISION, STONYFELL

Sections 905, 907 and 1089 Hd. Adelaide

INTRODUCTION

The request to investigate the site of a housing subdivision proposed by the Adelaide Olive Company, was received in a letter dated 28th January, 1965 from the Town Planners Office.

The area was initially inspected in company with Mr. J.K. Taylor, soils consultant to the Department, and Mr. D.H. Stapledon, Senior Geologist Engineering and Soils Geology Section.

It was agreed that the site presented a number of special problems, the nature of which could best be assessed by mapping surface features and examining test pits in several selected positions.

Fourteen test pits ranging from two to eight feet in depth have been prepared and logged, and the area has been geologically mapped at a scale of 80 feet to 1 inch. The results of this work are shown on the accompanying plan (Fig. 1). The boundaries between the various geological features are approximate only.

RESULTS OF INVESTIGATIONS

The site is located on the Eden Fault Scarp, immediately east of Crompton Drive, Wattle Park, and consists of a series of near parallel ridges separated by gullies. The ridges trend approximately east-west, and slope westwards at angles ranging from 5° to 15°, generally about 10°.

The gullies, numbered 1 to 5 for identification (Fig. 1) are entrenched 20 to 30 feet below well defined narrow ridges (numbered 1 to 6) on the eastern side, but widen out into gentle depressions on the western edge of the site.

Examination of rock and soil exposures both on the surface and in the test pits, suggest that the site is intersected by a branch of the Eden Fault, which runs approximately parallel to and 250' east of Crompton Drive. Where studied in greater detail, elsewhere in the foothills area, the Eden Fault appears to consist of a number of separate splinters or branches in a zone up to [illegible] mile wide.

Upslope of the suspected fault trace, the crests and upper sides of the ridges are generally underlain by partly weathered slates, phyllites, and fine grain quartzites at depths between one and three feet below ground surface. The rocks belong to the Torrensian Series of The Adelaide System, and are of Proterozoic age. They strike roughly north-south, dip 15 - 20° to the west, and are often kunkarised near the top. The bedding is generally partly obscured by a well developed near-horizontal cleavage.

The areas of shallow bedrock are shown light purple on Fig. 1, with actual outcrops shown a darker shade of the same colour. Shallow topsoil overlying the rock consists generally of a thin veneer of sandy loam overlying red-brown clay. It contains an abundance of slate fragments many of which have been exposed at the surface by the removal of olive trees. Erosion has largely prevented the formation of a true soil profile anywhere on the area investigated.

Below the suspected fault trace the ridges broaden and are underlain by talus material to depths of at least six feet (as shown in the test pits). The talus is essentially a very coarse gravel with a matrix of low density liey clay or silt. The gravels are generally angular fragments of phyllite, slate, schist, quartzite, and quartz, often lime coated, and range from a fraction of an inch up to two feet across. A recent poorly developed red-brown earth profile is developed over most of the talus slopes (depicted brown on Fig.1)

Red-brown clays (shown red) are exposed in the gully floors and in places extend for some distance up the steeper sides of the ridges, e.g. on the northern sides of gullies 4 and 5 especially towards the heads of those gullies. Test pit No. 10 in the centre of gully 1 reveals red-brown clay to a depth of at least 6 feet below the gully floor. The clay is similar to the reactive "B" horizon of the well known RB 3 soil. Type RB 3 is the dominant member of the Urrbrae Association (as mapped within the Adelaide Area Ref. 1.). The clay exhibits a well defined prismatic structure with slickensided faces on individual units, and also exhibits severe shrinkage cracking on the ground surface.

The calcareous "C" horizon is generally fairly deep, suggesting deep leaching with favourable drainage conditions, except during periods of prolonged precipitation.

A small terrace near the base of Gully 5 on the north side probably represents a local deepening of the clay material, left by diversion of the gully drainage.

The lower portion of ridge No. 5 has been excavated to a more gentle gradient and the material removed has been pushed into the adjacent gully floors, along with some external filling. The filling in these gullies appears to be underlain by red-brown clay.

CONCLUSIONS

a. The area in which weathered bedrock is assumed present at shallow depth (less than two feet) should be stable, except perhaps on the steeper slopes at the heads and sides of some gullies, where soil creep (i.e. movement of the soil mantle downhill over the underlying rock surface) would be a possibility if the soil were to become saturated. Some of the highly to completely weathered slate near the surface could also move under such conditions. The importance of this problem will naturally depend on the extent and depth of the red-brown clay on the various slopes. Faces of cuttings made into the firm rock should generally be stable at fairly steep angles, say ½ : 1 (63° [illegible]), although the soil mantle would require a much flatter angle for permanent stability.

b. The rock material forming the upper parts of the ridges appears to consist mainly of slate with relatively small amounts of quartzite. Slatey material of this type can usually be excavated by bulldozer and ripper, but quartzite commonly requires blasting.

c. The talus material on the lower slopes generally has a matrix of low density limy clay. Although possessing good bearing capacity in the dry state, this type of material tends to become soft and collapse with increase in moisture content. The talus is present immediately downslope of the main suspected fault branch, hence would readily absorb water running down the clay-rock interface of the slopes above. Although there are no signs of past or present soil movements on the talus slopes, it is felt that saturation and excavation of benches could result in instability in the steeper sections. Experience in similar talus materials has shown that with good drainage, cutting angles of 1: 1 (45°) or flatter are required for long term stability. The limy matrix material is readily erodable unless protected by vegetation or other means.

d. Experience in other sloping sites developed for housing has shown that considerable amounts of water are artificially applied to the soil, in addition to the normal seasonal precipitation. Problems have arisen in similar areas where water running down the clay rock interfaces from higher slopes has caused considerable inconvenience to properties situated below.

e. The gullies are filled with red-brown clay to a depth which is generally unknown. Experiments carried out by the C.S.I.R.O. Division of Soils, on similar clays (Ref. 2) have shown them to undergo seasonal shrinkage and swelling movements of appreciable magnitude, due to the reaction of the clay minerals present when water evaporates or is absorbed. The vertical component of the movement translated at the soil surface is as much as one and a half inches for a typical RB 3 soil profile under extreme conditions of wetting and drying. The clay present in the gullies may be locally modified by sandy or stoney material and may not be subject to this full range of seasonal moisture variation. The amount of movement which could be expected is not known, but may be considerable. Gullies 4 and 5 have relatively steep (up to 22°) grades. Experience in other areas where slopes have been similarly cleared adjacent to such steep gullies, has shown that excessive scour or the development of mud-flows can occur in the gullies during periods of intense rainfall.

f. The Eden Fault, part of which passes through the site, was active in 1954. The possibility of future movements along this fault should be considered.

g. The geological plan (Fig. 1) is necessarily very generalised, and is submitted for use as a guide to the development of the area. It is not intended that it be used for the design of footings for individual allotments. The ground profiles will clearly be changed during development, and it will be very desirable for a separate assessment to be made of foundation conditions at each allotment before building.

RDS:AWK
23.4.65

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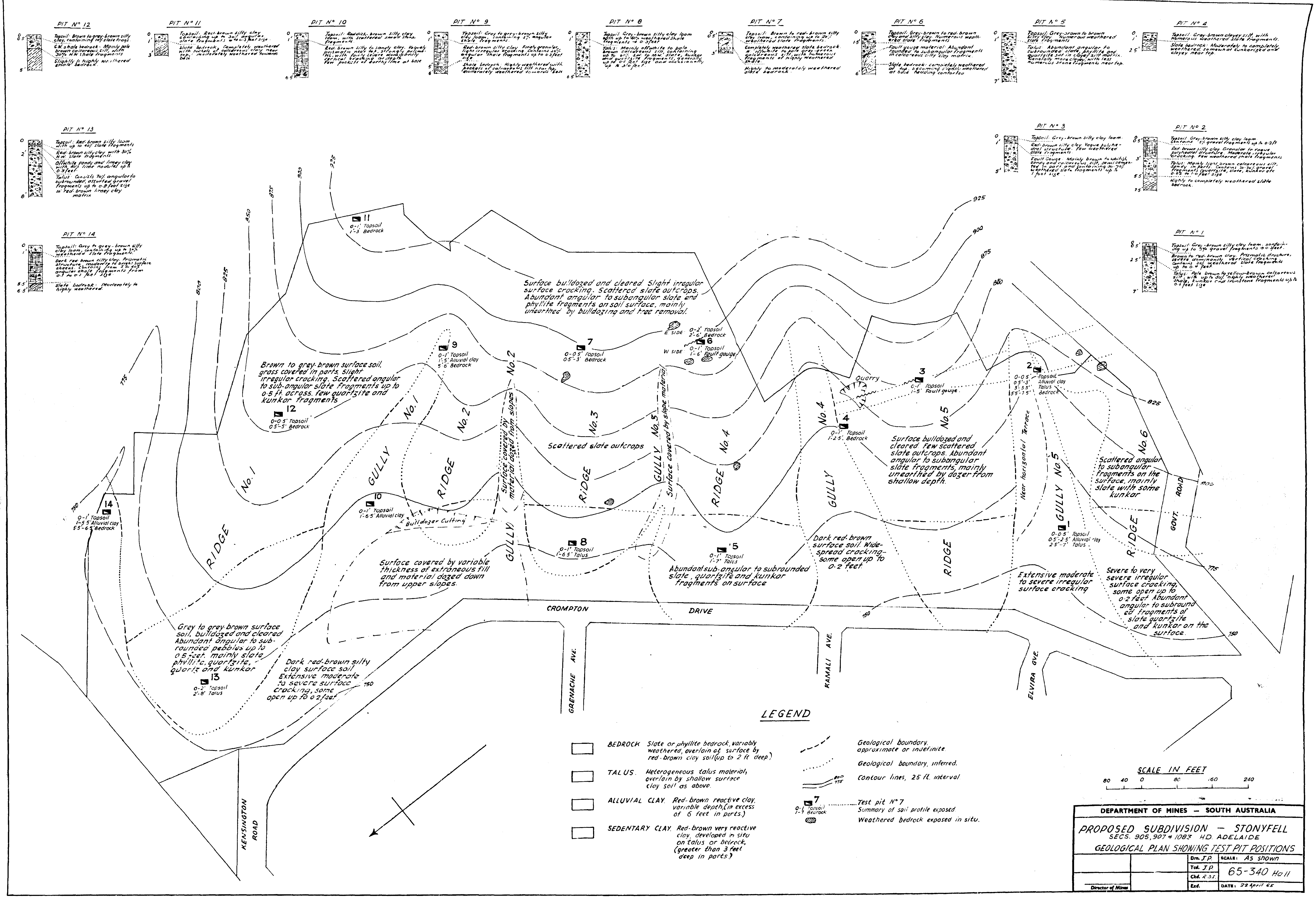
REFERENCES

1. The Soils and Geology of Adelaide and Suburbs. Bulletin 32. Geological Survey of South Australia.



PIT Nº 12
Topsoil: Brown to grey-brown silty clay, containing 10% slate frags.
C.W. shale bedrock: Mainly pale brown calcareous silt, with 30% H.W. shale fragments
Slightly to highly weathered shale bedrock.
PIT Nº 11
Topsoil: Red-brown silty clay containing up to 30% angular slate fragments up to 0.3 feet size.
Slate bedrock. Completely weathered with pockets of calcareous clay near top; moderately weathered towards base.
PIT Nº 10
Topsoil: Reddish-brown silty clay loam, with scattered small stone fragments.
Red-brown silty to sandy clay. Vaguely prismatic near top, strongly prismatic, with fairly severe dominantly vertical cracking at depth. Few pockets of earthy lime at base
PIT Nº 9
Topsoil: Gray to grey-brown silty clay loam, containing 5% angular shale fragments.
Red-brown silty clay. Finely granular, light irregular cracking. Contains 30% angular shale fragments up to 0.3 feet size.
Shale bedrock. Highly weathered with pockets of calcareous silt near top, moderately weathered towards base
PIT Nº 8
Topsoil: Grey-brown silty clay loam with up to 40% weathered shale fragments → 0.3 feet
Talus: Mainly offwhite to pale brown calcareous silt, containing up to 60% S.W. to M.W. slate, kunkar and quartzite fragments, generally up to 0.5 feet size and occasionally up to 3.0 feet.
PIT Nº 7
Topsoil: Brown to red-brown silty clay loam, containing up to 20% weathered slate fragments.
Completely weathered slate bedrock. offwhite to pale grey-green calcareous silt, with numerous fragments of highly weathered shale.
Highly to moderately weathered slate bedrock.
PIT Nº 6
Topsoil: Grey-brown to red-brown clay and silty clay. Numerous weathered slate fragments
Fault gouge material: Abundant rounded to subangular fragments in calcareous silty clay matrix.
Slate bedrock: completely weathered at top, becoming slightly weathered at base. Bedding contorted
PIT Nº 5
Topsoil: Grey-brown to brown silty clay. Numerous weathered slate fragments
Talus: Abundant angular to subrounded slate, phyllite and quartzite set in clayey silt matrix. Generally more clayey, with less numerous stone fragments near top.
PIT Nº 4
Topsoil: Gray-brown clayey silt, with numerous weathered slate fragments.
Slate bedrock: Moderately to completely weathered, somewhat kunkarized and clayey near top.
PIT Nº 13
Topsoil: Red-brown silty loam with up to 40% slate fragments
Red-brown silty clay with 30% H.W. slate fragments.
Offwhite sandy and limey clay with 40% lime nodules up to 0.3 feet.
Talus: Consists 70% angular to subrounded, assorted gravel fragments up to 0.8 feet size in red-brown limey clay matrix
PIT Nº 3
Topsoil: Grey-brown silty clay loam.
Red-brown silty clay. Vague polyhedral structure. Few weathered slate fragments
Fault Gouge: Mainly brown to whitish sandy and calcareous silt, semi cemented in part and containing 30-70% weathered slate fragments up to 1 foot size
PIT Nº 2
Topsoil: Grey-brown silty clay loam. Contains 5% gravel fragments up to 0.2 ft
Red-brown silty clay. Granular to vague polyhedral structure. Moderate irregular cracking. Few weathered shale fragments
Talus: Mainly light brown calcareous silt, sandy in parts. Contains 30-70% gravel fragments (quartzite, slate, kunkar etc 0.02 to 1.0 feet size
Highly to completely weathered slate bedrock.
PIT Nº 14
Topsoil: Grey to grey-brown silty clay loam, containing up to 20% weathered slate fragments.
Dark red-brown silty clay. Prismatic structure, moderate to bright surface sheens. Contains from 5 to 40% angular shale fragments from 0.1 to 0.5 feet size.
Slate bedrock: Moderately to highly weathered.
PIT Nº 1
Topsoil: Grey-brown silty clay loam, containing up to 5% gravel fragments → 0.3 feet.
Brown to red-brown clay. Prismatic structure, severe dominantly vertical cracking. Contains 30% weathered slate fragments up to 0.4 feet.
Talus: Pale brown to yellow-brown calcareous silt, with up to 50% highly weathered shale, kunkar and ironstone fragments up to 0.5 feet size
925
900
875
850
825
800
775
750
11 0-1' Topsoil 1-3' Bedrock
Surface bulldozed and cleared. Slight irregular surface cracking. Scattered slate outcrops. Abundant angular to subangular slate and phyllite fragments on soil surface, mainly unearthed by bulldozing and tree removal.
7 0-0.5' Topsoil 0.5'-3' Bedrock
E SIDE 0-2' Topsoil 2'-6' Bedrock
6
W SIDE 0-1' Topsoil 1'-6' Fault gouge
Brown to grey-brown surface soil, grass covered in parts. Slight irregular cracking. Scattered angular to sub-angular slate fragments up to 0.5 ft. across, few quartzite and kunkar fragments
12 0-0.5' Topsoil 0.5'-5' Bedrock
9 0-1' Topsoil 1'-5' Alluvial clay 5'-6' Bedrock
Quarry
3 0-1' Topsoil 1'-5' Fault gouge
2 0-0.5' Topsoil 0.5'-3' Alluvial clay 3'-5.5' Talus 5.5'-7.5' Bedrock
4 0-1' Topsoil 1'-2.5' Bedrock
RIDGE No. 1
GULLY No. 1
RIDGE No. 2
GULLY No. 2
RIDGE No. 3
GULLY No. 3
RIDGE No. 4
GULLY No. 4
RIDGE No. 5
GULLY No. 5
RIDGE No. 6
Surface covered by material dozed from slopes
Surface covered by slope material
Scattered slate outcrops
Surface bulldozed and cleared. Few scattered slate outcrops. Abundant angular to subangular slate fragments, mainly unearthed by dozer from shallow depth.
Near horizontal Terrace
Scattered angular to subangular fragments on the surface, mainly slate with some kunkar
GOVT. ROAD
14 0-1' Topsoil 1'-5.5' Alluvial clay 5.5'-6.5' Bedrock
10 0-1' Topsoil 1'-6.5' Alluvial clay
Bulldozer Cutting
8 0-1' Topsoil 1'-6.5' Talus
5 0-1' Topsoil 1'-7' Talus
1 0-0.5' Topsoil 0.5'-2.5' Alluvial clay 2.5'-7' Talus
Surface covered by variable thickness of extraneous fill and material dozed down from upper slopes.
Abundant sub-angular to subrounded slate, quartzite and kunkar fragments on surface
Dark red-brown surface soil. Widespread cracking, some open up to 0.2 feet
Extensive moderate to severe irregular surface cracking
Severe to very severe irregular surface cracking, some open up to 0.2 feet. Abundant angular to subrounded fragments of slate quartzite and kunkar on the surface.
CROMPTON DRIVE
GRENACHE AVE.
KAMALI AVE.
ELVIRA GVE.
Grey to grey-brown surface soil, bulldozed and cleared. Abundant angular to subrounded pebbles up to 0.5 feet, mainly slate, phyllite, quartzite, quartz and kunkar
13 0-2' Topsoil 2'-8' Talus
Dark red-brown silty clay surface soil. Extensive moderate to severe surface cracking, some open up to 0.2 feet
KENSINGTON ROAD
LEGEND
BEDROCK Slate or phyllite bedrock, variably weathered, overlain at surface by red-brown clay soil (up to 2 ft deep)
TALUS. Heterogeneous talus material, overlain by shallow surface clay soil as above.
ALLUVIAL CLAY. Red-brown reactive clay, variable depth, (in excess of 6 feet in parts.)
SEDENTARY CLAY. Red-brown very reactive clay, developed in situ on talus or bedrock, (greater than 3 feet deep in parts)
Geological boundary, approximate or indefinite.
Geological boundary, inferred.
800 775 Contour lines, 25 ft. interval
7 0-1' Topsoil 1-7' Bedrock Test pit Nº 7 Summary of soil profile exposed.
Weathered bedrock exposed in situ.
SCALE IN FEET
80 40 0 80 160 240
DEPARTMENT OF MINES — SOUTH AUSTRALIA
PROPOSED SUBDIVISION — STONYFELL
SECS. 905, 907 & 1083 HD. ADELAIDE
GEOLOGICAL PLAN SHOWING TEST PIT POSITIONS
Drn. J.P.
Trd. J.P.
Chd. R.D.S.
Exd.
Director of Mines
SCALE: As shown
65-340 Hall
DATE: 22 April 65