

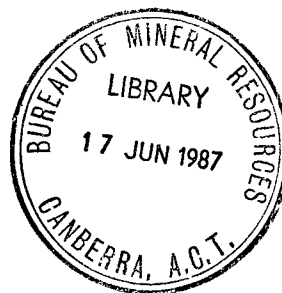
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DUNTROON SAND INVESTIGATION

RESULTS OF PERCUSSION DRILLING

by

J.K. Hill.

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DUNTROON SAND INVESTIGATIONRESULTS OF PERCUSSION DRILLING

At the request of the Commonwealth Department of Works fourteen holes were drilled on a 300-foot grid to determine whether any deposits of builders' sand or fine aggregate underlie a small river flat (encompassed on three sides by the Molonglo River) in the vicinity of the Royal Military College, Duntroon. The drilling rig used is technically termed a "chop pump": a heavily weighted sludge or sand pump fitted with a cutting shoe and flap valve at the bottom is driven into the ground by repeatedly dropping it from a truck-mounted tripod. The cutting shoe is about 12 inches in diameter and the casing about 16 inches in diameter. The 4-foot lengths of casing were driven by means of a jarring device fitted to the chop pump and later removed by means of twin hydraulic jacks. The maximum capacity of the drilling rig in unconsolidated alluvium is determined by the ability of the hydraulic jacks to withdraw the casing, and with those used would be about 40 to 50 feet.

Samples of the ground penetrated were taken at 1-foot intervals and were laid out and labelled by the driller. As requested by the Department of Works, the material was logged in detail (see attached descriptions) but not sampled for further analysis.

The results of the drilling show that a narrow strip of ground bordering the river is underlain by either clean or washable gravel sand* which could probably be used for building purposes. The inferred outline of the area is shown on the accompanying map. The gravel sand is either clean or is contaminated with a moderate amount of silty material, generally insufficient to bind the coarse particles together. The sand fraction consists of medium to very coarse, angular to sub rounded, predominantly quartz sand; the gravel fraction ranges from sub-rounded to well-rounded, small pebbles to large cobbles, of quartz, silicified quartz sandstone and siltstone, quartzite, and other assorted metamorphic rocks. The gravel content varies from less than 10% up to 75% by volume.

Bedrock was encountered at R.L.1818 feet in Hole No. 1, and R.L.1827 feet in Hole No. 2, but it apparently increases in depth to the south-west and as a result other holes as deep as R.L.1801 feet did not reach it. Overlying bedrock is the bed of gravel sand, at least 15 feet thick in Holes Nos. 11 to 14, but probably decreasing in thickness towards Hole No. 6. The top of the bed lies between R.L.1815 to 1820 feet, and the overburden varies in depth from 7 to 12 feet.

A reliable estimate of the volume of gravel sand cannot be made because it is not known at what rate the bed decreases in thickness to the north-west. Holes Nos. 2, 5, 9, 8, and 7 did not penetrate gravel sand. Possibly the boundary of the gravel sand is abrupt, (perhaps a buried river bank or low cliff). The total thickness of the bed is also not known. However, it is safe to say that the volume of the deposit (above the deepest drill hole) is less than 200,000 cubic yards, (assuming the maximum area to be 50,000 square yards and the average proven thickness to be 12 feet).

Immediately overlying the gravel sand is a bed of sand with silty fines, which may be suitable after washing for builders' sand. The deposit varies from clean angular coarse quartz sand (rarely) to fine or medium sand with excess** silty or clayey fines (commonly), and rare bands of pure silt. It underlies the same narrow strip of ground bordering the river as the gravel sand, but extends farther north to at least N4000. The inferred boundary is shown on the map. The deposit varies in thickness from 3 to 12 feet, except at Hole No. 9 where 16 feet was penetrated, the main trend being a decrease in thickness to the north. Numerous small pits and excavations show that the sand

* The Snowy Mountains Authority soil classification system and nomenclature is used throughout this report.

** "Excess silty or clayey fines" are fine particles (of silt or clay size) present in sufficient amounts to bind the coarse grains together, rendering them coherent as opposed to free-running.

has previously been exploited. Through most of the area the sand is encountered immediately beneath a thin layer of silty soil.

Using an average thickness of 9 feet, and an area of 67,000 square yards, it is estimated that the maximum possible volume of sand is also about 200,000 cubic yards.

Measurements of the water level in several holes were made immediately after drilling and showed the water surface to be between R.L.1813 and R.L.1817 feet over most of the area. The true equilibrium water table would be somewhat higher than this.

Before a decision is made to exploit the sand and gravel deposits in this area, representative samples should be taken and laboratory tested for silt and clay content with a view to determining whether or not the material will require washing before use.

10-7-62.

(J. K. HILL)
Geologist Grade I

DUNTEROON SAND INVESTIGATION

LOGS OF DRILL HOLES

<u>Hole No. 1</u>	15.6.62
0'-1'6"	Dark yellowish brown silt.
1'6"-4'6"	Mottled grey to pale yellowish orange clay of high plasticity.
4'6"-5'6"	Light brown fine to medium sand with excess clayey fines.
5'6"-15'0"	Moderate brown silt of medium to low plasticity, with a few fragments of mottled grey and orange clay.
15'0"	Angular fragments of weathered metamorphosed siltstone (bedrock). End of hole.
<u>Hole No. 2</u>	15.6.62
0'-1'6"	Moderate brown coarse silt of low plasticity.
1'6"-4'0"	Light brown medium to coarse sand with excess clayey fines.
4'0"-5'0"	Tough mottled grey to pale yellowish orange clay of high plasticity.
5'0"-7'6"	Angular fragments of moderately hard slightly weathered greyish yellow metamorphosed siltstone (bedrock).
7'6"	End of hole.
<u>Hole No. 3</u>	25.6.62
0'-1'	Dark yellowish brown silt.
1'-6'	Dark yellowish brown silt with brick, coke, and other rubble.
6'-20'	Dusky yellowish brown to dark grey silt of medium plasticity; some clay of medium plasticity.
20'	End of hole. Water level in hole is more than 12' below surface.
<u>Hole No. 4</u>	Not drilled.
<u>Hole No. 5</u>	18.6.62.
0'-2'	Dark yellowish brown silt of medium plasticity.
2'-12'	Dusky brown organic silt of low to medium plasticity.
12'-15'	Mottled dark grey to moderate brown silt of low to medium plasticity.
15'-20'	Mottled dark grey to moderate brown fine to coarse grained sand with excess silty fines and a few medium pebbles (up to 12 mm.).
20'	End of hole.
<u>Hole No. 6</u>	19.6.62
0'-8'	Dark yellowish brown silt.
8'-9'	Pale yellowish brown fine to coarse sand with excess silty fines.
9'-20'	Moderate yellowish brown fine to very coarse gravel sand with excess silty or clayey fines. Gravel ranges from granules to very large pebble size (up to 50 mm.). Both sand and gravel are poorly sorted.
20'	End of hole.
<u>Hole No. 7</u>	22.6.62
0'-6'	Moderate to dark yellowish brown very fine to medium sand with excess silty fines.
6'-12'	Moderate yellowish brown to light grey silt of medium plasticity, with a few sandy layers.
12'-15'	Mottled moderate yellowish brown to dark grey, medium to coarse sand with silty fines and a few medium pebbles up to 12 mm. Organic material, possibly fragments of coal, occurs at 15 ft.

15'-20'	Moderate yellowish brown medium grained sand with excess silty fines.
<u>Hole No. 8</u>	25.6.62
0'-7'	Moderate yellowish brown fine sand with excess silty fines.
7'-8'	Moderate yellowish brown medium sand with silty fines.
8'-16'	Dark yellowish brown silt of medium plasticity.
16'-17'	Dark grey clay of low to medium plasticity.
17'-20'	Dark yellowish brown silt of medium plasticity.
<u>Hole No. 9</u>	21.6.62
0'-4'	Dark yellowish brown coarse silt of low plasticity.
4'-20'	Dark to moderate yellowish brown fine to medium sand with various amounts of silty fines. The sand is almost clean between 8 and 11 ft., but dark grey to black organic silt with decayed vegetable matter occurs between 18 and 19 ft. Most of the sand washes clean with ease.
20'	End of hole.
<u>Hole No. 10</u>	29.6.62
0'-7'	Dusky yellowish brown silt.
7'-9'	Very dirty gravel with excess silt and clay fines, the gravel ranging from large pebbles to large cobbles of quartz, quartzite, and silicified siltstone.
9'	End of hole (chop pump unable to penetrate or retrieve material).
<u>Hole No. 11</u>	27.6.62
0'-5'	Dark yellowish brown fine to coarse sand with excess silty fines.
5'-12'	Moderate to dark yellowish brown gravel sand with silty fines. Sand fraction is fine to very coarse grained and constitutes the bulk of the material; gravel fraction is minor, with a few small pebbles up to 5mm. Washes clean with moderate ease.
12'-15'	Moderate yellowish brown coarse gravel sand with silty fines. Gravel is sub-angular to well rounded and ranges up to small cobbles (75mm.). Same rock types as in other holes. Washes clean with moderate ease.
15'-20'	Clean gravel sand, poorly sorted, ranging from medium sand to large cobbles (150 mm.). Gravel content estimated at about 50% at 20 ft. depth, and is mainly subrounded to well rounded; much of the sand however is angular or subangular. The sand is predominantly quartz.
20'	End of hole. Chop pump unable to penetrate or retrieve. Water level 7 ft. below ground surface.
<u>Hole No. 12</u>	22.6.62
0'-4'	Moderate yellowish brown very fine sand with excess silty fines.
4'-7'	Moderate yellowish brown fine to coarse sand with excess silty fines. Washes clean with difficulty.
7'-10'	Moderate yellowish brown gravel sand with silty fines. Gravel ranges up to very large pebbles (35mm.) and from angular to subrounded; mainly quartz. Washes clean with ease.
10'-15'	Moderate yellowish brown gravel sand with silty fines. Gravel ranges up to small cobble size (75mm.) and is sub-angular to sub-rounded, composed of quartz, quartzite, silicified quartz sandstone and siltstone and shale. Washes clean with ease. Gravel is estimated to occupy up to 50% by volume of the material.
15'-16'	Dark yellowish brown coarse to very coarse clean sand well sorted.
16'-20'	Moderate yellowish brown gravel sand with silty fines, as described for 10 to 15 ft. interval. Gravel constitutes up to about 75% by volume.

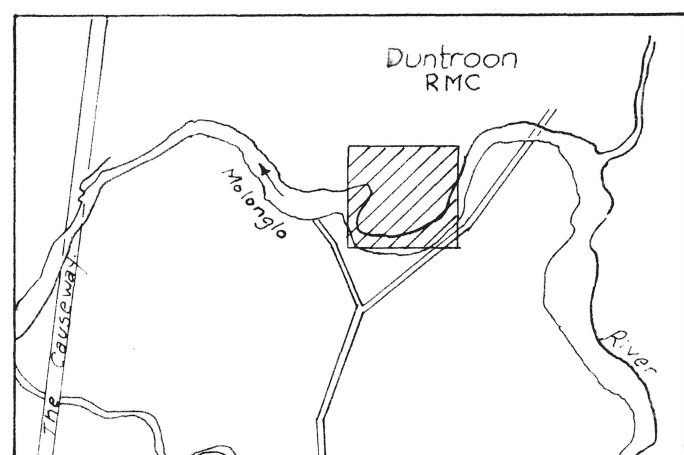
20'-23'	Moderate yellowish brown gravel sand with excess silty or clayey fines. Washes clean with moderate ease. Gravel ranges up to large cobbles (150mm.).
23'	End of hole. Chop pump unable to penetrate or retrieve. Water level 11 ft. below ground surface.
<u>Hole No. 13</u>	27.6.62
0'-1'	Dark yellowish brown very fine to medium sand.
1'-2'	Dusky yellowish brown medium to coarse sand with silty fines.
2'-7'	Dark yellowish brown medium to coarse sand, well sorted, with only a little silt. Washes clean with moderate ease.
7'-11'	Dusky brown fine to medium sand with excess silty fines.
11'-12'	Mottled (moderate reddish brown, pale yellowish orange, dusky brown) gravel sand with excess silty fines, consisting mainly of subangular to rounded granules up to 4mm. Parts of the material are weakly cemented by iron oxides.
12'-19'	Greyish brown gravel sand with silty fines, consisting mainly of well sorted granules up to 4mm; angular to subrounded, mainly quartz. Washes clean with ease. Thin silt band at 18 ft.
19'-24'	Clean gravel sand, poorly sorted, ranging from medium sand to very large pebbles. The sand to granule fraction is angular to subrounded, while the pebble fraction is rounded to well rounded. Gravel increases in size to small cobbles at 24'.
24'	End of hole. Chop pump unable to penetrate or retrieve. No water level measured as hole caved in 10 ft. below surface.
<u>Hole No. 14</u>	21.6.62
0'-3'	Greyish brown fine sand with excess silty fines.
3'-6'	Greyish brown fine to coarse sand with excess silty fines.
6'-7'	Greyish brown medium to coarse sand with a little silt only.
7'-8'	Greyish brown medium to coarse sand with excess silty fines and lumps of silt.
8'-9'	Light brownish grey silt of medium plasticity.
9'-18'	Moderate yellowish brown gravel sand with silty fines. Gravel occurs in sizes up to small cobbles (75mm.)
18'-19'	Light olive grey gravel sand, poorly sorted but clean, with very large pebbles up to 50 mm.
19'-22'	Moderate yellowish brown gravel sand with silty fines, as described for 9 to 18 ft. interval.
22'-25'	Clean gravel sand, mainly white quartz with some shale and siltstone, as described for 18 to 19 ft. interval.
25'	End of hole.
<u>Hole No. 15</u>	28.6.62
0'-1'	Brownish black very fine sand with excess silty fines.
1'-5'	Brownish black very fine to medium sand with excess silty fines.
5'-7'	Dark yellowish brown silt.
7'-8'	Greyish brown very fine to medium sand with excess silt and reddish ferruginous mottling.
8'-11'	Moderate yellowish brown fine to very coarse sand with silty fines.
11'-12'	Moderate yellowish brown fine to very coarse sand with excess silty fines and silt bands.
12'-22'	Clean gravel sand, sand fraction very coarse grained, gravel ranges from small pebbles to small cobbles.
22'	End of hole. Chop pump unable to penetrate or retrieve.



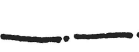


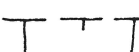
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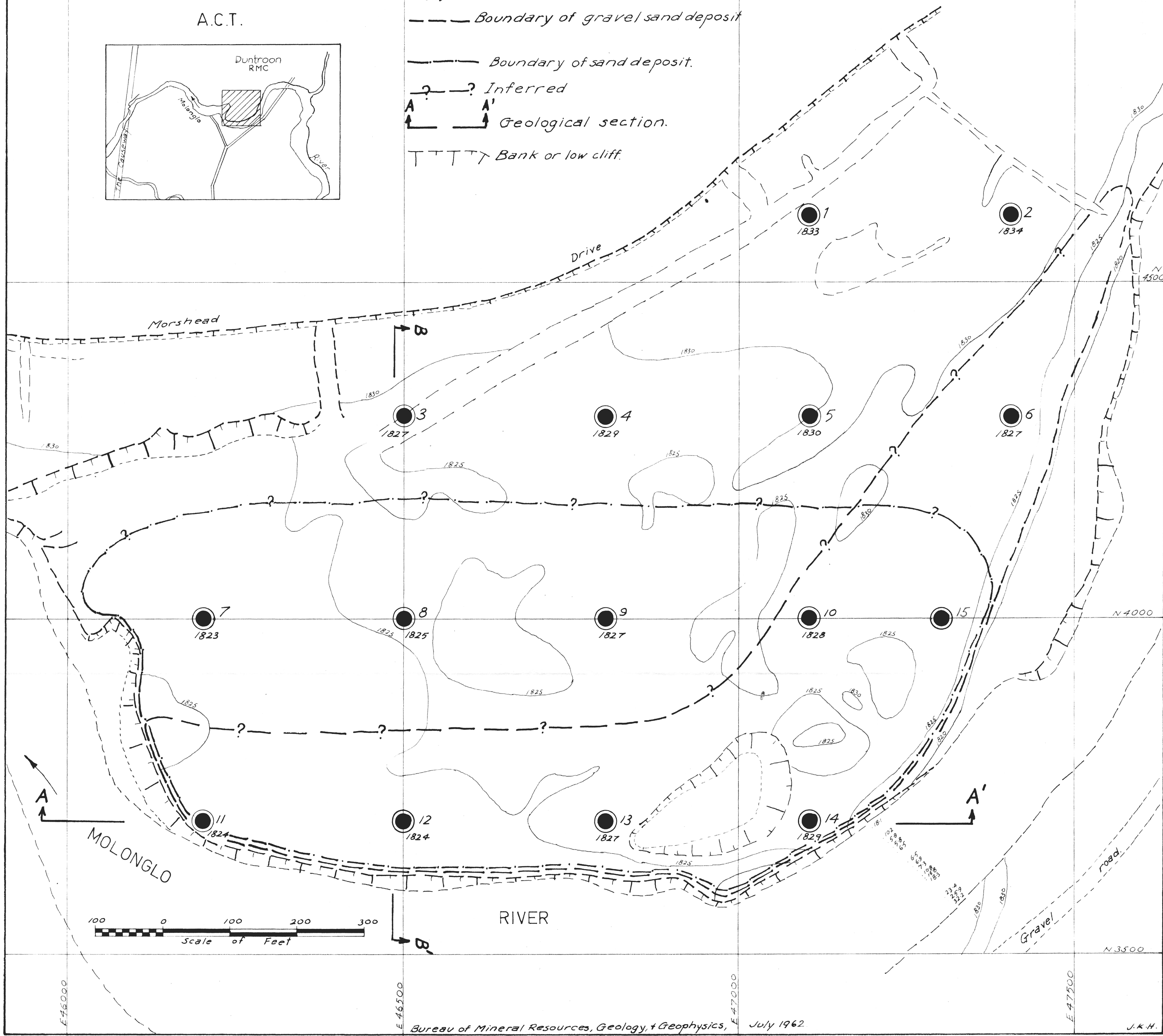
<u>Term</u>	<u>Diameter</u>
Boulder	more than 256 mm.
Large cobble	128 - 256 mm.
Small cobble	64 - 128 mm.
Very large pebble	32 - 64 mm.
Large pebble	16 - 32 mm.
Medium pebble	8 - 16 mm.
Small pebble	4 - 8 mm.
Granule	2 - 4 mm.
Very coarse sand	1 - 2 mm.
Coarse sand	$\frac{1}{2}$ - 1 mm.
Medium sand	$\frac{1}{4}$ - $\frac{1}{2}$ mm.
Fine sand	$\frac{1}{8}$ - $\frac{1}{4}$ mm.
Very fine sand	$\frac{1}{16}$ - $\frac{1}{8}$ mm.
Silt or clay	less than $\frac{1}{16}$ mm.

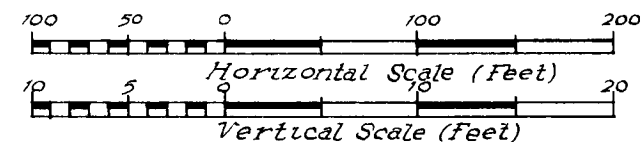
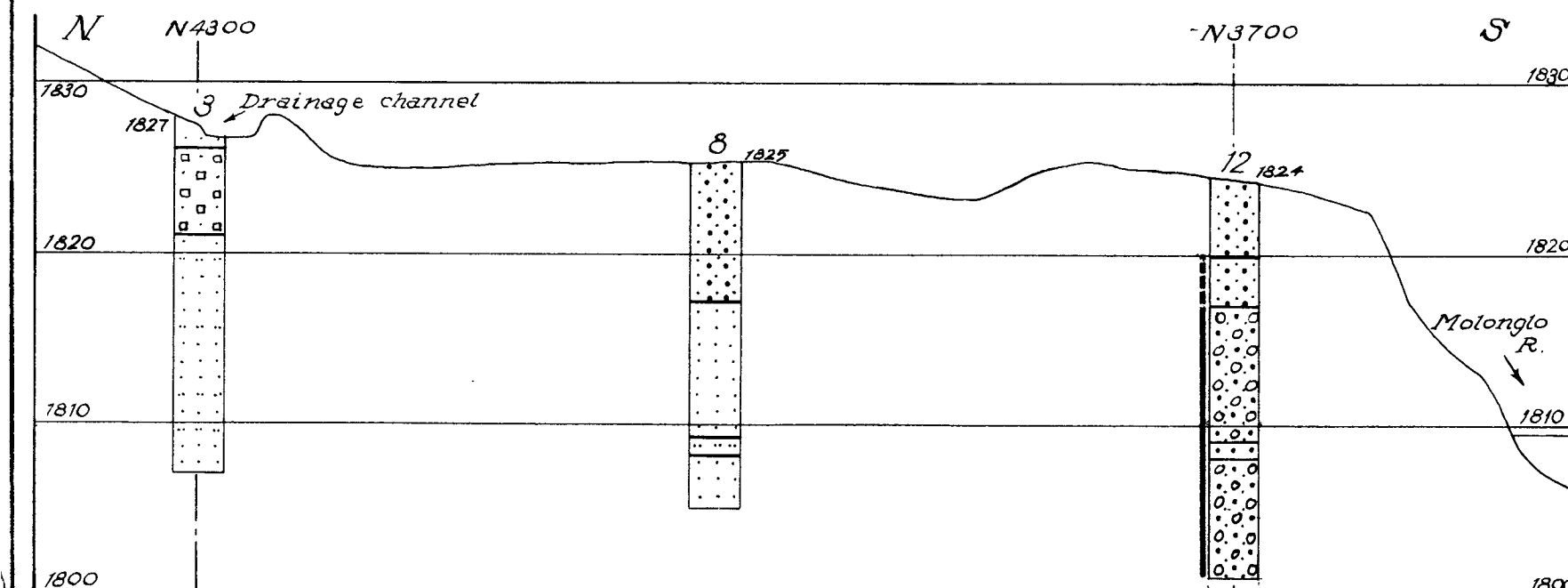
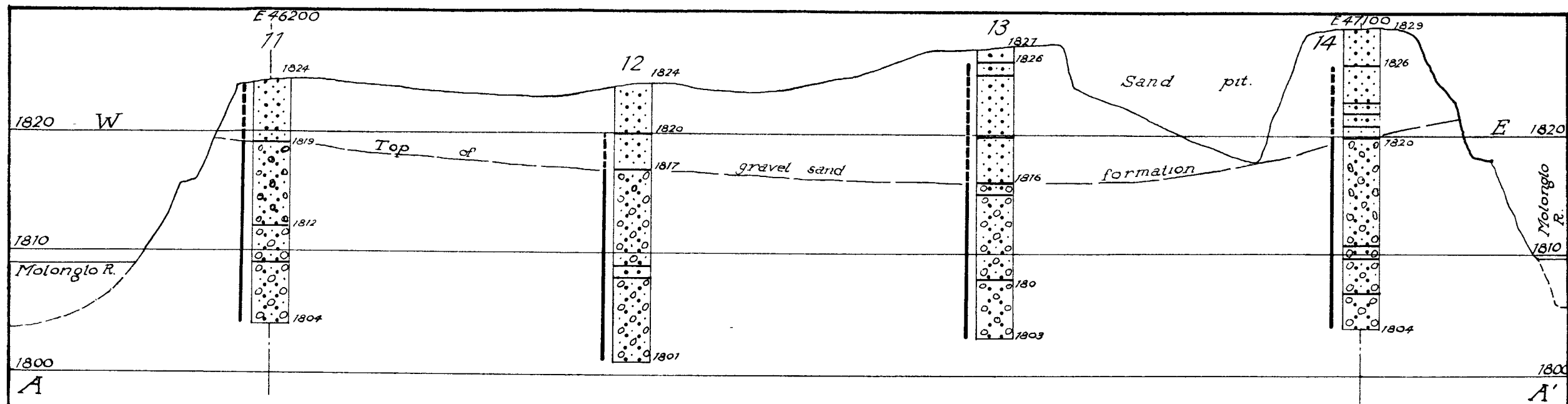
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DUNTROON SAND INVESTIGATION A.C.T.



-  7 Percussion drill hole with R.L.
-  Boundary of gravel/sand deposit
-  Boundary of sand deposit.
-  Inferred
-  Geological section.
-  Bank or low cliff.





DUNTROON SAND INVESTIGATION

- Silt with clay bands
- Silt with brick and coke rubble
- Clean sand
- Sand with silty or clayey fines
- Clean gravel sand
- Gravel sand with silty or clayey fines
- Possible washable sand formation.
- Clean or washable gravel sand.