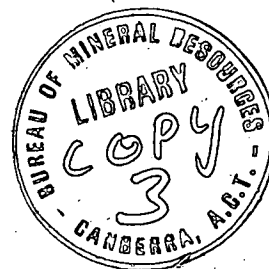


DEPARTMENT OF  
MINERALS AND ENERGY



BUREAU OF MINERAL RESOURCES,  
GEOLOGY AND GEOPHYSICS

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GEOLOGICAL FACTORS IN LAND USE,

LOWER MOLONGLO VALLEY, ACT

by

G.A.M. HENDERSON

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SUMMARY

The terrain evaluation map of the Canberra region (Grant, in prep.) has been used to define areas suitable for possible urban development or other uses in the Lower Molonglo Valley. Four terrain provinces and eight terrain patterns have been recognized, and suggested land uses for each terrain pattern are indicated.

Locations of possible sources of sand are indicated but reserves are limited. Some possible quarry sites require further investigation. No extensive deposits of topsoil are known but further examination of some small deposits may indicate exploitable reserves. Three notable features of particular geological interest are worth preserving, and are briefly described.

## INTRODUCTION

These notes on geological factors affecting possible land use of the Lower Molonglo valley were prepared at the request of the National Capital Development Commission in August 1973.

## TERRAIN EVALUATION

There are a number of constraints on use of land in the lower Molonglo valley area. Many of these are shown on the joint CSIRO - BMR terrain evaluation map of the Canberra region, together with its explanatory tables and notes (Grant, in prep.). The accompanying Figure 1 is derived from the terrain evaluation map.

In Figure 1 the area is divided into 8 categories based on the terrain evaluation provinces and patterns of the Canberra region. A province is defined as an area underlain by a particular rock type or association of rock types. A terrain pattern is 'an area containing recurring topography, and soil and vegetation associations'. Terrain patterns may be further divided into units and components. In the reference to Figure 1 the areas are referred to as categories, but the terrain province and terrain pattern numbers have also been listed, and the dominant characteristics of each are shown in the following table.

TERRAIN PATTERNS IN THE LOWER MOLONGLO VALLEY

CATEGORY	TOPOGRAPHY	VEGETATION	SOIL
1 (52012-01/2)*	Major river channel of Murrumbidgee River and adjacent hummocky river flats	Casuarina and Melaleuca	Stratified sand, gravel, cobbles, boulder beds of variable depth; some rock outcrops
2 (52012-13)	Broad smooth sloping surfaces commonly with incised erosion gullies	Grassland with scattered trees	Duplex, occasionally gradational brown, grey, yellow-brown, or yellow- red silt. In places sandy or clayey silt with some gravel and sometimes organic matter in the top 0.1 to 0.5 metre, overlying yellow-red or yellow-brown medium to heavy textured clay. In places stratified sand, silt, or clay to variable depth over de- composed rock
3 (33007-22)	Undulating with isolated rocky hills	Grassland with scattered trees	Duplex brown, red-brown, or yellow-brown sandy silt. Sometimes containing organic matter to 0.3 metres, overlying yellow-brown medium to heavy textured clay to 1.5 metres, over decomposed rock. Near rock outcrops the lower layer is not present
4 (33007-34)	Steep dissection, slopes leading to major drainage	Grassland and scattered trees	Duplex yellow-brown sandy clayey silt to 0.3 metre, over- lying yellow or red heavy textured clay to 1 metre, over decomposed rocks. Much rock outcrop

\*Numbers in brackets are the CSIRO terrain  
evaluation province and pattern numbers.

TERRAIN PATTERNS IN THE LOWER MOLONGLO VALLEY (CONT.)

CATEGORY	TOPOGRAPHY	VEGETATION	SOIL
5 (33007-44)	Strongly undulating	Grassland with scattered trees	Duplex brown fine sandy silt with some clay to 0.4 metre, over brown coarse sandy medium-textured clay becoming sandy with depth, over decomposed rock. Lower layer missing near rock outcrops. Much rock outcrop
6 (33005-02)	Gently undulating	Grassland with scattered trees	Duplex red-brown or grey silt to 0.3 metre, over yellow-red or red-brown medium-textured clay containing limestone gravel to 1.4 metres, overlying brown-yellow heavy textured clay containing some gravel to 2 metres, over decomposed shale
7 (33005-15)	Undulating	Grassland with scattered trees	Shallow yellow-grey gravelly silt to 0.2 metre, overlying yellow-brown gravelly silt to silty clay to 0.5 metre, over rock; some rock outcrop
8 (32006-26)	Strongly undulating	Woodland	Grey-brown silt to 0.2 metre over gravelly silty clay; brown-yellow or red-yellow, medium to heavy-textured clay to 0.5 metre, over decomposed rock. Much rock outcrop

From the above information it is possible to assess the suitability of each category for various land uses. The areas providing least constraints for urban development are categories 3 and 6; these areas also contain the best arable land and pasture. Areas of categories 4, 5 and 8 contain steep slopes, shallow soil,

and rocky outcrops where, in some places, difficulties with slope stability and excavation of hard rock at shallow depth might be expected. However, much of the area within categories 4 and 5 provides good grazing land. Areas of category 2 may be suitable for urban development but could contain minor drainage problems. All areas except category 1 are suitable for pine forest although full utilization of some areas, particularly in category 4, would be prevented by extensive rock outcrops; poor drainage in some areas of category 2 could also be a limiting factor.

### RESOURCES

#### Sand

Locations of natural resources are shown in Figure 2. Deposits of sand have been worked at several places along the Molonglo and Murrumbidgee Rivers (Gardner, 1958). Two types of sand are present: coarse river sand along the Murrumbidgee and Molonglo Rivers; and fine wind-blown sand on slopes above the Molonglo River.

The most extensive sand reserves are along the Murrumbidgee River and these are at present being worked (Category 1). Another large deposit on the Molonglo River, about 3 km upstream from its junction with the Murrumbidgee River has been worked until recently, but little sand now remains. Likewise the deposit of wind-blown sand at Coppins Crossing has now been largely worked out.

Most of the other sand deposits along the Molonglo River are either small or impure and would probably not be economical to exploit.

#### Rock for Aggregate

Fresh dacite in terrain province 33007 resembles the Mugga Mugga Porphyry at Mugga Quarry, and it is expected that this rock would be suitable for aggregate. Should a quarry be desired in the area the most suitable



localities, both for favourable topography and shallow overburden, would probably be along the lower 4 km of the Molonglo River, upstream from its junction with the Murrumbidgee River. However additional investigation would be required before a firm recommendation could be made.

#### Topsoil

No thick deposits of good quality alluvial topsoil are known in the area, but further examination might be warranted along the upper part of Coppins Creek northeast of Coppins Crossing. Deposits could also be present in other places.

#### Notable Geological Features

At least three geological features worth preserving are known in the Molonglo valley, some of which has been geologically mapped in detail. There may be other features in areas where only reconnaissance mapping has been done. The locations of the features are shown in Figure 2.

(L) This is an outcrop of a thin limestone bed in the surrounding dacite; interesting contacts of the dacite and limestone are exposed, and the limestone itself contains fossils.

(D) This is an outcrop of banded dacitic tuff exposed in a cliff face in the Molonglo valley.

(Y) A near-vertical dolerite dyke (about 3 m wide) occurs about 100 m east of the sand pit. Most of the dolerite has been weathered away to form a steep-sided narrow gorge.

REFERENCES

GARDNER, D.E., 1958 - Sources of sand in and near Canberra City district.

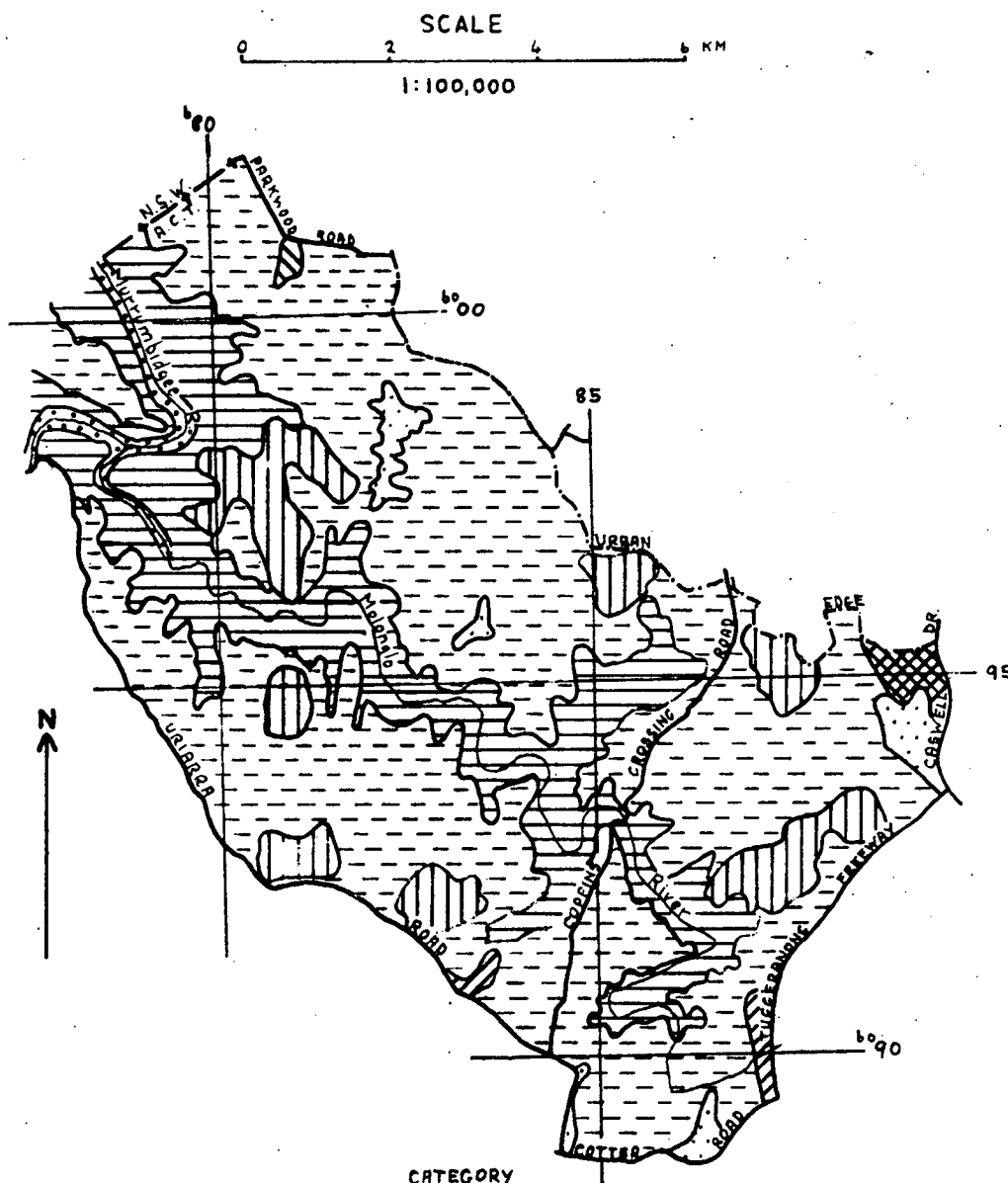
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FIG. 1

# LOWER MOLONGLO VALLEY

## TERRAIN EVALUATION MAP



PROVINCE  
NO.

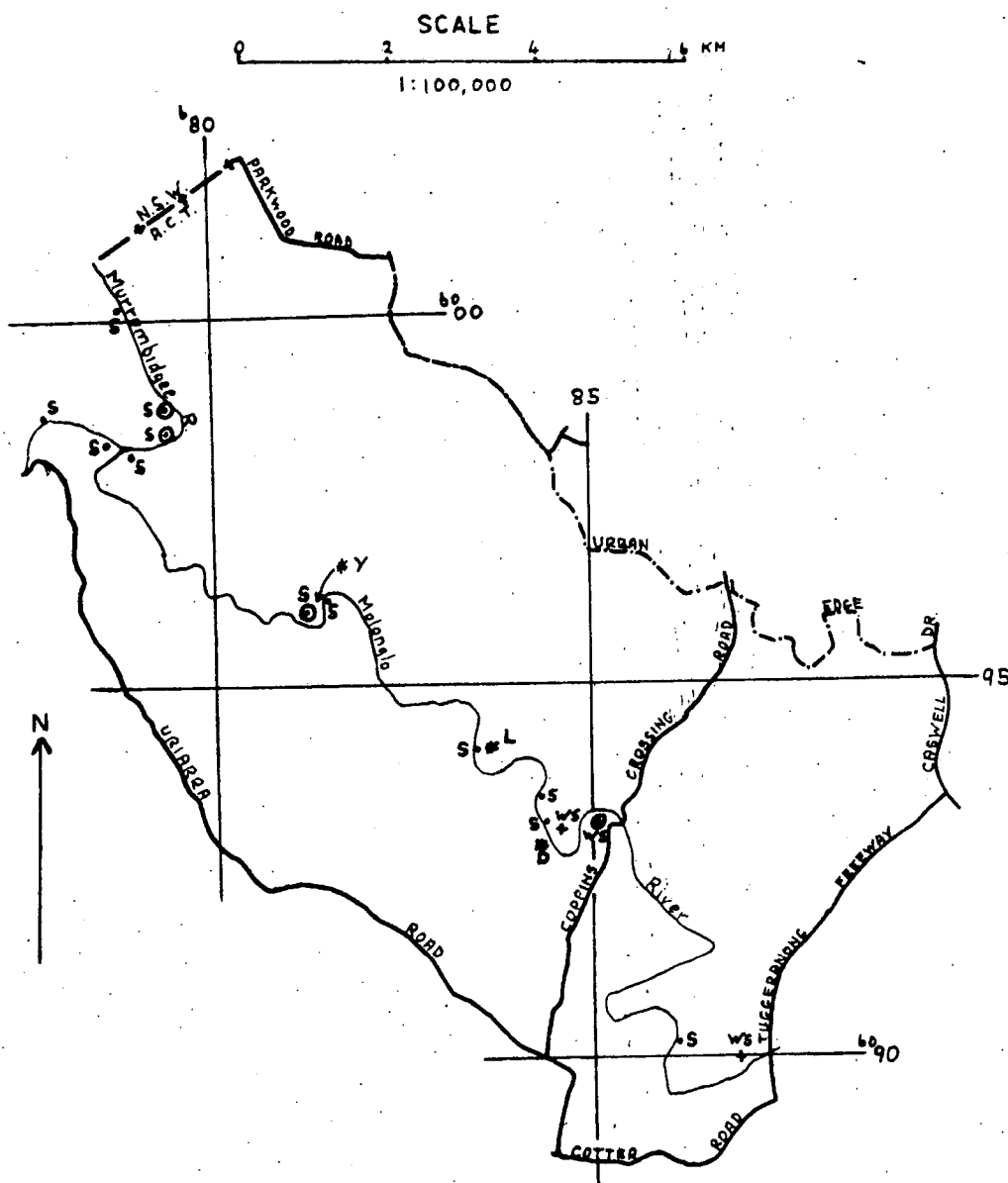
CATEGORY

PATTERN  
NO.

- 52012 Sand, gravel, silt and clay of alluvial or colluvial origin.
- 33007 Dacite, rhyolite and tuff
- 33005 Calcareous shale, limestone, sandstone and tuff
- 32006 Sandstone, shale, mudstone; minor chert, siliceous shale and quartzite

- |  |   |  |      |
|--|---|--|------|
|  | 1 | River bed outcrops and alluvial deposits of the Murrumbidgee River | 01/2 |
|  | 2 | Colluvial soils in shallow upland basins                           | 13   |
|  | 3 | Residual and colluvial soils on undulating valley shoulders        | 22   |
|  | 4 | Steeply dissected slopes of Molonglo valley                        | 34   |
|  | 5 | Strongly undulating hills and ridges                               | 44   |
|  | 6 | Gently undulating upland   | 02   |
|  | 7 | Undulating with shallow residual soil                              | 15   |
|  | 8 | Strongly undulating with thin gravelly soil and rock outcrops      | 26   |

# LOWER MOLONGLO VALLEY RESOURCES MAP



- ⊙ S River sand deposit, worked
- S River sand deposit, unworked
- ⊙ WS Wind-blown sand deposit, worked
- + WS Wind-blown sand deposit, unworked
- \* Geological feature
  - L Limestone
  - D Banded dacite tuff
  - Y Dolerite dyke