

# GAM Gambier Land System

**Area:** 274.8 km<sup>2</sup>

**Landscape:** Undulating plains and rises covered with ash deposits derived from Mt. Gambier and Mt. Schank volcanoes. The volcanoes form prominent cones above the surrounding plains. Soils vary from shallow over limestone to deep where sand underlies the ash. The deeper volcanic soils occur close to the volcanoes, and conversely the ash thins away from them.

**Annual rainfall:** 745 – 805 mm average

**Geology:** Holocene volcanic rocks and ash variously overlie Pleistocene Bridgewater Formation calcarenite stranded beach ridges, Coomandook formation lagoonal deposits and Eocene Gambier Limestone marine limestones

**Main soils:**

- O1** (47%) Volcanic soil (Andic Tenosol)  
The volcanic ash soils near Mt. Gambier and Mt. Schank are very dark brown to black, strongly structured loamy soils, which overlie layered and welded volcanic ash containing volcanic bombs or limestone fragments.
- B3** (14%) Shallow Loamy Sand on Calcrete (Petrocalcic Tenosol/Rudosol)

**Minor soils:**

- I1** (10%) Deep Sand (Arenic Podosol)
- B6** (10%) Shallow Loam over Red Clay on Calcrete (Petrocalcic Red Chromosol)

**Summary:** The deeper volcanic soils within a few km. of the volcanoes are very fertile, well drained and are highly productive, becoming less fertile as the ash deposits thin. Soil pH's are mostly near neutral in the surface, becoming more alkaline with depth. Moisture-holding capacity is moderate to low, on the deeper soils on lower slopes and plains, but is low where soils are shallow over calcrete or limestone on the surrounding plains and old beach ridge ranges.

Inherent fertility in the soils overlain with volcanic ash is variable and usually lower than the volcanic ash soils.

## Soil Landscape Unit summary: Gambier Land System (GAM)

SLU	% of area	Component	Main soils	Prop#	Notes
MELv	0.13	Plain	B3	V	Swale with sandy & rocky rises with variable thickness, surface layer of ash. Main soils: <b>Plains:</b> <u>Shallow sandy loam on calcrete</u> - <b>B3</b> . <b>Rises:</b> <u>Bleached siliceous sand</u> - <b>H3</b> .
		Rise	H3	L	
MOBv	0.37	Rise	B6B3	D	Gently undulating former beach ridge with ironstone gravelly sandy loam over red clay on calcreted aeolianite. Volcanic ash in surface horizon. Main soils: <u>Shallow sandy loam over red-brown clay on calcrete</u> - <b>B6</b> and <u>Shallow sandy loam on calcrete</u> - <b>B3</b> .
MRCv	0.23	Rise	G3	D	Shallow sandy loam over red clay on calcreted aeolianite. Volcanic ash in surface horizon. Main soils: <u>Thick sand over clay</u> - <b>G3</b> .
OFCv	0.49	Dune	I1	D	Deep sand on dune. Volcanic ash in surface horizon. Main soils: <u>Highly leached sand</u> - <b>I1</b> .
PBEv	0.20	Depression	O1	D	Ash covered sandy swale. Main soils: <u>Volcanic ash soil</u> - <b>O1</b> .



PPbv	0.28	Plain	G3I2	V	Sand over clay plain with 10-20% sand rises. Volcanic ash in surface horizon. Main soils: <b>Plains:</b> <u>Thick sand over clay - G3</u> and <u>Wet highly leached sand - I2</u> . <b>Sandy rises:</b> <u>Highly leached sand - I1</u> .
		Sand rise	I1	L	
mFAv	0.35	Plain/rise	B6B3	D	Low rise with shallow sandy loam over poorly structured clay on limestone. Ash covered. Main soils: <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> and <u>Shallow sandy loam on calcrete - B3</u> .
vAA	15.48	Plain	O1	D	Slopes and plains adjacent to and in the proximity of extinct volcanoes with moderately deep tuffaceous loamy fertile black Dermosols and Tenosols over limestone. The soils commonly contain ejecta including fragments of bryozoa limestone derived from the country rock as well as basaltic tuff and olivine bombs. Soils are well-to-excessively drained, especially on slopes of volcanoes. Some tillage interference from rock fragments. Main soils: <u>Volcanic ash soil - O1</u> .
vAB	1.93	Volcano slope	O1	D	
vBA	1.70	Plain	O1	D	Moderately shallow, dark volcanic soils on welded tuff/ash over calcreted limestone <b>vBA</b> Loamy, dark fertile plain
vBB	5.68	Plain	O1	V	
vBC	0.55	Rise	O1I1	C	<b>vBB</b> Gently undulating landscape with a complex of volcanic soils overlying deep sands on dunes <b>vBC</b> Undulating land with complex of volcanic soils overlying calcreted former beach ridges. Shallow soils common. Main soils: <b>Plains:</b> <u>Volcanic ash soil - O1</u> . <b>Rises:</b> <u>Volcanic ash soil - O1</u> , <u>Highly leached sand - I1</u> and <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> .
			O1B6	D	
vEA	3.23	Plain	I1O1	D	Deep siliceous sandy soils with surface deposits of volcanic ash. <b>vEA</b> Loamy volcanic plain on deep sandy soils
vEB	4.76	Plain	B3O1	V	
vEC	11.86	Dune	H3I1	C	<b>vEB</b> Gently undulating dunes overlain with dark loamy volcanic ash. <b>vEC</b> Undulating land with deep sand dunes, low fertility, wind erodible. Main soils: <b>Plains:</b> <u>Highly leached sand - I1</u> , <u>Shallow sandy loam on calcrete - B3</u> and <u>Volcanic ash soil - O1</u> . <b>Dunes:</b> <u>Bleached siliceous sand - H3</u> , <u>Wet highly leached sand - I2</u> and <u>Volcanic ash soil - O1</u> . <b>Rises:</b> <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> and <u>Volcanic ash soil - O1</u> .
		Dune	I1O1	V	
		Rise	H3	L	
vFB	1.13	Rise	B6O1	L	Landscapes with surface deposits of volcanic ash on calcarenite often with deep sandy soils. <b>vFB</b> Gently undulating rise with shallow volcanic loams often over red clay on calcrete. Minor low sand dunes with deep sands. Minor clay loamy soils in swales. <b>vFC</b> Undulating slopes as above. Main soils: <b>Rises:</b> <u>Volcanic ash soil - O1</u> , <u>Shallow sandy loam on calcrete - B3</u> and <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> . <b>Dunes:</b> <u>Volcanic ash soil - O1</u> , <u>Highly leached sand - I1</u> and <u>Bleached siliceous sand - H3</u> . <b>Swales:</b> <u>Volcanic ash soil - O1</u> , <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> and <u>Shallow red loam on limestone - B4</u> .
		Dune	I1	M	
vFC	2.98	Rise	O1B3	V	
		Dune	O1I1	L	
		Swale	H3	L	
vGA	0.56	Plain	O1B6	D	<b>vFC</b> Undulating slopes as above. Main soils: <b>Rises:</b> <u>Volcanic ash soil - O1</u> , <u>Shallow sandy loam on calcrete - B3</u> and <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> . <b>Dunes:</b> <u>Volcanic ash soil - O1</u> , <u>Highly leached sand - I1</u> and <u>Bleached siliceous sand - H3</u> . <b>Swales:</b> <u>Volcanic ash soil - O1</u> , <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> and <u>Shallow red loam on limestone - B4</u> .
			B4		
vGA	0.56	Plain	O1	D	<b>vGA</b> Plains with often thick, dark volcanic sandy loam over red and brown clay subsoils.
			G3		



vGB	0.20	Plain	O1 G3	V	<b>vGB</b> Gently undulating plains and rises as above. Loamy sand over poorly structured clay also occurs on rises. <b>vGBF</b> As above, flinty equivalents, common south of Mt Schank.
		Rise	G3 O1	L	
vGBF	3.13	Rise	G3 G2	V	Main soils: <b>Plains:</b> <u>Volcanic ash soil - O1</u> and <u>Thick sand over clay - G3</u> . <b>Rises:</b> <u>Thick sand over clay - G3</u> , <u>Bleached sand over sandy clay loam - G2</u> and <u>Volcanic ash soil - O1</u> .
		Plain	G3 G2	C	
vHA	1.32	Plain	B3	V	Mostly shallow low stony ranges, with sandy loam over red clay soils on calcrete. Volcanic ash in surface only. Rock outcrop common on ranges. Former beach ridge.
		Rise	B3	L	
vHB	0.17	Rise	B3	D	<b>vHA</b> plain with <10% rises.
vHC	4.53	Stony range	B3O1	D	<b>vHB</b> Gently sloping rises
vHE	0.05	Depression	O1B6	D	<b>vHE</b> Depression with volcanic soils and shallow loam over red clay on limestone.
					Main soils: <b>Plains and rises:</b> <u>Shallow sandy loam on calcrete - B3</u> . <b>Stony ranges:</b> <u>Shallow sandy loam on calcrete - B3</u> and <u>Volcanic ash soil - O1</u> . <b>Depressions:</b> <u>Volcanic ash soil - O1</u> and <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> .
vIA	1.35	Plain	O1B6	V	Deep loamy volcanic soils in association with shallow loams grading to red clay on calcrete.
		Rise	O1B3	L	
vIC	0.33	Rise	O1B3	D	<b>vIA</b> Plain with 10-20% rises. <b>vIC</b> Undulating rises.
					Main soils: <b>Plains:</b> <u>Volcanic ash soil - O1</u> and <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> . <b>Rises:</b> <u>Volcanic ash soil - O1</u> and <u>Shallow sandy loam on calcrete - B3</u> .
vJA	0.77	Plain	O1	D	Shallow dark volcanic loamy soils on welded ash, in close proximity to volcanoes.
vJC	0.76	Volcano slope	O1	D	
vJG	1.12	Ash cone	O1	D	<b>vJA</b> Plain <b>vJC</b> Undulating/moderate slopes. Main soils: <u>Volcanic ash soil - O1</u> .
vKA	11.87	Plain	O1	D	Plains & rises with mostly deep loamy to clay loamy, well structured fertile volcanic soils.
		Rise	O1	M	
vKB	2.16	Rise	O1	D	<b>vKA</b> plain, <10% rises
vKC	8.00	Dune	O1H2	V	<b>vKB</b> gentle slopes. <b>vKC</b> - is a former beach ridge with mostly deep sands mantled with volcanic material. Main soils: <b>Plains and rises:</b> <u>Volcanic ash soil - O1</u> . <b>Dunes:</b> <u>Volcanic ash soil - O1</u> and <u>Deep brown sand - H2</u>
		Rise	O1	E	
vMC	0.29	Plain	O1	V	Plains and rises with deep loamy to clay loamy, well structured fertile volcanic soils. Some shallow soils on calcrete. Main soils: <b>Plains:</b> <u>Volcanic ash soil - O1</u> . <b>Rises:</b> <u>Shallow sandy loam on calcrete - B3</u> and <u>Shallow sandy loam over red-brown clay on calcrete - B6</u> .
		Rise	B3B6	C	
vNB	0.15	Rise	F2O1	D	Dark, clay loam over poorly structured, dispersive clay on rise with deeper volcanic loams. Main soils: <u>Sandy loam over poorly structured brown or dark clay - F2</u> and <u>Volcanic ash soil - O1</u> .
vOA	0.74	Plain	O1	D	Plain with shallow, dark, loamy/clay loamy soil on calcrete. Main soils: <u>Volcanic ash soil - O1</u> .
vPC	10.85	Stony range	B3I1	V	Former beach ridge with shallow sandy loam over calcrete in association with deep sands; sand over clay soils and dark volcanic loams occur in swales. Main soils:
		Swale	G2 O1	L	



					<b>Stony ranges:</b> <u>Shallow sandy loam on calcrete - B3</u> and <u>Highly leached sand - I1</u> . <b>Swales:</b> <u>Bleached sand over sandy clay loam - G2</u> and <u>Volcanic ash soil - O1</u> .
XI-	0.30	Lake	WW	D	Crater lakes.

# PROPORTION codes assigned to Soil Landscape Unit (SLU) components:

D	Dominant in extent (>90% of SLU)	C	Common in extent (20–30% of SLU)
V	Very extensive in extent (60–90% of SLU)	L	Limited in extent (10–20% of SLU)
E	Extensive in extent (30–60% of SLU)	M	Minor in extent (<10% of SLU)

### Detailed soil profile descriptions:

- B3** Shallow sandy loam on calcrete (Petrocalcic Rudosol)  
Medium thickness non calcareous sandy loam, often having a slight clay increase with depth, over calcreted calcarenite shallower than 50 cm - rises.
- B4** Red sandy loam over calcrete (Petrocalcic, Red Dermosol)  
Medium thickness red sandy loam grading to friable red clay loam over calcreted calcarenite within 50 cm - rises.
- B6** Shallow sandy loam over red-brown clay on calcrete (Petrocalcic, Red Kandosol)  
Medium thickness sandy loam with slight ironstone gravel overlying a weakly structured reddish brown sandy clay on calcarenite within 50 cm - rises.
- F2** Sandy loam over poorly structured brown or dark clay (Brown-Dark Sodosol-Chromosol)  
Topsoil <30 cm over a poorly structured subsoil. Loamy, often sandy loam, to clay loamy texture contrast soil with a sodic/dispersive/poorly structured brown clayey subsoil. Often sandy loam, usually with a bleached horizon, and thin topsoil over a poorly structured B.
- G2** Bleached sand over sandy clay loam (sandy Brown-Red Chromosol)  
Sandy texture contrast soil with a bleached A2 and a friable brown-red sandy clay loam to sandy loam subsoil.
- G3** Thick sand over clay (Hypercalcic, Brown Sodosol/ Chromosol)  
Thick bleached sand with an organically darkened surface abruptly overlying a massive to coarsely structured brown to reddish yellow sandy clay to clay, calcareous with depth - rises.
- H3** Deep bleached sand (Basic, Arenic, Bleached -Orthic Tenosol)  
Grey sand over a very thick bleached sand grading to yellow sand continuing below 100 cm.
- I1** Highly leached sand (Fragic, Pipey, Aeric Podosol)  
Grey sand with a very thick bleached A2 layer, over dark brown and yellow massive soft to semi-hard clayey sand (coffee rock), grading to softer yellow and brown sand to sandy clay loam from about 80 cm.
- I2** Wet highly leached sand (Fragic, Humic, Aquic Podosol)  
Grey sand with a thick bleached A2 horizon, overlying a thin to thick layer of coffee rock, grading to pale brown sand sharply overlying a grey, brown and yellow mottled sandy clay loam to light clay.
- O1** Volcanic ash soil (Mostly Podosols and Tenosols)  
Deep volcanic ash soils and soils overlain with volcanic ash.
- WW** Water

Further information: [DEWNR Soil and Land Program](#)

