DISTRICTS OF THE 
MCLAREN VALE 
WINE REGION

McLaren Vale Grape Wine 
and Tourism Association

www.mclarenvale.info 
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Australia

MCLAREN VALE 
one thing leads to another
GEOLOGY BY

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EDITED BY

*James Hook* – Viticulturalist - DJ’s Growers

WORKING GROUP

*Kevin Fiddaman* – Viticulturist - Wirra Wirra Wines  
*Corrina Wright* – Winemaker - Olivers Taranga  
*Chester Osborn* – Winemaker - d’Arenberg  
*Drew Noon MW* – Winemaker – Noon Wines  
*Michael Fragos* – Winemaker - Chapel Hill Wines  
*Charles Whish* – Winemaker – Serafino Wines  
*Jodie Pain* - Viticultural Officer – MVGWTA (2010-12)  
*Belinda Bramley* - Industry Development – MVGWTA (2012- current)  
*Philip White* – Wine Writer and Author – www.drinkster.blogspot.com  
*Dudley Brown* – Grape grower – Inkwell Wines  
*Toby Bekkers* – Viticulturalist - Bekkers Wines (2010)  
*Duncan Kennedy* – Shottesbrooke (2013- current)

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Beneath the ground the McLaren Vale Wine Region is one of the most complex wine regions in the world. It is also the best studied.

In 2008 Philip White and Dudley Brown raised the idea of developing a Geology Map for the McLaren Vale Wine Region. Jock Harvey agreed to fund this work until further funding could be found. The McLaren Vale Grape Wine and Tourism Association (MVGWTA) was able to secure funding to develop this map.

The final map by W. Fairburn, Jeff Olliver, Wolfgang Preiss and Philip White was launched on 14 July 2010.

In 2010, leveraging our world class geology map, the MVGWTA commenced a long term exercise in defining and understanding our grape growing and winemaking.

Using the considerable expertise of geologist Jeff Olliver, co-author of the map, and pairing him with experienced viticulturists and winemakers to form the Districts of McLaren Vale Working Group, 19 individual districts of the McLaren Vale Wine Region were identified, each unique in their ‘terroir’.

The boundaries of these districts have been defined using geological, soil, climate and topographical indicators. They are not yet fixed in stone. The boundaries are being further refined as more information becomes available.

There are no good or bad districts, just differences between them. Grapegrowing practices and winemaking techniques used have a major influence in wine quality. This initiative aims to better understand the unique natural diversity of our region. Defining or proposing official sub-regions is expressly not an objective of this project.

ONGOING PROJECTS.

The draft districts in this report are being further defined by the Districts of McLaren Vale Working Group accounting for any new information that arises.

We are also developing tasting notes for the region. For several years MVGWTA members have been submitting one year old Shiraz wines from single vineyard parcels without the influence of new oak. Submissions are identified along the lines of which draft district they were grown in.

The tasting panel has been collating texture, tannin and flavour descriptors for each district and defining the distinctive characteristics of each. We have also been working with the Adelaide University on a scientific descriptive wine analysis based on geology.

- These tasting notes provide MVGWTA projects like ‘scarce earth’ with some more layers of interest etc.
- Marketing information & Educational resources.
HOW YOU CAN USE THIS INFORMATION.

This information is freely available for use. Each district comes with a description of the district. This is suggested text for wineries and grape growers to use for example on a wine back label or for a promotional website.

For example if your vineyard is located in district #1 you can use the text as so, “Our vineyard is situated on the Sellicks Piedmont.” “Our vineyard is on coalescing fans of Christies Beach Formation laid down over the last 100,000 years” This is both geologically accurate and paints a scenic picture of where your vineyard is located.

View from the Mt Lofty Ranges piedmont on Delabole Hill looking west to Port Willunga. Photo supplied by James Hook
District: #1 Sellicks Piedmont. Coalescing alluvial fans of Christies Beach Formation (100 000 years).

District: #2 Delabole Piedmont. Coalescing alluvial fans of Christies Beach Formation (100 000 years) with more clay and less gravel beds than #1.

District: #3 Willunga Piedmont. Coalescing alluvial fans of Christies Beach Formation (100 000 years) similar to #2.

District: #4 Aldinga Plains. Outwash clay of Ngaltinga Formation (1 ma).

District: #5 Whites Ridges. Outwash clay of Ngaltinga Formation (1 ma) at higher elevation than #4 and with near-surface calcrete.

District: #6 Gloucester Sand. Pebbly sandstone of Pirramimma Sandstone (2.5 ma).

District: #7 Maslin Coast. Complex interlayered geology. Non marine coarse sand of North Maslin Sand (56 ma) overlain by thin marine South Maslin Sand (50 ma) capped by limestone of Blanche Point Formation (35 ma) and sandstone of Ochre Cove Formation (2 ma) with thin clay of Ngaltinga Formation (1 ma) in northwest.

District: #8 Noarlunga Embayment. Tertiary sediments (56-2.5 ma) and thin Holocene cover (10 000 years to present).

District: #9 Onkaparinga Rocks. Umberatana to Wilpena Group metasediments (650-600 ma) often weathered and kaolinised in outcrop. Thin capping of Pirramimma Sandstone (2.5 ma) on high ground in southeast.
**District: #10 Beautiful View.** Complex interlayered geology with coarse sand of North Maslin Sand (56 ma) overlain by fossiliferous sand and limestone of South Maslin Sand (50 ma) covered by limestone of Blanche Point Formation (35 ma) and, in north block, scattered Pirramimma Sandstone (2.5 ma) on high ground.

**District: #11 The Gateway.** Umberatana to Wilpena metasediments (650-600 ma) often weathered and kaolinised in outcrop.

**District: #12 Blewitt Sands.** Mainly coarse sand of North Maslin Sand (56 ma) overlain in southwest by Pirramimma Sandstone (2.5 ma) and minor white drift sand of Semaphore Sand (10 000 years).

**District: #13 Bakers Flat.** Modern alluvium of unconsolidated silty clay, sand and gravel (10 000 years to present).

**District: #14 Clarendon Rocks.** Burra Group metasediments (750 ma) often weathered and kaolinised in outcrop capped by thin Pirramimma Sandstone (2.5 ma) west of Clarendon.

**District: #15 Range Escarpment.** Burra, Umberatana and Wilpena Group metasediments (750-600 ma) and in the southwest mainly limestone and dolomite of Cambrian Normanville Group (520 ma).

**District: #16 McLaren Alluvium.** Alluvial fans of Christies Beach Formation (100 000 years) incised by unconsolidated silty clay, sand and gravel of modern alluvium (10 000 years to present).

**District: #17 McLaren Sandhills.** Nine separate blocks of pebbly sandstone of Pirramimma Sandstone (2.6 ma).

**District: #18 Kurrajong Landslide.** Slope talus of unsorted angular rock fragments, clay and silt of Kurrajong Formation (1ma).

**District: #19 O’Halloran Rocks.** Umberatana to Wilpena Group metasediments (650-600 ma) capped on high ground by thin Pirramimma Sandstone (2.5 ma) north of Happy Valley Reservoir.
View from District #10 – Beautiful View – south over McLaren Vale township. Photo supplied by James Hook
GENERAL INFORMATION

Map Coordinates
35° 14'S, 138º 33'E

Altitude
50 – 200 m AHD (164 – 656 feet)

Sunshine, Oct-Apr
145.2 MJ m⁻² BOM
(Wake Institute 5th. Adelaide metropolitan, Gladstones)

Rainfall
506 mm (20 inches) BOM

Mean Growing Season Oct-Apr
185 mm (7.2 inches) BOM

Relative Humidity, 3 pm
Average 46%

Harvest
Feb – April

Compiled from;

CropWatch McLaren Vale’s Weather Station Network
www.mclarenvale.info/weather

Australian Bureau of Meteorology
McLaren Vale Station #023876 Mean 1993 – 2013

Variety Area Planted - 2012

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<th>Variety</th>
<th>Total Planting Ha</th>
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<tr>
<td>Shiraz</td>
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<td>Cabernet Sauvignon</td>
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<td>Grenache</td>
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<td>Total White Varieties</td>
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<td>Total</td>
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SA Winegrape Crush Survey 2012
District: #1

Description: Sellicks Piedmont

Terrane: The Piedmont

Topography: Land slopes to northwest from 100-110m above sea level to 10m at Sellicks Beach to 40m above sea level at northeastern end.

Soil: Gently sloping fans and level flats were formed on gravelly clay outwash sediments. Also found is silty loam over red clay, silty loam over brown clay and in the west, black cracking clay.

Geology: Christies Beach Formation of Pleistocene Age (2.6m – 10,000 year ago) was formed by coalescing alluvial fans which were discharged from Mt Lofty Ranges during major flooding.

The sediments dip west at low angles away from the Willunga Fault and consist of red-brown to chocolate-brown clay and loam with abundant discontinuous lenses of gravel and numerous flat bedrock pebbles.

Feedstock, the rocks and other material located upslope, is mainly Normanville Group of Cambrian Age (520ma) limestone and dolomite with lesser siltstone and sandstone and scattered phosphate nodules derived from Heatherdale Shale. The secondary source, again upslope, is older Neoproterozoic Wilpena Group (600ma) which is mainly sandstone and quartzite.

Geological setting: Same geology as the other piedmonts (districts #2 and #3) being Christies Beach Formation, but feedstock is different which is a key reason this district is considered unique.

Mesoclimate

Diurnal Range: Close to Gulf St Vincent and hence, maritime climate with a low diurnal range (low difference between night and day temperature) compared to vineyard sites further inland.

Winds: High speed summer gully winds have significant impact on vineyards which are also influenced by early afternoon sea breezes.

Rainfall: Generally lower rainfall than the districts further east in the Willunga Embayment.

Season Length: Vineyards are early ripening. Harvest ripeness (EL-38) for the variety Shiraz would occur in the last 2 weeks of February in most seasons.
District: #2

Description: Delabole Piedmont

Terrane: The Piedmont

Topography: Land slopes to northwest from about 120m above sea level to 50m. Zone is wider than Sellicks Piedmont (district #1) with more gentle slopes.

Soil: Gently sloping fans and level flats formed on gravelly outwash sediments. Silty loam over red clay, silty loam over brown clay and in the west, black cracking clay.

Geology: Christies Beach Formation of Pleistocene Age (2.6m – 10,000 year ago). Coalescing alluvial fans were discharged from ranges during major flooding over 100,000 years ago. The sediments dip west at low angles away from the Willunga Fault and consist of red-brown to chocolate-brown clay and loam with abundant discontinuous lenses of gravel and numerous flat bedrock pebbles. Neoproterozoic feedstock is mainly Wilpena Group (600ma) sandstone and siltstone with lesser Umberatana Group (650ma) which includes some limestone.

Geological setting: Same geology as the other piedmonts (districts #1 and #3) all on Christies Beach Formation, but the feedstock on the hillsides above is different.

Sediments are expected to be finer than in as this zone is wider and beds dip at lower angles.

Mesoclimate

CropWatch weather station: http://weather-mclarenvale.info/?aws_id=MVGWT06

Diurnal Range: Further from Gulf St Vincent than district #1, the Sellicks Piedmont, and therefore has increased diurnal variation (difference between night and day temperature).

Winds: Summer gully winds have reasonable impact on vineyards which are also influenced by mid afternoon sea breezes which arrive later in the day than in district #1 the Sellicks Piedmont.

Rainfall: Generally lower than sites further east in the Willunga Embayment.

Season Length: Vineyards are early ripening. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last 2 weeks of February in most seasons.
District: #3

Description: Willunga Piedmont.

Terrane: The Piedmont.

Topography: Land slopes to northwest from about 150m above sea level (AHD) to 60m with more gentle slopes in the west.

Soil: Gently sloping fans and level flats were formed on gravelly outwash sediments formed in a band approximately 4.5km wide from the Mt Lofty Range escarpment. Also present is silty loam over red clay, silty loam over brown clay and in the west, black cracking clay. Gentle slopes formed on heavy clay outwash sediments in northern 1.5km. Also present is sandy loam over poorly-structured brown clay.

Geology: Christies Beach Formation of Pleistocene Age (2.6m – 10,000 year ago). Coalescing alluvial fans were discharged from ranges during major flooding over 100 000 years ago. The sediments dip west at low angles away from the Willunga Fault and consist of red-brown to chocolate-brown clay and loam with abundant discontinuous lenses of gravel and numerous flat bedrock pebbles.

Neoproterozoic feedstock is mainly Umberatana Group (650ma) with major input from Brighton Limestone and Tapley Hill Formation limestone, dolomite and dolomitic siltstone.

Geological setting: Same geology as the other districts on the Piedmont, Christies Beach Formation, but feedstock is different. Sediments are expected to be similar to The Delabole Piedmont, with gentle dips.

Mesoclimates

CropWatch weather station: [http://weather-mclarenvale.info/?aws_id=MVGWT05](http://weather-mclarenvale.info/?aws_id=MVGWT05)

Diurnal Range: As it is further from Gulf St Vincent than districts #1 and #2, The Sellicks Piedmont and The Delabole Piedmont it has increased diurnal variation.

Winds: Summer gully winds have some impact on vineyards but significantly less than in the other districts on the Piedmont, districts #1 and #2. During the night time cold air drainage can cause localised cooler microclimates.

Rainfall: Higher rainfall than the other districts on the Piedmont, districts #1 and #2, especially for vineyards situated on higher elevation.

Season Length: Mid season with vineyards generally slightly later ripening than the other districts on the Piedmont (districts #1 and #2). Harvest ripeness (EL-38) for the variety Shiraz occurs in the first two weeks of March in most seasons.
District: #4

Description: Aldinga Plains

Terrane: Clay Plains of Aldinga

Topography: Relatively flat at 10-20m above sea level (AHD) apart from gentle northwest slopes along eastern boundary. Willunga Creek forms northern boundary.

Soil: Gently sloping fans and level flats formed on gravelly outwash sediments in eastern half. Heavy black cracking clay soil with lesser silty loam over red clay and over brown clay. Sandy rises and low hills in the Aldinga Scrub. Sand over sandy clay and deep sand in places. Undulating coastal land formed on Ngaltinga Clay along coast north of the Aldinga Scrub and south of Pt Willunga. Sandy loam over red clay, loamy sand over brown clay and black-brown cracking clay.

Geology: Ngaltinga Formation of Pleistocene Age (1ma). Grey-green and red-brown mottled clay reaches 5m in thickness.

Geological setting: Same geology as district #5, Whites Ridges, based on Ngaltinga Formation, but with less calcrete and overall flatter landscape.

Mesoclimate

CropWatch Weather Station: http://weather-mclarenvale.info/?aws_id=MVGWT07

Diurnal Range: Adjacent to Gulf St Vincent, therefore maritime climate with low diurnal variation.

Winds: Wind strength reduces with increasing distance from Mt Lofty Range escarpment.

Rainfall: Lower rainfall than district #1, the Sellicks Piedmont. Long term rainfall data indicates this is one of the driest areas of the Willunga Embayment.

Season Length: Vineyards are generally early ripening similar to district #1, the Sellicks Piedmont. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last 2 weeks of February in most seasons.
District: #5

Description: Whites Ridges

Terrane: Clay Plains of Aldinga

Topography: Undulating land with higher elevation compared to #4, the Aldinga Plains. The main west-east Malpas Ridge extends east from the coast for 7.5km with flat top from 40m above sea level (AHD) rising slightly to the east to 60m. There are three smaller outliers to the north and east which are from 60m to 80m above sea level. Willunga Creek forms southern boundary.

Soil: From the coast, undulating coastal land forms the main ridge with heavy black cracking clay soil but with scattered calcrete outcrop and float.

Undulating rises on Ngaltinga Clay extend over the eastern part and three outliers. Heavy black cracking clay soil with lesser silty loam over red clay and over brown clay.

Geology: Ngaltinga Formation of Pleistocene Age (1ma). Grey-green and red-brown mottled clay reaches 5m in thickness.

Geological setting: Four separate areas interspersed with #6, the Gloucester Sandstone, south of McLaren Vale township, sandy areas extending south of McLaren Vale township, east to Rifle Range Road and west to Blanche Point, Maslins Beach. Same geology as #4 the Aldinga Plains but with more calcrete.

Mesoclimates

Diurnal Range: Similar to #4, the Aldinga Plains, adjacent to Gulf St Vincent, therefore maritime climate with low diurnal variation.

Winds: Summer gully winds have low impact compared to sites on the Piedmont (districts #1, #2 and #3) with some impact from southeastern spring winds in exposed sites.

Rainfall: Low rainfall, similar to other districts close to the Gulf St Vincent.

Season Length: Vineyards are generally early ripening similar to those in districts #1 and #2, the Sellicks Piedmont and the Delabole Piedmont. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last 2 weeks of February in most seasons.
District: #6

Description: Gloucester Sandstone

Terrane: Sand and Sandstone

Topography: Main area of undulating land at 70-80m above sea level from the McLaren Vale township south to Malpas Creek with two southern outliers at lower levels - south bank of Malpas Creek for 1.5 km at 50-60m and south bank of Willunga Creek for 4 km at 40-50m above sea level.

Soil: Consists of undulating rises on sandy sediments. Heavy black cracking clay soil with lesser silty loam over red clay and over brown clay.

Geology: Pirramimma Sandstone of Pleistocene Age (2.5ma). Grey-white to yellow-buff pebbly sandstone and silt caps hill tops and ridges where younger Ngaltinga Clay had not formed or has been eroded.

Geological setting: Interspersed with district #5 the Whites Ridges clayey areas.

Mesoclimate

CropWatch Weather Station: http://weather-mclarencave.info/?aws_id=MVGWT09

Diurnal Range: Lower diurnal range compared to districts #10, #16, #17 and #18 but higher diurnal range than district #4 adjacent to Gulf St Vincent.

Winds: Low impact from summer gully winds compared to district #3, some impact from southeastern spring winds in exposed sites.

Rainfall: Mature vines flourish with minimal irrigation due to deep root penetration and a higher natural rainfall than vineyard sites closer to the Gulf St Vincent.

Season Length: Mid season length with vineyards being later ripening than those sites closer to the Gulf St Vincent in districts #4, but ripen earlier than those sites at higher elevations in districts #10, #16, #17 and #18. Harvest ripeness (EL-38) for the variety Shiraz occurs in the first two weeks of March in most seasons.
GEOLOGY OF THE McLaren Vale Wine Region

Legend:
- Younger than 560 million years
- Older than 560 million years, younger than 1 billion years
- Older than 1 billion years, younger than 2.5 billion years
- Older than 2.5 billion years, younger than 3.5 billion years
- Older than 3.5 billion years, younger than 4.5 billion years
- Older than 4.5 billion years, younger than 5 billion years
- Older than 5 billion years, younger than 6 billion years
- Older than 6 billion years
- Older than 6 billion years, younger than 7 billion years
- Older than 7 billion years

Various geological formations and features are marked on the map.

GULF ST VINCENT

Port Willunga

Geological formations and detailed geology are indicated throughout the region.

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McLaren Vale Geosystems

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GEOLOGICAL INFORMATION:
- Varied geological structures
- Detailed geological mapping
- Importance of geology for wine production
District: #7

Description: Maslin Coast

Terrane: Sand and Sandstone with Limestone Country in south and east.

Topography: Gently undulating land at 30-80m above sea level (AHD) extends east from the coast for 4.5km to the outskirts of McLaren Vale township in a zone up to 3km north-south. The major construction sand mining area extends from the coast in the centre west for 2km. Pedler Creek and its tributaries drain along the northern boundary. Slightly elevated compared to #4 the Aldinga Plains and #5 the Whites Ridges.

Soil: Consist of coastal land with undulating rises to the east on sand, not heavy clay. Heavy black cracking clay soil with lesser silty loam over red clay and over brown clay.

Moderate to steep slopes along Pedler Creek with sandy loam over red clay, sandy loam over brown clay and black-brown cracking clay.

Geology: Mainly coarse grained multi-coloured sand of North Maslin Sand of Eocene Age (56ma), with basal gravel, overlain on high ground by coarse red-yellow mottled sand of Ochre Cove Formation of Pleistocene Age (2ma). South Maslin Sand, marine with fossiliferous layers and green sandy layers containing glauconite (potassium-iron mineral) unconformably overlies North Maslin Sand but is restricted to the western part and does not outcrop. Thin outlier of Ngaltinga Clay overlies Ochre Cove Formation sand extending inland for 1km from Ochre Point. Feedstock mainly from districts #11 and lesser districts #9, #14 and #15.

Geological setting: Contrasts with district #10 which abuts to the northeast and has no overlying Ochre Cove Formation.

Mesoclimate

Diurnal Range: Maritime climate with low diurnal range.

Winds: Vineyards are influenced by sea breezes in summer but are not affected by gully winds like vineyards to the east nearer the escarpment.

Rainfall: Generally lower than sites to the west of the Willunga Embayment.

Season Length: Vineyards in this area are early ripening compared to sites in districts #9, #14 and #15. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last two weeks of February in most seasons.
**District:** #8

**Description:** *Noarlunga Embayment*

Historically significant early vineyards and associated wineries especially at *Reynella* and *Morphett Vale*.

**Terrane:** Terranes #2, #3, #4, #5, #6 and #7

**Topography:** Gently undulating but steeper in the eastern foothills against *Ochre Cove-Clarendon Fault*. Lower reaches of *Onkaparinga River* meander across low lying coastal plain.

**Soil:** Variable.

**Geology:** Tertiary and Quaternary sediments fill the *Noarlunga Embayment* on the western down-thrown side of the Ochre Cove-Clarendon Fault.

Feedstock comes from districts #9, #11 and #14 in east and #19 in north.

**Geological setting:** Similar to the *Willunga Embayment*.

**Mesoclimate**

Rainfall and generally climate similar to the *Willunga Embayment*. Rainfall increases west to east and climate changes with altitude.
**District:** #9

**Description:** *Onkaparinga Rocks*

**Terrane:** *Ancient Rocks*

**Topography:** Steep slopes rising to 320m above sea level at *Mt Chandler* with relatively level ridge tops and deeply incised by west draining *Onkaparinga River*. Vineyards are concentrated at *Chapel Hill Road* in the south and between *Piggott Range Road* and *Cox Hill Road* in the north.

**Soil:** Loam over red clay on limey rock and shallow calcareous loam along the frontal hills from *Pedler Creek* in south to *Morphett Vale* in north.

Generally thin patchy soil with gravel and extensive outcrop of *Neoproterozoic* rocks on the moderate to steep slopes flanking *Onkaparinga River*. Loam over red or brown clay on bedrock and shallow stony loam.

**Geology:** *Neoproterozoic Umberatana to Wilpena Group* (650-600ma) from *Sturt Tillite* up to *Brachina Formation* often weathered and kaolinised in outcrop and overlain on high ground by thin *Pirramimma Sandstone*.

**Geological setting:** Similar to district #11, #14, #15 and #19.

**Mesoclimates**

**Diurnal Range & Winds:** Moderate diurnal variation influenced by sea breezes, not gully winds.

**Rainfall:** Moderate rainfall compared with areas closer to the *Gulf St Vincent*, which are drier or districts #13 and #14 further to the west of the *Willunga Embayment* which are wetter.

**Season Length:** Mid season but varies with elevation and exposure to seas breezes. Grapes ripen significantly earlier than those in district # 14 located to the east. Harvest ripeness (EL-38) for the variety Shiraz occurs in the first two weeks of March in most seasons.
District: #10

Location: Beautiful View

Terrane: Sand and Sandstone overlain by Limestone Country.

Topography: Two blocks of undulating land with steep hills divided by the alluvial valley of Pedler Creek.

Northern larger block centred on d'Arenberg Winery, 50-100m above sea level (AHD) and the smaller southern block on Tatachilla College, 30-80m above sea level (AHD).

Soil: Consisting of undulating rises on sand and limestone. Sandy loam to loam over red clay, loamy sand over brown clay and black/brown cracking clay.

Geology: Basal coarse multi-coloured North Maslin Sand and, in places, overlain marine South Maslin Sand of Eocene Age (56ma) are covered by Blanche Point Formation of Eocene Age (35ma) fossiliferous calcareous silt and sand, limestone and chert and, only in the northern larger block by Pirramimma Sandstone pebbly sandstone and silt of Pleistocene Age (2.5ma). Feedstock is obtained from district #9, #14 and probably #15.

Geological setting: Similar to district #7 which abuts to the west and #12 to the east. Differs from district #9 to the north which consist of the Ancient Rocks terrane.

Mesoclimate

CropWatch Weather Station: http://weather-mclarenvale.info/?aws_id=MVGWT04

Diurnal Range & Winds: Moderate diurnal variation influenced by sea breezes, not gully winds.

Rainfall: Moderate rainfall compared with areas closer to the Gulf St Vincent, which are drier or districts #13/#14 further to the west of the Willunga Embayment which are wetter.

Season Length: Mid season but varies with elevation and exposure to sea breezes. Harvest ripeness (EL-38) for the variety Shiraz occurs in the first two weeks of March in most seasons.
District: # 11

Description: The Gateway

Terrane: Ancient Rocks

Topography: Relatively level ridge tops south of the deeply incised Onkaparinga River. Vineyards are concentrated at the area known as the McLaren Gateway. Highest point is 107m above sea level in the Paxton Gateway vineyard.

Soil: The Gateway vineyards grow on shallow loam, stony in places, over red clay on limey weathered bedrock.

Geology: Neoproterozoic Umberatana to Wilpena Group (650-600 ma) from Wilmington Formation up to Brachina Formation often weathered and kaolinised in outcrop.

Geological setting: Similar to districts #9, #14, #15 and #19.

Mesoclimate

Diurnal Range & Winds: Inland with same diurnal range as district #7 but higher elevation, influenced by sea breezes, not gully winds.

Rainfall: Similar rainfall as district #7.

Season Length: Mid season with vineyards ripening earlier than in districts #12, and significantly earlier than those in district #14 located to the north east. Harvest ripeness (EL-38) for the variety Shiraz occurs in the first two weeks of March in most seasons.
GEOLOGY OF THE McLaren Vale Wine Region
District: #12

Description: Blewitt Sands

Terrane: Sand and Sandstone.

Topography: Major block extends for 13km northeast from the McLaren Vale township to beyond Baker Gully. Undulating land with high sand ridges up to 210m ADH cut by south or north draining gullies.

Soil: Sand over sandy clay, deep sand and ironstone soil.

Geology: Predominantly coarse grained multi-coloured North Maslin Sand of Eocene Age (56ma) overlain in the southwest by grey-white to yellow-buff pebbly sandstone and silt of Pirramimma Sandstone of Pleistocene Age (2.5ma) and, in places, younger white drift sand of Semaphore Sand generated by wind action during the last 10,000 years. South Maslin Sand may be present along the southern boundary. Feedstock is obtained mainly from north and east from districts #14 and #15.

Geological setting: Similar to district #10 which has Blanche Point Formation (35 ma) limestone whereas districts #12 has none.

Mesoclimate

CropWatch Weather Station: http://weather-mclarenvale.info/?aws_id=MVGWT02

Diurnal Range: Continental climate, higher diurnal variation compared to closer to the coast.

Winds: Lesser influence of sea breezes than districts #9 and #10 which are closer to the coast.

Rainfall: Rainfall increases in the Willunga embayment as the topography increases in elevation from west to east, therefore sites in district #12 have a higher rainfall than those to the west in #7, #11 as examples.

Season Length: Mid to late season depending on the site. Vineyards generally have a higher elevation which leads to later ripening than districts #10 and #11. Harvest ripeness (EL-38) for the variety Shiraz occurs from the first two weeks of March into the last two weeks of March in most seasons.
District: #13

Description: *Bakers Flat*

Terrane: *Alluvial Flats*

**Topography:** Isolated low-lying drainage channels at 170m above sea level enclosed by district #12 *The Blewitt Sands*.

**Soil:** Consists of gentle slopes with little topsoil as channel sediments change after heavy rain.

**Geology:** Modern alluvium varying from silty clay to sand and gravel. Feedstock from districts #12, #18 and #15 with reworked #15 and *Permian* glacial sediments from *Prospect Hill* further to the east.

**Geological setting:** Areas of low lying flood plain extend west for 3km from *Kangarilla* township similar to #16.

**Mesoclimate**

**Diurnal Range:** Higher range, more continental, than districts to the east.

**Winds:** Sheltered with less wind than surrounding districts.

**Rainfall:** Higher rainfall than most other districts.

**Season Length:** Later ripening than others especially #12. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last two weeks of March in most seasons.
GEOLOGY OF THE McLaren Vale WINE REGION
District: #14

Description: Clarendon Rocks

Terrane: Ancient Rocks

Topography: Steep slopes along Onkaparinga River which rise to 370m above sea level with gentler slopes to south and west.

Soil: Moderate to steep hills in the Clarendon-Onkaparinga Gorge area where rock outcrop is abundant and soil is thin and patchy often gravelly. Elsewhere, loam over red or brown clay on bedrock and shallow stony loam.

Geology: Neoproterozoic Burra Group (750ma) siltstone, quartzite, sandstone with minor dolomite, weathered and kaolnised in outcrop with ridges capped by thin Pirramimma Sandstone (2.5ma) west of Clarendon township.

Geological setting: Similar to northern part of districts #8, #9 and #15.

Mesoclimate

Diurnal Range: Higher altitude and more continental climate than district #12.

Winds: Vineyards in district #14 are sheltered from south-easterly springs winds and northerly summer winds. Summer sea-breezes weaken as they moved to the east and have a low impact on ripening conditions.

Rainfall: Higher rainfall than districts #9 and #10.

Season Length: Generally later ripening than most other areas except sites in district #15. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last two weeks of March in most seasons.
District: #15

Description: Range Escarpment

Terrane: Ancient Rocks

Topography: Steep slopes of the Mt Lofty Ranges up to 408m above sea level at Mt Wilson and Wickham Hill.

Soil: Consist of abundant rock outcrops with thin and patchy soil, non-arable.

Geology: Cambrian Normanville Group (520ma) in southwest above district #1, Neoproterozoic Wilpena Group (600ma) above district #2, Umberatana Group (650ma) above district #3 and Burra Group (750ma) above districts #16, #17 and #18.

Geological setting: Similar Neoproterozoic rocks to districts #9, #14 and #19.

Mesoclimate

CropWatch Weather Station: [http://weather-mclarenvale.info/?aws_id=MVGWT01](http://weather-mclarenvale.info/?aws_id=MVGWT01)

Diurnal Range: Higher altitude and more continental climate than districts #9, #12, #14 and #19.

Winds: Summer sea-breezes weaken as they moved to the east and have a low impact on ripening conditions.

Rainfall: Higher rainfall than #12.

Season Length: Late ripening. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last two weeks of March in most seasons, some sites can ripen as late as the first two weeks of April.
District: #16

Description: McLaren Alluvium

Terrane: The Piedmont and Alluvial Flats

Topography: West-draining Pedler Creek and tributaries. Height above sea level ranges from 170m AHD in the East to 70m in the West.

Soil: Consists of silty loam over brown clay and sandy loam over poorly-structured brown clay.

Geology: Pedler Creek drainage filled with Christies Beach Formation (100 000) red-brown to chocolate-brown clay and loam with discontinuous gravel lenses. This unit is overlain by modern alluvial silty clay, sand and gravel.

Geological setting: Drains districts #15, #18 and #16 to the east and #10 and #12 to the north. Similar to district #13 Bakers Flat.

Mesoclimate:

CropWatch Weather Station: http://weather-mclarenvale.info/?aws_id=MVGWT03

Diurnal Range: Further inland than #5 the Whites Ridges, #6 and #7 and therefore has higher diurnal range and higher rainfall.

Winds: Influenced by gully winds but moderate strength compared to districts #1 and #2.

Rainfall: Rainfall in the embayment increases as sites move to the east, therefore higher rainfall than for example #4 the Aldinga Plains, #5 the Whites Ridges and #7 the Maslins Coast.

Season Length: Late ripening compared to districts closer to the sea. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last two weeks of March in most seasons.
District: #17

Location: McLaren Sandhills

Terrane: Sand and Sandstone

Topography: East-west ridges up to 160m above sea level eroded by westerly-draining Pedler Creek and tributaries.

Soil: Consists of sandy clay, deep sand and ironstone.

Geology: Grey-white to yellow-buff pebbly sandstone of Pirramimma Sandstone of Pleistocene Age (2.6 ma).

Geological setting: Down-slope from #18 and drained by #16. Similar to #6.

Mesoclimate:

Diurnal Range: Inland with higher diurnal range than #5 the Whites Ridge, #6 and #7 which are closer to the coast.

Winds: Influenced by gully winds but moderate strength compared to #1 and #2.

Rainfall: Higher rainfall than #5, #6 and #7 which are closer to the coast.

Season Length: Mid to late season ripening. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last two weeks of March in most seasons, although some sites may run earlier while others are naturally delayed.
District: #18

Location: Kurrajong landslide

Terrane: Talus Slope

Topography: Westerly-sloping foothills extending from the eastern end of Rifle Range Road for 15km north to Mt Bold Reservoir, 3km northeast of Kangarilla township. Vineyard sites range from 300-270m above sea level at Mt Bold and Kangarilla to 170m above sea level at Rifle Range Road. Further sections of Kurrajong Formation (1ma) not currently shown on the McLaren Vale Geology map are found between Rifle Range Road and Sellicks Beach in a line with the Mt Lofty Ranges.

Soil: Consists of breccia of large angular blocks of quartzite and siltstone in the east becoming finer grained progressively to the west. Most distal alluvial fans consist of clayey sandstone.

Geology: Kurrajong Formation (1ma) of slope talus contains unsorted angular rock fragments, clay and silt. Some large blocks of bedrock have been deposited on the downside of the Willunga Fault during the second flood event about 1ma. Smaller outcrops extend further south to the Victor Harbor Road at Willunga Hill – not yet fully identified on the McLaren Vale Geology Map.

Geological setting: The Talus Slope is underlain by North Maslin Sand (56ma). Feedstock is derived from #15 mainly Burra Group (750ma) with some reworked Permian glacial sediments washed down from near Kuitpo.

Mesoclimate

CropWatch Weather Station: [http://weather-mclarenvale.info/?aws_id=MVGWT08](http://weather-mclarenvale.info/?aws_id=MVGWT08)

Diurnal Range: Inland, similar to #15 and #17.

Winds: Influenced by gully winds but moderate strength compared to #1, #2 and #3.

Rainfall: Higher rainfall than #5, #6 and #7 which are closer to the coast.

Season Length: Mid to late season ripening. Harvest ripeness (EL-38) for the variety Shiraz occurs in the last two weeks of March in most seasons, although some sites may run earlier while others are naturally delayed.
GEOLOGY OF THE McLAREN VALE WINE REGION
Number: #19

Location: O’Halloran Rocks

Terrane: Ancient Rocks

Topography: Gently undulating, more subdued than district #9 the Onkaparinga Rocks. Highest point at 201m AHD on an extensive plateau along Majors Road. Deeply incised Field River drains west from Happy Valley Reservoir to Hallet Cove.

Soil: Consists of shallow clay loam to heavy clay over weathered bedrock.

Geology: Neoproterozoic Umberatana to Wilpena group (650-600ma) on down-thrown western side of Ochre Cove-Clarendon Fault. Units range from Sturt Tillite in the east to Brachina Formation on the coast. These are overlain on the high ground near Happy Valley Reservoir by thin Pirramimma Sandstone (2.5ma).

Geological setting: Similar to district #9 the Onkaparinga Rocks and district #11 The Gateway.

Mesoclimate

Diurnal Range: Moderate diurnal variation influenced by sea breezes but not gully winds.

Winds: n/a.

Rainfall: Higher rainfall than #8 which is closer to the coast.

Season Length: n/a.
**SOURCE MATERIAL**

**GEOLOGY MAP**

The first definitive map published of the McLaren Vale Wine Region’s geology was by William Fairburn (1998). It related geology to grape growing and was restricted to the Willunga Embayment which is now the southern half of the McLaren Vale Wine Region.

This was modified and published as an information brochure with the geology map slightly less than A4 size. This was accompanied by two other smaller maps and seven colour plates (Fairburn, 2000a). About the same time, mapping of the Noarlunga Embayment was also completed (Fairburn, 2000b).

These two data bases were merged to produce an A3 size Tour Guide for the Australian Geological Convention which was held in Adelaide in July 2002 (Fairburn, 2002).

Dudley Brown and Philip White were aware of this material and had the idea of producing a McLaren Vale Wine Region map based on this existing geological data. They shared this idea with Jock Harvey funded initial work on the project.

In early 2008, Jeff Olliver accepted the invitation from Jock Harvey (then Chair of MVGWTA) to produce an enlarged and updated geology map. This was facilitated by the availability of Bill Fairburn who had continued mapping in the region until he left Adelaide in April 2005.

The final map by Fairburn, Olliver, Wolfgang Preiss and Philip White was launched at McLaren Vale on 14 July 2010.

It is this version that graces the regions cellar doors, winery offices and vineyard sheds. It shows in remarkable detail the unique geology of McLaren Vale.

The Geology Map divided the McLaren Vale region into seven different terranes. These range in age from the ‘Ancient Rocks’ created circa 750 million years ago to the ‘Alluvial Flats’ which were in low lying creekbeds within the last 10,000 years.

**MCLAREN VALE REGIONAL PROFILE**

In 2006 MVGWTA published a region profile by Davidson Viticulture compiling data from the McLaren Vale Wine Region. This contained useful maps of native vegetation, rainfall and water catchment area, which allied with the underlying geology, helped distinguish the unique ‘Districts of McLaren Vale’.
## SEVEN TERRANES OF McLaren Vale

<table>
<thead>
<tr>
<th>TERRANE</th>
<th>UNIT</th>
<th>AGE</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Ancient Rocks</td>
<td>Neoproterozoic Cambrian</td>
<td>From 750ma 520ma</td>
<td>Weathered bedrock Limestone, dolomite</td>
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<tr>
<td>2. Sand and Sandstone</td>
<td>South Maslin Sand</td>
<td>Eocene 50ma 56ma</td>
<td>Marine, fossiliferous Coarse sand &amp; gravel. First flood</td>
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<tr>
<td></td>
<td>North Maslin Sand</td>
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<tr>
<td></td>
<td>Pirramimma Sandstone</td>
<td>Pleistocene 2.5ma</td>
<td>Pebbly sandstone</td>
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<td></td>
<td>Ochre Cove Formation</td>
<td>Pleistocene 2ma</td>
<td>Coarse sandstone</td>
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<td></td>
<td>Semaphore Sand</td>
<td>Holocene 10 000</td>
<td>Beach, dune &amp; drift sand</td>
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<tr>
<td>3. Limestone Country</td>
<td>Blanche Point Formation</td>
<td>Eocene 35ma</td>
<td>Fossiliferous limestone</td>
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<td>4. Clay Plains of Aldinga</td>
<td>Ngaitinga Formation</td>
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<td>Green clay</td>
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<td>5. Talus Slope</td>
<td>Kurrajong Formation</td>
<td>Pleistocene 1ma</td>
<td>Clayey sand to breccia. Second flood</td>
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<tr>
<td>6. The Piedmont</td>
<td>Christies Beach Formation</td>
<td>Pleistocene 100 000</td>
<td>Alluvial clay, sand and gravel. Third flood</td>
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<tr>
<td>7. Alluvial Flats</td>
<td></td>
<td>Holocene &lt;10 000</td>
<td>Clay, silt &amp; sand</td>
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GEOLOGICAL SETTING

The McLaren Vale Wine Region extends from Hallet Cove-O’Halloran Hill in the north for 34km south to Sellicks Beach and from the coast inland for 20km beyond Kangarilla township (Fig 1).

The Willunga Embayment to the south and the similar but smaller Noarlunga Embayment to the north have been filled with Tertiary and Quaternary sediments. These two embayments are part of the St Vincent Basin, an intracratonic basin formed by rejuvenated Willunga and Ochre Cove-Clarendon Faults during separation of Australia and Antarctica in Eocene times about 56ma.

Geological history is summarised in the following pages by using Department of Mines and Energy diagrams updated by Jeff Olliver.

Figure 1: Bore Plan from Department of Mines and Energy (1979) showing the cross sections AA, BB, CC and DD.
On Cross Sections AA (figure 2) and BB (figure 3), pebbly and bouldery claystone and sandy laminated claystone with dropstones of Cape Jervis Formation have accumulated in glacial valleys that were cut into Neoproterozoic bedrock during Carboniferous-Permian times about 300ma.

**Figure 2:** Left - Cross Section AA from Department of Mines and Energy (1979).

**Figure 3:** Right - Cross Section BB from Department of Mines and Energy (1979).

Cross Sections B-B, C-C and D-D show that *Eocene* and younger sediments dip gently southeast. Non-marine gravel, sand and clay alternate with calcareous fossiliferous sediments that were formed during periods of marine inundation.

Continued movement along the *Willunga Fault* during sedimentation has dragged the original flat lying sedimentary units into near-vertical orientation adjacent to the Fault.
Figure 4: Left - Cross Section CC from Department of Mines and Energy (1979).

Figure 5: Below - Cross Section DD from Department of Mines and Energy (1979).
REFERENCES


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