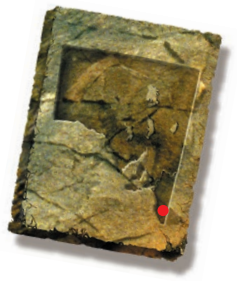

Compton Sandstone — Marte's other limestone

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Introduction

Since 1997 a dolomitic rock from the Gambier Limestone, with the trade name Compton Sandstone, has been produced for use as a dimension stone from Carraill Quarry in the Marte area in the Lower South East (Fig. 1). The quarry is located ~10 km west of Mount Gambier, the largest city in regional South Australia, and where Gambier Limestone has been used as a building stone since colonisation.

Compton Sandstone has been utilised for many applications, including feature homes and buildings in the South East and Victoria. Recently it has been used in renovations to the Bordertown Library and for seating and walling at 1 Bay Road, Mount Gambier.

Location

Carraills Quarry is operated under Mineral Lease (ML) 5715 and is located in the Marte area, Section 202, within the Hundred of Blanche (Fig. 1).

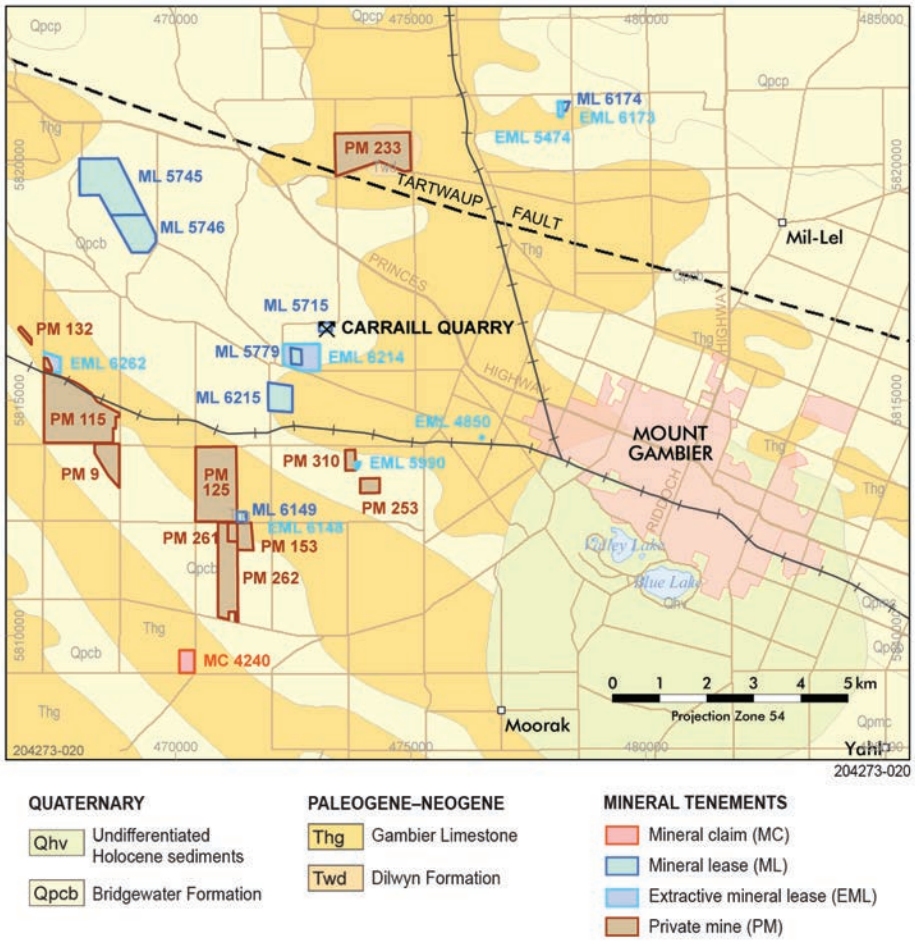

Figure 1 *Locality map of the Marte area showing mineral production tenements and surface geology.*

History, tenure and production

Building blocks of Gambier Limestone, called ashlars, have been used since colonisation where first pastoralists, the Arthur brothers, cut blocks to build their huts on the edge of Little Blue Lake, ~14 km south of Mount Gambier (Olliver 2003; Hough 2006).

ML 5715 was initially granted to Commercial Minerals Ltd in 1991 and produced a total of 969 t of dolomite for industrial and agricultural purposes for the 12-month period ending 30 June 1992. The production of dolomite for dimension stone from Carraill Quarry commenced in 1997 with the quarry operating on both a part-time and campaign basis. To the six-month period ending 31 December 2010, a total of 3265 t of dimension stone has been produced from the quarry.

Geology and petrology

Compton Sandstone is a trade name only as the material quarried from ML 5715 is a dolomite from the Gambier Limestone and is not to be confused with the Compton Conglomerate as described in White (1996). The Gambier Limestone occurs extensively in the Gambier Basin as well as the southwestern Murray Basin (White 1996). The Gambier Limestone ranges in age from Late Eocene to at least early Middle Miocene (c. 40–15 Ma) White (1996).

Quarrying of the Gambier Limestone is concentrated within the Marte area where two parallel lenses of the unit outcrop along a northwest–southeasterly trend. Most of the rock quarried is limestone, but dolomite is produced in a few localities, including Tantanoola where it is quarried for use in glass manufacture and other purposes. Smith

et al (1995) stated that dolomitised zones in the Gambier Limestone are associated with the Tartwaup and Nelson faults; however, Carraill Quarry is ~3 km south of the mapped position of the Tartwaup Fault (Fig. 1).

Pontifex (2011) described the petrography of a representative sample of Compton Sandstone as pale reddish beige, fairly homogeneous dolomite, massive to vaguely macro-layered, medium-grained crystalline with minor porosity. In parts the dolomite features compacted masses of shells and fossiliferous casts. Some iron oxide staining is present contributing to the rock's colour. The equigranular, sugary texture may have led to the 'sandstone' label used elsewhere.

Geotechnical testing

The following geotechnical tests were completed on the Compton Sandstone by Stone Initiatives + Materials Testing Group Pty Ltd and results are summarised in Table 1:

- bulk specific gravity
- water absorption
- flexural strength
- compressive strength
- resistance to salt attack.

Bulk specific gravity and water absorption were determined in accordance with ASTM standard *ASTM C97-02 Standard test methods for absorption and bulk specific gravity of dimension stone*. Specimens were dried at 60 ± 2 °C for 48 hours, followed by soaking at 22 ± 2 °C for a further 48 hours.

The flexural strength of each specimen was determined in accordance with *ASTM C880-98 Standard test method for flexural strength of dimension stone*. Dry specimens were dried at 60 ± 2 °C for 48 hours prior to testing; soaked specimens were immersed in water for 48 hours at 22 ± 2 °C.

Unconfined compressive strength was determined in accordance with *ASTM C170-90(1999) Standard test method for compressive strength of dimension stone*. Dry specimens were dried at 60 ± 2 °C for 48 hours prior to testing; soaked specimens were immersed in water for 48 hours at 22 ± 2 °C.

Dolomitic rock from the Gambier Limestone exposed in Carraill Quarry, Marte area. The rock is produced for use as dimension stone and sold under the trade name Compton Sandstone. (Photo 410961)

Resistance to salt attack was determined according to Method A of Standards Australia *AS/NZS 4456.10:2003 Masonry units and segmental pavers and flags - Methods of test - Determining resistance to salt attack*. Specimens were subjected to 15 cycles of soaking in a 6.2% sodium sulfate solution for a period of 2 hours, followed by overnight drying at 65 °C. Weight loss was then determined by filtering the residue collected.

Contemporary geotechnical testing indicates that the Compton Sandstone has superior quality and compares favourably to other limestone and sandstone currently available on the market.

Applications and finishes

Compton Sandstone is suitable for a variety of finishes and uses as it can be sawn and sealed to produce a smooth-finish or, alternatively, it can be left as rock-face.

Testing carried out by Stone Initiatives demonstrated that Compton Sandstone is an A Grade durable stone with high-density, low-water absorption and moderate strength. Geotechnical properties indicate the stone would be suitable for use as paving, cladding and ashlar construction.

The durability of the stone is such that it could be utilised in locations that may be exposed to frequent wetting and drying or significant exposure to salt attack, such as pool surrounds. Testing indicated the stone is also worthy of consideration for use in commercial applications. The mean water absorption test revealed that the stone is superior to that of *ASTM C616 / C616M-10 Standard specification for quartz based dimension stone and ASTM C568/C568M-10 Standard specification for limestone dimension stone* and hence would comply with the majority of commercial specifications for use as paving, curtain wall veneer or ashlar. Both tests for flexural strength and compressive strength revealed the stone to be superior to ASTM requirements for sandstone and medium density limestone.

Mann and Braggs (2006) questioned the apparent relationship between the colour and strength of the stone tested, suggesting that greater strength was evident in the deeper pink stone as compared to the paler white stone. It is suggested herein that this relationship could be a result of greater magnesium concentrations expected in a dolomite in comparison to dolomitic limestone or limestone.

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For product information see the Compton Sandstone website <http://comptonsandstone.bigpondhosting.com/homepage.htm> or contact Marc Van Riet, phone +61 418 826 164.

ASTM Standards are available from the ASTM International website <www.astm.org> and Australian Standards from the SAI Global InfoStore website <http://infostore.saiglobal.com/store2>.

For other information contact Joanne Hough, phone +61 459 845 592, email <Joanne.Hough@sa.gov.au>.

Top: *Beach side property built from rock-faced Compton Sandstone, Mornington Peninsula, Victoria. (Photo 410962)*
Bottom: *Rock-faced and polished benches of Compton Sandstone used for seating, Main Corner Project, 1 Bay Road, Mount Gambier. (Photo 410963)*

Table 1 *Geotechnical properties of Compton Sandstone, typical Gambier Limestone, Western Australian limestone and relevant standards.*

Property	Compton Sandstone	Typical first grade Gambier Limestone[1]	Western Australian limestone	ASTM C568 medium density limestone specification[2]	ASTM C616 sandstone specification[2]
Bulk specific gravity (kg.m^{-3})	2589	1210	1500	2160	2003
Water Absorption (mean)					
% by weight	1.3	32	26	7.5 maximum	8.0 maximum
% by volume	3.3	39	—	—	—
Flexural strength (loaded perpendicular to bedding; MPa)					
Dried strength	5.9	—	—	3.4 minimum	2.4 minimum
Soaked strength	3.6	—	—	3.4 minimum	2.4 minimum
Compressive strength (loaded perpendicular to bedding; MPa)					
Dried strength	73.9	4.0	4.4	28.0 minimum	27.6 minimum
Soaked strength	63.5	3.4	2.0	28.0 minimum	27.6 minimum
Resistance to salt attack					
Weight loss (wt. %)	0.15	10.6	0.4	—	1.0 maximum
Mode of decay	Slight pitting	—	—	—	—
Classification[3]	A	D	—	A	—

1 Young (1993).
2 From Mann and Baggs (2006) – included as a guide for comparative purposes only (see full report).
3 Stone Initiatives internal classification:
A = sandstone with a high resistance to salt attack.
D = >10% weight loss; may only be suitable for use in sheltered locations free from exposure to salt attack and/or occasional wetting or drying; additional engineering practices may be required to protect stone.