# BRIDGETOWN QUARRY

## DOLOMITE RESERVES

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## 1. LOCALITY (Figure 1)

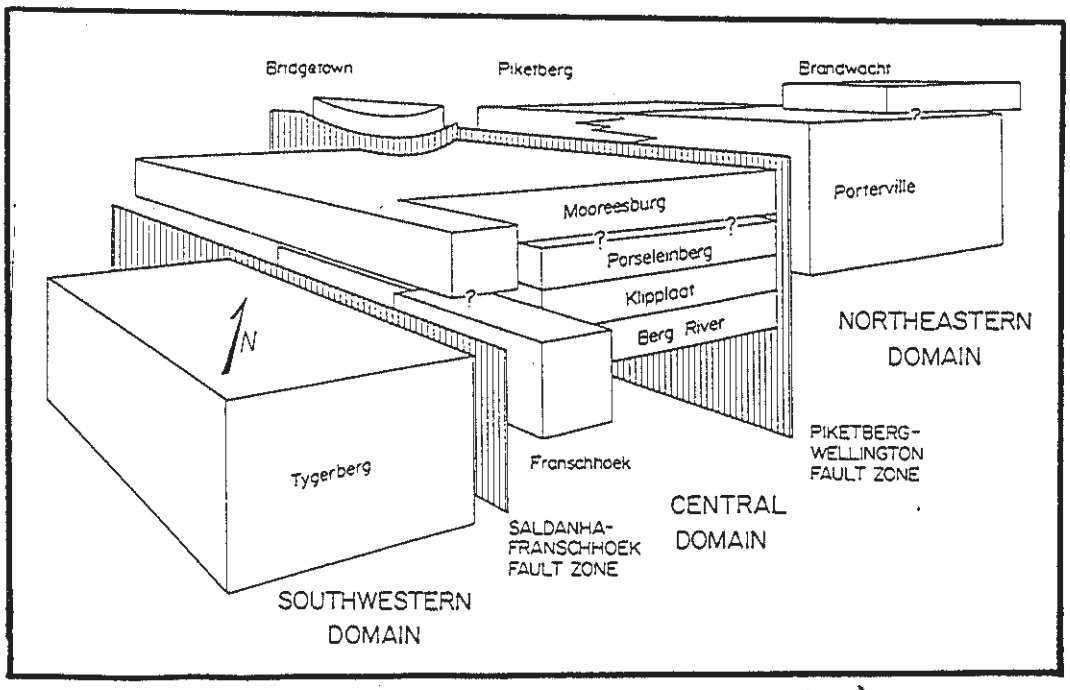
Bridgetown Quarry is located 20 km east of Moorreesburg off the Moorreesburg - Gouda road. The mine and reserves are situated on farms :

| | |
|---|---|
| Vledermuisdrift | No 398 / Remainder portion 7 |
| Vledermuisdrift | No 398 / Portion 20 |
| Vledermuisdrift | No 398 / Portion 8 |
| Vledermuisdrift | No 398 / Portion 9 |
| Vogelstruisdrift | No 335 / Portion 2 |

## 2. GEOLOGY (Figures 1 and 2, and Annexure 1)

Bridgetown Quarry is situated in the Central Tectonic Domain of the **Malmsbury Group** (approximately 750 Ma) and exploits a body of high grade dolomite that constitutes one of the lithological units of **Bridgetown Formation**, a fault bound block in the Piketberg - Wellington fault zone (Figure 2).

Figure 2 : Regional geology showing the relationship between the Bridgetown Formation and other formations of the Malmsbury Group.




(Tankard et.al., 1982, Crustal Evolution)

The absence of a marker horizon and the disguising of structural features by the dolomite make structural interpretation difficult or impossible. A near horizontal structural plane can be observed in the present quarry. This is most likely to be a **thrust fault** but there is no evidence of displacement. **Normal faults** with northward dipping thrust planes and small displacement (less than 30 mm) are also present. Vertical **axial planar cleavage** can be seen in two directions contributing to the highly fractured nature of the dolomite, and suggests at least two phases of folding. Thrust and normal faulting as well as folding is likely to have resulted in thickening of the deposit.

The dolomite is exposed from the base of the cliffs that form the eastern bank of the Berg River on portion 398/9 (25 meters a.m.s.l.) to 58 meters a.m.s.l. at the highest point on portion 398/7. The Western contact of the dolomite is near vertical and marked by deeply weathered **phyllite.** **Chert** is present further to the west; and a **greenstone plug** forms the northern and eastern boundaries of the dolomite. Negative weathering **greenstone dykes** are common in the dolomite and represent a second phase of greenstone intrusion.

A dark grey, folded and finely bedded **shale** occurs locally on portion 398/8 and dips at a shallow angle (15 – 20 degrees) to the west underneath the dolomite. A **cemented karst cavity** can be seen in the same area and consists of angular and rounded clasts of dolomite and quartz pebble in a pink/purple, silicious, iron-rich matrix. Some chert stringers are also present within this zone. This area has been excluded from the tonnage calculations as the non-dolomitic lithologies and the narrowness (less than 50 m) of the dolomite body make it unsuitable for mining.

The overburden consists of **red iron-rich topsoil** containing rounded pebbles suggesting a fluvial depositional environment. The Berg river deposited this material on the dolomite and phyllite prior to cutting to its present level. The phyllite being a softer unit would have been eroded by the river at a faster rate than the dolomite, hence the thicker alluvial overburden overlying this formation. The overburden thickness ranges between 20 centimeters and 6 meters on portions 398/7, 398/8 and 398/20 and is absent or thin (<0.5 m) on portions 398/9 and 335/2.

## 3. EXPLORATION

Two phases of exploration were undertaken, the first on portion 398/7 where the present quarry is situated, and the second over the balance of the area in order to secure and delineate further reserves.

One hundred and thirty one (131) holes were drilled over the total area approximately two kilometers long and five hundred meters wide, lying to the east of, and adjoining the Berg River. A hundred and thirty of these were drilled using a rotary percussion rig to a maximum of twenty five meters, and a single core was taken to eighty (80) meters. The objectives were to establish the position, volume and grade of the dolomite as well as overburden thickness.

The drilling proved the dolomite to be a narrow, north - south trending body that pinches and swells from fifty to five hundred meters in width, with a proven minimum thickness of 80 meters (proven by core only).

Two areas are proven to be economic due to sufficient width and absence of non dolomitic lithologies. The Southern Deposit occurs on portions 398/7 (present quarry) and 398/8; and the Northern Deposit on portions 398/9 and 335/2. The dolomite between these deposits is uneconomic as it has a narrow surface width (<50 m), is underlain by shale and contains the silicified Karst cavity.

The volume of dolomite on portion 335/2 was found to be less than initially anticipated as it is cut by a 50 meter wide phyllite unit that is not obvious prior to drilling.

## 4. SAMPLING AND GRADES (Annexures 2,3,4 and 5; Tables 1 and 2)

The first exploration phase was conducted on portion 398/7 prior to the opening of the quarry, and involved mapping as well as sampling and analysing material during air drilling. Representative samples were taken over three meter intervals without attempting to exclude clay, originating from cavities and weathered horizons in the dolomite, from the samples. Chip samples have also been taken from within the quarry and analysed (annexure 4).

During the second phase chips and dust were sampled over three meter intervals during the air drilling (annexure 2), but care was taken not to contaminate these samples with material from iron rich clay cavities, overburden and weathered horizons. This was done so that the samples give a more realistic indication of the grade as most of this fine material can be screened out during the processing phase.

**Contamination** did however occur especially by overburden over the first three meters of drilling and is reflected in the lower carbonate content over the upper meters of holes SB2, SB4, SB5, SB6, SD5, TH2 and TE1. Contamination by the clay cavities occurred in holes SA1, SA5 and TH1. Complications during drilling required shifting of the rig a number of times during drilling of hole SA7. This dislodged overburden and clay material contaminating the samples considerably (Annexures 2 and 3).

The core was taken to 80 meters, logged and analysed at regular intervals (Annexure 5). This proved that the **dolomite is consistently high grade to this depth.** Thin Greenstone veins extend horizontally from the nearby dyke and occur between 14 and 21 meters. This material is high enough grade to be used for agricultural lime but can be avoided by selectively mining the areas between the dykes, such as is occurring at present.

The percentages of calcium and magnesium carbonate proved to be remarkably consistent throughout the deposit.

TABLE 1 : Range in percentage of magnesium and calcium carbonate for uncontaminated air drill samples on portions 398/8, 398/9 AND 335/2 (Annexure 1,2 and 3).

| | MAXIMUM | MINIMUM |
|---|---|---|
| CaCO | 61.10 | 49.48 |
| MgCO | 47.78 | 33.03 |
| Ca,Mg(CO ) | 100.00 | 89.00 |

TABLE 2 : Range in percentage of silica, R O and calcium and magnesium carbonate for samples taken at regular intervals through the 80 meter core, excluding overburden and the seven meter horizon containing greenstone veins (Annexures 1 and 5).

| | MAXIMUM | MINIMUM | AVERAGE |
|---|---|---|---|
| CaCO | 58.73 | 54.09 | |
| MgCO | 44.73 | 40.13 | |
| Ca,Mg(CO ) | 100.00 | 90.14 | |
| SiO | 8.90 | 0.40 | 1.45 |
| R O | 3.60 | 0.30 | 1.17 |

## 5. RESERVES

The reserves were calculated using a density of 2.6 tons per cubic meter and a thickness of 36 meters (Four 9 meter benches).

TABLE 3 : Bridgetown Quarry Dolomite Reserves

| DEPOSIT | SERVITUDE | SURFACE AREA $m^2$ | VOLUME $m^3$ | TONNAGE t |
|---|---|---|---|---|
| NORTH:A | 335/2 | 130 778 | 4 708 008 | 12 240 820 |
| | 398/9 | | | |
| :B | 335/2 | 8 815 | 317 340 | 825 084 |
| SOUTH | 398/7<br>398/8 | 142 000 | 5 112 000 | 13 291 200 |
| TOTAL | | 281 593 | 10 137 348 | 26 357 104 |

## 6. CONCLUSIONS

Lime Sales Limited has secured rights on the largest economically viable dolomite deposits within the Bridgetown formation of the Malmsbury Group.

This material has been proven to be consistently high grade material throughout a proven thickness of 80 meters.

The overburden thickness ranges between 20 centimeters and 6 meters for the Southern Deposit, and is nonexistent or less than 0.5 meters thick for the Northern Deposit.

The greenstone dykes are the only formation that complicate mine planning within the mining areas.
The position of these dykes has only been determined over parts of the mining area due to lack of surface outcrop.
Future work should determine the exact positions of these dykes throughout the mining areas.

The Environmental Management Program for the present mining area (398/7) should be expanded to include the new reserves (398/8, 398/9 and 335/2).

The total reserves of dolomite available is 26 357 104 tons calculated to a depth of 36 meters.