



Environmental  
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**Daracon Group Pty Limited**

**Martins Creek Andesite  
Quarry**

**Geology Assessment**

**September 2015**

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Prepared by:

**VGT Pty Ltd**

For the:

**Daracon Group Pty Limited**

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**Martins Creek Andesite**  
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**Geology Assessment**  
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# Acronyms and Terms Used Throughout the Report

Through this document, a number of Acronyms and reference terms are frequently used. To assist the reader, the following lists are provided.

| ACRONYMS |                         |
|----------|-------------------------|
| Daracon  | Daracon Group Pty Ltd   |
| AHD      | Australian Height Datum |

## Geology Glossary

| Word                                 | Meaning  |
|--------------------------------------|--|
| <b>Alluvial Soil</b>                 | Juvenile soils formed by deposition from still or moving water. Little pedological development beyond some accumulation of organic matter at the surface.  |
| <b>AHD – Australian Height Datum</b> | A height of zero was assigned to the mean sea level determination at 30 tide gauges around the Australian Mainland coastline, measured over a three year period from 1966 to 1968 <sup>Ref 2</sup> .   |
| <b>Aquifer</b>                       | A soil or rock layer or group of layers that is sufficiently saturated and permeable to yield significant quantities of water.   |
| <b>Andesite</b>                      | A fine grained volcanic igneous rock <sup>Ref 3</sup> . The term is derived from the series of mountains found along the west coast of South America, known as the “Andes”. These general form along convergent plate margins.   |
| <b>Arenite</b>                       | Arena means Sand in Latin, being the material they threw onto the arena before the Gladiators fought. Arenite is a general term meaning sand based rocks.  |
| <b>Bed Rock</b>                      | The unweathered rock that lies below loose surface deposits of soil and alluvium.  |
| <b>Conglomerate</b>                  | Is a rock consisting of individual clasts within a finer grained matrix.   |
| <b>Earthworks</b>                    | The process of extracting, moving and depositing earth during construction.  |
| <b>Embankment</b>                    | A mound or bank of earth or stone formed to support a roadway, serve as a protective barrier, or the like.   |
| <b>Erosion</b>                       | The natural process where wind or water detaches a soil particle and provides energy to move the particle.   |
| <b>Excavation</b>                    | The act or process of digging out earth during construction.   |
| <b>Feldspar</b>                      | Most important rock forming silicate mineral, either Plagioclase or Alkali Feldspar Group <sup>Ref 3</sup> .   |
| <b>Hydrology</b>                     | The study of rainfall and surface water runoff processes.  |
| <b>Ignimbrite</b>                    | <p>New Zealand geologist <a href="#">Patrick Marshall</a> derived the term 'ignimbrite' from 'fiery rock dust cloud' (from the <a href="#">Latin igni-</a> (fire) and <a href="#">imbri-</a> (rain)), formed as the result of immense explosions of pyroclastic ash, lapilli and blocks flowing down the sides of volcanoes.</p> <p>Or sometimes known as Welded Tuffs. An ignimbrite is the deposit of an extremely hot pyroclastic ash, such that the edges of fragments can be seen to weld together.</p> <p>This term describes how the rock is formed not the chemical composition of the rock. Ignimbrites can only form as a result of sub-aerial volcanic activity</p> |

| Word                       | Meaning  |
|----------------------------|--|
|                            | <sup>Ref 3</sup> . Ignimbrites can be Rhyolite, Rhyodacite or Dacite in composition.<br>Sometimes the crystals can appear flat to show a flow effect but this is due to a layering of the material as the material compacts and presses down on the hot beds.  |
| <b>Indurated</b>           | Heat affected rocks that are harder than normal and maybe even partially melted and recrystallised.  |
| <b>Latite</b>              | Or Trachyandesite – Intermediate volcanic rock, between Trachyte and Andesite. Ref 3   |
| <b>pH</b>                  | A measure of the degree of acidity or alkalinity expressed on a logarithmic scale of 1-14, on which 1 is most acid, 7 is neutral and 14 is most basic.   |
| <b>Plagioclase</b>         | A type of sodium and calcium feldspar.   |
| <b>Porphyry</b>            | Is an igneous rock with large crystals set in smaller crystals.  |
| <b>Quartz</b>              | Chemically SiO <sub>2</sub> this mineral is very resistant to weathering which allows it to be the most common mineral on the surface of the earth.  |
| <b>Rehabilitation</b>      | The restoration of a landscape and especially the vegetation following its disturbance.  |
| <b>Remnant vegetation</b>  | Native vegetation remaining after widespread clearing has taken place.   |
| <b>Rudite</b>              | A word derived from Latin word “Rudus” which means crushed stone, debris or rubble. This is a general term for a sedimentary rock composed of rounded or angular pebbles, cobbles and / or boulders. Rudites are mostly composed of siliciclastic gravel known as Conglomerates.                     |
| <b>Sand</b>                | Are categorised as particles that range between 0.0625 mm to 2.00 mm. Ref 1. These can be made from quartz, limestone, feldspar, basalts, latites, organic particles and olivine. These deposits are found on beaches, dunes, rivers, glacial outwash and volcanic slopes.                           |
| <b>Sediment</b>            | Material of varying sizes that has been or is being moved from its site of origin by the action of wind, water or gravity.   |
| <b>Sedimentation basin</b> | An area where run-off is ponded to allow sediment to be deposited. The longer the period that run-off is held, the smaller the size of the sediment deposited. Such basins have to be cleaned regularly.   |
| <b>Silt</b>                | Are categorised as particles that range between 0.0625 mm to 0.0039 mm.<br><sup>Ref 1</sup>  |
| <b>Soil</b>                | That part of the upper weathered layer of the earth’s crust that can support plant growth. Any naturally occurring loose or soft deposit forming part of the earth’s crust and resulting from weathering or breakdown of rock formation or from the decay of vegetation.                             |
| <b>Soil Texture Group</b>  | An important attribute of soils that affects the effectiveness of sediment retention structures is the proportion of particles finer than 0.02 mm. Particles that are finer than 0.02 mm are relatively difficult to trap in simple sediment retention basins, while those that are coarser are not. |
| <b>Tuff</b>                | A pyroclastic ash, originated from volcanoes <sup>Ref 3</sup> .  |
| <b>T – Tonnes</b>          | Weight measurement being 1000 kilograms.   |
| <b>Volcano</b>             | A vent or fissure in the Earth’s crust through which molten magma, hot gases and other fluids escape onto the Earths surface.  |
| <b>Waste</b>               | Includes any matter (whether liquid, solid, gaseous or radioactive) that is discharged, emitted or deposited in the environment in such volume, constituency, or manner as to cause an alteration to the environment.  |

## References

1. Pettijohn F.J, Potter, P.E. and Siever R. 1972 Sand and Sandstone.
2. G.C. Luton and G.M Johnson 2001
3. Penguin Geology Dictionary, Whitten and Brooks 1982

## Section 1. Introduction

### 1.1. Introduction

Martins Creek Quarry is situated off Station Street, Martins Creek. Daracon extract Andesite from this site to produce aggregates for concrete, road, armour rock and manufactured sand applications.

VGT Pty Limited was engaged by Daracon to evaluate the geology of the Martins Creek Quarry, see *Figure One, Appendix A*.

The principal goal for this evaluation is to determine the lateral and vertical extent of the Volcanic Strata and undertake a volume assessment.

Martins Creek is well known in the industry and produces Andesite, the petrographic assessment found in *Appendix B* identifies the rock as a Latite Tuff. For the purposes of geological correctness the remainder of the report will call the product rock Latite.

### 1.2. Previous Geological Assessments

#### 1.2.1. 1968 Exploration Program

A five hole drilling program was undertaken in 1968, with the approximate locations of the drill holes found on *Figure Two*. The logs and photographs of the drill core are located in Appendix C, as supplied by Daracon.

Summarised below is a table of the drill logs.

| Hole Number | Collar (RL m) | Good Rock (m) | Bad Rock (m) | Total Depth (m) |
|-------------|---------------|---------------|--------------|-----------------|
| BH1968 – 1  | 99            | 22.4          | 19.8         | 42.2            |
| BH1968 – 2  | 70            | 7.2           | 8.5          | 15.7            |
| BH1968 – 3  | 58            | 2.8           | 13.3         | 16.1            |
| BH1968 – 4  | 82            | 21.1          | 6.3          | 27.4            |
| BH1968 – 5  | 82            | 1.6           | 8.1          | 9.7             |

#### 1.2.2. 1984 Exploration Program

No drill data could be found for this program.

### 1.2.3. 2006 Exploration program

Eleven core holes were sunk to evaluate the thickness and extent of the Latite, all logs are found in *Appendix D*. Locations are found on *Figure Two*.

| Hole Name | Northings   | Eastings   | RL (m)  |
|-----------|-------------|------------|---------|
| 8086-1    | 6397788.650 | 370854.181 | 90.00   |
| 8086-2    | 6398000.558 | 370636.245 | 124.000 |
| 8086-3    | 6398448.194 | 370204.574 | 88.000  |
| 8086-4    | 6398270.972 | 370030.885 | 49.500  |
| 8086-5    | 6398202.695 | 370452.250 | 60.600  |
| 8086-6    | 6397663.987 | 370947.323 | 103.00  |
| 8086-7    | 6397722.605 | 371018.685 | 122.00  |
| 8086-8    | 6397654.294 | 370736.745 | 78.00   |
| 8086-9    | 6397877.234 | 370833.382 | 95.000  |
| 8086-10   | 6397866.988 | 370772.757 | 107.000 |
| 8086-11   | 6397846.791 | 370465.085 | 79.300  |

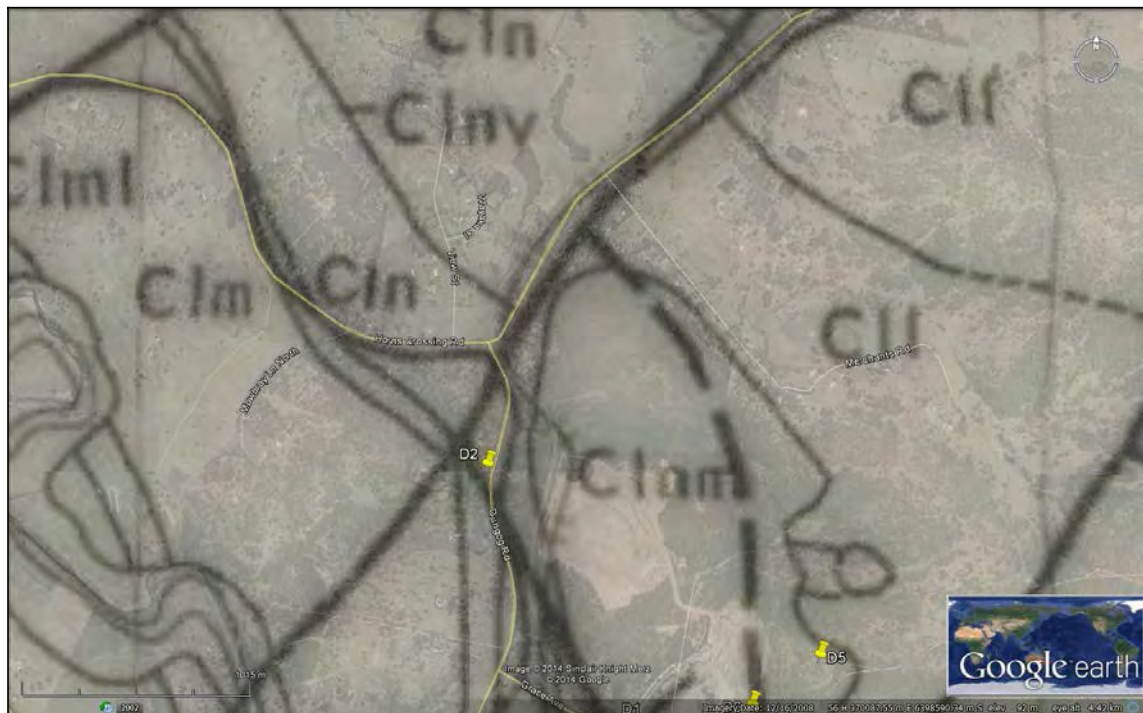
## Section 2. Geology

### 2.1. Regional Geology

The site is underlain by Carboniferous volcanic and sedimentary sequences. The quarry is underlain by the Martins Creek Andesite, identified as “Clnm” on the geology map see *Plate 2*. This unit terminates in the vicinity of the railway line to the north and the northwest where the overlying sequences of Cln (Newtown Volcanics) and Clnv (Vacy Ignimbrite Member) commence.

*Plate 1* below shows the Newcastle 1:100,000 geology sheet overlying an aerial photograph map.

#### **Plate 1 – Geology and Air Photograph**





**Plate 2 – Lithology codes for Carboniferous units for the Newcastle Geology Sheet**

|  |      |                            |       |   |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
|--|------|----------------------------|-------|---|-----|------|------|-----|------|--|---|-----------------------------------|--|--------------------|------|-----|------|--|--|--|---------------|----------------------|
| <table border="1"> <tr> <td>Cuc</td> <td>Cur</td> <td>Cus</td> </tr> <tr> <td>Cub</td> <td>Cui</td> <td>Cup</td> </tr> <tr> <td>Cuk</td> <td>Cub</td> <td>Cuj</td> </tr> </table>  | Cuc  | Cur                        | Cus   | Cub   | Cui | Cup  | Cuk  | Cub | Cuj  | <p>Cuc. Sandstone, mudstone, conglomerate, minor lavas, chert<br/> Cur. Sandstone, conglomerate, mudstone, siltstone, chert<br/> Cus. Lithic sandstone, block mudstone, siltstone, chert<br/> Cub. Lithic sandstone, lenticular conglomerate<br/> Cui. Laminated claystone, siltstone, sandstone, shale, diamictites, conglomerates<br/> Cup. Lithic sandstone, shale, coal, chert, ignimbrites, tufts<br/> Cuk. Coarse, polymictic boulder conglomerate<br/> Cub. Tuffite, varved shale, conglomerate, tuff, sandstone, mudstone, minor lava<br/> Cui. Acid lava flows, crystal tuff, interbedded conglomerate, ignimbrite<br/> Cuj. Conglomerate, tuff, sandstone, shale</p> | <p>Crawford Formation<br/> Isaac Formation<br/> Baeral Formation<br/> Karuah Formation<br/> Grahamstown Lake Fm.<br/> Italia Road Formation<br/> Ballickera Conglomerate<br/> Seaham Formation<br/> Pasarsun Formations<br/> Mt. Johnson Formation<br/> Narang Volcanics<br/> Gistore Volcanics<br/> Mowbray Formation<br/> Lange Valley Ignimbrite Mb.<br/> Berkio Ignimbrite Mb.<br/> Eggleton Volcanics<br/> Newtown Volcanics<br/> Vacy Ignimbrite Member<br/> Martins Creek Andesite<br/> Mossman Swamp Andesite</p> | <p>KINGS<br/> HILL<br/> GROUP</p> | <p>NAURUJAH – WESTPHALIA<br/> STEPHANIAN</p> | <p>P. A. L. K.</p> |      |     |      |  |  |  |               |                      |
| Cuc  | Cur  | Cus                        |       |   |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
| Cub  | Cui  | Cup                        |       |   |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
| Cuk  | Cub  | Cuj                        |       |   |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
| <table border="1"> <tr> <td rowspan="5">Clna</td> <td rowspan="5">Cln</td> <td>Clnel</td> <td>Cln</td> <td>Cle</td> </tr> <tr> <td>Clnb</td> <td>Cln</td> <td>Cle</td> </tr> <tr> <td>Clnv</td> <td>Cln</td> <td>Cle</td> </tr> <tr> <td>Clnm</td> <td>Cln</td> <td>Cle</td> </tr> <tr> <td>Cli</td> <td>Cli</td> <td>Cliw</td> </tr> </table> | Clna | Cln                        | Clnel | Cln   | Cle | Clnb | Cln  | Cle | Clnv | Cln  | Cle   | Clnm                              | Cln  | Cle                | Cli  | Cli | Cliw | <p>Clna = Cln. Toscanite, dacite, andesite, ignimbrite, agglomerate, conglomerate, sandstone, siltstone<br/> Cln. Ignimbrite, reddish-purple sandstone, lithic tuff, conglomerate<br/> Clnel. Wairu, dellenite, porphyritic, ignimbrite, volcanic breccia<br/> Clnb. Andesitic ignimbrite<br/> Cln. Toscanite, dellenitic and rhyolitic, volcanic and pyroclastic rocks<br/> Clnv. Lithic sandstone, polymictic pebble conglomerate, siltstone<br/> Clnm. Micaceous ignimbrite<br/> Cln. Andesitic ignimbrite<br/> Clns. Andesitic pitchstone, ignimbrite, tufts, dacitic ignimbrite</p> | <p>Conger Formation<br/> Wallaringa Formation<br/> Wallarobba Conglomerate Mb<br/> Woolton Beds<br/> Flagstaff Formation<br/> Bonnington Formation<br/> Ararat Formation<br/> Binglebura Formation</p> | <p>GILMORE<br/> VOLCANICS<br/> GROUP</p> | <p>WISEAN</p> | <p>CARBONIFEROUS</p> |
| Clna   |      |                            | Cln   | Clnel   | Cln | Cle  |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
|  |      |                            |       | Clnb  | Cln | Cle  |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
|  |      |                            |       | Clnv  | Cln | Cle  |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
|  |      |                            |       | Clnm  | Cln | Cle  |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
|  | Cli  | Cli                        |       | Cliw  |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
| <table border="1"> <tr> <td>Clic</td> <td>Cli</td> <td>Cliw</td> </tr> </table>  | Clic | Cli                        | Cliw  | <p>Clic. Lithic sandstone, lenticular conglomerate<br/> Cli. Coarse to conglomeratic lithic sandstone<br/> Cliw. Coarse polymictic conglomerate</p> |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
| Clic   | Cli  | Cliw                       |       |   |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
| <table border="1"> <tr> <td rowspan="4">Ciw</td> <td>Ciif</td> <td>Cibo</td> <td>Cia</td> <td>Cib</td> </tr> <tr> <td>Ciif</td> <td>Cibo</td> <td>Cia</td> <td>Cib</td> </tr> <tr> <td>Ciif</td> <td>Cibo</td> <td>Cia</td> <td>Cib</td> </tr> <tr> <td>Ciif</td> <td>Cibo</td> <td>Cia</td> <td>Cib</td> </tr> </table>                       | Ciw  | Ciif                       | Cibo  | Cia   | Cib | Ciif | Cibo | Cia | Cib  | Ciif   | Cibo  | Cia                               | Cib  | Ciif               | Cibo | Cia | Cib  | <p>Ciw. Lithic sandstone, mudstone, conglomerate, minor limestone<br/> Ciif. Coarse, tuffaceous, lithic sandstone, minor interbeds of siltstone and mudstone<br/> Cibo. Fine hard, blue-grey siltstone, mudstone<br/> Cia. Lithic sandstone, conglomerate lenses, minor limestone<br/> Cib. Mudstone, siltstone, minor lithic sandstone, limestone</p>   |  |  |               |                      |
| Ciw  |      | Ciif                       | Cibo  | Cia   | Cib |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
|  |      | Ciif                       | Cibo  | Cia   | Cib |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
|  |      | Ciif                       | Cibo  | Cia   | Cib |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
|  | Ciif | Cibo                       | Cia   | Cib   |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
| <table border="1"> <tr> <td>C</td> </tr> </table>  | C    | <p>C. Undifferentiated</p> |       |   |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |
| C  |      |                            |       |   |     |      |      |     |      |  |   |                                   |  |                    |      |     |      |  |  |  |               |                      |

Geological Survey of N.S.W.  
Department of Mines  
Report by W. Chesnut and V. Gebert  
Date: 22.12.76.

**2.2. Quarry Geology**

The quarry faces and floor is dominated by a volcanic rock locally known as Andesite, but the petrological assessments of this rock has identified this as a Latite Tuff (see sample in *Plate 4*). The large white rhombohedra crystal (plagioclase) is 3mm in length.

There are some exposures of underlying red sandstone and claystone in parts of the quarry floor, see *Plate 3* these are known as meta sediments. This underlying sequence is most likely to be CII the Wallaringar Formation.

**Plate 3 – View of Daracon Quarry Floor and Faces**



**Plate 4 – Microscopic view of Latite Tuff**



## Section 3. Exploration Methodology and Results

A site visit was undertaken on 27<sup>th</sup> February 2015, where a site inspection was undertaken and drill holes were determined, in conjunction with Daracon. Two programs were developed one with the onsite blast drill hole rig and the other to be drilled using *Total Drilling* exploration hammer drill rig. Drilling occurred in March 2015 and all samples were collected by Daracon representatives. Sample trays were logged and photographed by VGT. All logs are found in *Appendix E*.

*Figure Two* shows the drill hole locations.

Table 3.1 – Drill hole co-ordinates

| Hole Name | Northings | Eastings | RL (m) |
|-----------|-----------|----------|--------|
| PBH1      | 6398174   | 370106   | 50     |
| PBH2      | 6398119   | 370174   | 50     |
| PBH3      | 6398041   | 370301   | 51.5   |
| PBH4      | 6397989   | 370295   | 50     |
| PBH5      | 6397960   | 370339   | 53.5   |
| PBH6      | 6397852   | 370302   | 50     |
| PBH7      | 6397702   | 370233   | 50     |
| PBH8      | 6397734   | 370112   | 50     |
| PBB9      | 6397759   | 370013   | 50     |
| PBH10     | 6397851   | 369999   | 49     |
| PBH11     | 6398027   | 370098   | 50     |
| PBH12     | 6398172   | 370172   | 61     |
| PBH13     | 6398013   | 370338   | 61.5   |
| PBH14     | 6397906   | 370372   | 61     |
| PBH15     | 6397908   | 370612   | 111    |
| PBH16     | 6397665   | 371044   | 136.6  |
| PBH17     | 6397608   | 371014   | 113.2  |
| E2        | 6397876   | 370775   | 109    |
| E3        | 6397514   | 370827   | 59     |
| E4        | 6397578   | 370334   | 92     |
| E5        | 6398188   | 370272   | 75     |
| E6        | 6397731   | 371118   | 132    |
| E7        | 6397711   | 370978   | 120    |
| E8        | 6397540   | 370791   | 59     |

Table 3.2 – Latite thickness and Base of RL

| Hole Name | RL (m)  | Thickness of Latite | Base of Latite (RL m) |
|-----------|---------|---------------------|-----------------------|
| PBH1      | 50      | 22.0*               | 28 +                  |
| PBH2      | 50      | 19.5                | 30.5                  |
| PBH3      | 51.5    | 7.5                 | 44.0                  |
| PBH4      | 50      | 8.0                 | 42.0                  |
| PBH5      | 53.5    | 4.0                 | 49.5                  |
| PBH6      | 50      | 4.0                 | 46.0                  |
| PBH7      | 50      | 12.5                | 37.5                  |
| PBH8      | 50      | 26.5                | 23.5                  |
| PBB9      | 50      | 29.0*               | 21+                   |
| PBH10     | 49      | 29.0*               | 20+                   |
| PBH11     | 50      | 26.5                | 23.5                  |
| PBH12     | 61      | 29.0*               | 32+                   |
| PBH13     | 61.5    | 11.0                | 50.5                  |
| PBH14     | 61      | 7.5                 | 53.5                  |
| PBH15     | 111.0   | 29.0*               | 82+                   |
| PBH16     | 136.6   | 11.1                | 125.6 **              |
| PBH17     | 113.2   | 8.5                 | 104.7                 |
| E2        | 109     | 10.0**              | 99                    |
| E3        | 59      | 5.5                 | 54.0                  |
| E4        | 92      | 42.5                | 49.5                  |
| E5        | 75      | 37.0                | 38.0                  |
| E6        | 132     | 0.0                 | None                  |
| E7        | 120     | 5.0                 | 115.0                 |
| E8        | 59      | 29.0                | 30.0                  |
| 8086-1    | 90.0    | 30.25               | 59.75                 |
| 8086-2    | 124.0   | 31.5                | 92.5                  |
| 8086-3    | 88.0    | 38.0                | 50.0                  |
| 8086-4    | 49.5    | 40.9                | 8.6                   |
| 8086-5    | 97.5    | 36.4                | 60.6                  |
| 8086-6    | 115.5   | 13.3                | 103.7                 |
| 8086-7    | 122.0?  | 0.0                 | None                  |
| 8086-8    | 78.00   | 50.3                | 27.7                  |
| 8086-9    | 95.000  | 0.0                 | None                  |
| 8086-10   | 107.000 | 6.2                 | 100.8                 |
| 8086-11   | 79.300  | 6.8                 | 72.5                  |
|           |         |                     |                       |

Note \*Hole terminated in the Latite

\*\* Weathered Latite, not product.

+ not reached basement

Latite thickness data presented in Table 3.2 is shown on *Figure Three.a* and *Figure Three.b* and the base RL plans are shown on *Figure Four.a* and *Figure Four.b*.

## Section 4. Latite Resource Assessment

### 4.1. Site Geological Review

The base of the Latite is dipping to the west at a range of dips from 5 to 8 degrees; this interestingly seems to be mimicking the dip of the existing topography. The underlying stratigraphy is made up of meta-sediments, mostly sandstone and some clays.

Latite at the contact of the meta-sediments mostly appears to be red / brown as reflected by the fine grained matrix of the rock, the outcrop of these appear toward the east as can be seen in Figure Five.

### 4.2. Resource Calculations

#### 4.2.1. Discussion

Drilling in the west pit area, which includes the current extraction area, and areas to north (to 8086-3) and south (to E4) and east (to 80862) provided enough base of Latite intersections and the correlation of these has been presented in Figure Six D, Six E and Six F. Figures Six A, Six B and Six C conversely show the variations of the deposit in this region.

The base of Latite has been contoured to assist with volume assessments; this contour plan is found in Figure Five.

#### 4.2.2. Volume Assessment

The geological and resource assessment of this deposit was undertaken using the following data:

- Site survey (Daracon),
- Drill site locations provided by Daracon,
- Hand held GPS co-ordinates for final drill hole locations for E and PBH series,
- Total drilling provided samples for E series,
- Precision drilling (blast hole rig) provided samples for PBH series,
- Daracon supplied 8086 series logs,
- Samples were collected by Daracon,
- Drill samples provided samples for E and PBH series were logged by VGT,
- Volumes calculated using SURPAC 3D modelling software,
- Density of Latite is 2.7 g/cm<sup>3</sup> (Daracon),
- The base of the Latite resource has been determined and interpolated from the drilling,
- Proposed hard rock quarry faces are 1H : 0.3V as identified in the quarry now, and
- A single batter face has been modelled to determine insitu volume.

*Figure Seven* shows the extraction of the Latite down to the westward sloping floor and the cross sections presented in *Figure Eight* shows the pre and post mining of the Latite.

The calculated volume of Latite is 14.1 million cubic metres or 38.07 million tonnes.

## Appendix A: Figures