

Your Ref: Greenmined Quarry Studies

Our Ref: 5163/12/Thandisizwe Quarry/Geotechnical Desk-Top Assessment Report/TS-rev00

2nd April 2021

Greenmined Environmental
Suite 62
P/Bag X15
Somerset West
7129

ATTENTION: MS M SAAL

Dear Madam

GEOTECHNICAL DESK-TOP ASSESSMENT
FOR A PROPOSED HARD ROCK DOLERITE QUARRY ON THE FARM THANDISIZWE NO. 16691,
OUTSIDE PIETERMARITZBURG

1. INTRODUCTION

Inzalo Crushing and Aggregates (Pty) Ltd propose to commission a hard rock dolerite quarry on the Farm Thandisizwe, located approximately 10 km north-east of Pietermaritzburg and on the eastern side of the main road between Pietermaritzburg and Greytown. Two alternative sites have been identified within the property with the preferred alternative, based upon environmental considerations, defined by the corner co-ordinates listed in Table 1-1.

Table 1 - 1: Corner Co-Ordinates of Preferred Alternative Site

Point	Latitude (Degrees South)			Longitude (Degrees East)		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
A	29	31	32.606	30	26	2.080
B	29	31	33.586	30	26	9.553
C	29	31	41.639	30	26	6.770
D	29	31	40.357	30	25	59.801

The quarry footprint will be about 4.9ha in extent.

2. INFORMATION REVIEW

The following information was reviewed in the preparation of this report:

- Report by Drennan Maud and Partners (August 2001). Hard Rock Quarry Potential on Thandisizwe Farm, Pietermaritzburg.
- Report by Greenmined Environmental (January 2021). Proposed Mining on a Portion of Portion 0 (Remaining Extent) of the Farm Thandisizwe No. 16691, Umshwati Municipal Area, KwaZulu-Natal Province. Final Basic Assessment Report. Reference no. KZN30/5/1/3/2/10724MP.
- Quotation by Terratest (Pty) Ltd (January 2017). Proposed Thandisizwe Dolerite Quarry, Pietermaritzburg. Quotation to Conduct a Geotechnical and Materials Investigation to Quantify Exploitable Reserves of Suitable Hard Rock Dolerite for Aggregate Production. Reference 41680/Geo-02/TS/Rev 00.
- Notes and Photographs by Terratest (Pty) Ltd on a Site Visit Conducted on the 11th January 2017.
- Council for Geoscience (2002). 1:50 000 Geological Map Series 2930 CB, Pietermaritzburg.
- Richards, N P, Botha, G A, Schoeman, P, Clarke, B M, Kota, M W and Ngcobo, F N (2006). Engineering Geological Mapping in Pietermaritzburg: Constraints on Development. International Association of Engineering Geologists, Paper No. 407.

3. PRELIMINARY ASSESSMENT OF EXPLOITATION POTENTIAL

The geology of the site comprises shale of the Pietermaritzburg Formation, Ecca Group of the Karoo Supergroup, and a concordant, intrusive post-Karoo dolerite sill. The material of interest in this study is the dolerite sill and its potential to provide economic reserves of hard rock for crushed aggregate production.

Both previous site assessments carried out by Drennan Maud and by Terratest concluded, based upon visual assessment and desk-top level studies, that the site has potential for commercial quarrying for aggregate production.

Drennan Maud indicated, based upon a visual site assessment and ortho-photographic interpretation, that the site offers good potential for development as a quarry, with exploitable reserves of hard rock dolerite estimated to be between eight and ten million cubic metres, but subject to confirmation by the undertaking of a “diamond drilling” programme. This was apparently based upon a maximum vertical thickness of about 40m for the dolerite sill. This is assumed to have been based upon an overall assessment of dolerite reserves within the property.

Figure 3-1, compiled by Terratest following a brief site visit undertaken in January 2017, shows the approximate delineation of the dolerite rock body (yellow outline), based upon an on-site visual assessment and aerial photographic interpretation. The preferred alternative proposed quarry site, defined by point numbers A, B, C and D has been

superimposed on the plan. The preferred alternative site measures approximately 200m by 250m.

The objectives of Terratest's quotation were to provide an investigation methodology to confirm the suitability of the site, both in respect of the rock quality and the exploitable volumes of good quality hard rock dolerite namely, to confirm the mineable reserves of dolerite. At that stage no preferred alternative site location had been designated and the assessment was of reserves within the property. The proposed method of investigation was to entail a combination of surface mapping, rotary core drilling ("diamond drilling"), percussion drilling, trial pits excavated by means of an excavator and laboratory testing.



Figure 3-1: Site Plan Showing Approximate Extent of Dolerite Rock Body and the Preferred Alternative Quarry Site

Figure 3-2 shows the southern portion of the site forming part of the preferred alternative site. Dolerite outcrop is visual in the sides of the north-east facing hillslope.



Figure 3-2: General View of the Preferred Alternative Proposed Quarry Site

4. RECOMMEDATIONS FOR DETAILED GEOTECHNICAL INVESTIGATIONS

To provide a representative detailed evaluation of the potential exploitation of the preferred alternative site the following method of investigation is recommended:

- The rotary core drilling of between six and eight boreholes, with drilling lengths varying between about 15m and 20m. Boreholes would be strategically positioned around the upper to mid slopes of the dolerite spur, to define the vertical thickness of the dolerite sill and enable a quality assessment to be made of the rock in respect of weathering, hardness and fracture frequency. Representative samples would be retrieved for strength and durability testing. The cumulative drilling length would vary between about 100m and 140m.
- Core logging by an engineering geologist according to prescribed methods for soil and rock logging.
- The retrieval of representative core sticks for laboratory testing that would include petrographic analyses, unconfined compressive strength (UCS) tests, ethylene glycol durability tests, aggregate crushing value (ACV) tests and 10% fine aggregate crushing tests (10% FACT).
- The undertaking of surface exposure mapping of the dolerite, including the measurement of joint and bedding plane orientations.
- The results of the site investigation and the laboratory testing would be incorporated into an interpretative geotechnical report that would evaluate the suitability of the site from a geotechnical perspective, for development as a commercial rock aggregate quarry, including the quantification of the exploitable rock volume.

5. CONCLUSION

Based upon a desk-top level assessment, the preferred alternative site is considered to have good potential for development as a hard rock dolerite quarry for the production of crushed aggregates, but this requires confirmation by the undertaking of a detailed geotechnical investigation to prove suitable reserves of good quality dolerite rock.

We trust that we have addressed your immediate requirements. Please contact the undersigned should you require clarification on any aspect of this report.

Yours faithfully



T SPEIRS Pr Sci Nat
for: **JG AFRIKA (PTY) LTD**



J NORRIS Pr Eng