June
2017

DRAFT ENVIRONMENTAL IMPACT REPORT
Thornridge Farm Quarry on Portion 55 of Farm Uitkomst & Doornrug No. 852
eThekwini Municipality
Cato Ridge Quarry (Pty) Ltd
KZN 30/5/1/3/2/10497MP

Prepared by

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This report was prepared by EnviroPro Environmental Consulting in terms of Appendix 3 to GNR 326

3 (1) (a) details of (i) the EAP who prepared the report; and (ii) the expertise of the EAP. Please see Appendix A for EAP Declaration as per Section 3 (1) (s) and full Curriculum Vitae;

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Tertiary Education:	BSc (Hons)	Zoology
	MSc	By thesis in estuarine fish ecology.
Work Experience:	2001 – 2002	MSc formed part of EIA for National Ports Authority
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Work Experience:	2012	Environmental Control Officer for EIMS on the Transnet NMPP
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Executive Summary

Cato Ridge Quarry (Pty) Ltd have applied for a Mining Permit to mine stone from Thornridge Farm in the eThekwini Municipality. The mine area is 4.99 hectares in extent and includes all stockpile areas, offices, parking etc. Controlled blasts will loosen material to create benches in the quarry with the material being screened and crushed on site. The material will be stored in stockpiles, collected by trucks and distributed to consumers. A number of environmental and social factors were taken into consideration by the EAP to determine the preferred quarry location on the property however the alternate sites for the quarry which were originally considered as well as alternative access routes to the site have also been assessed in this report.

The operation of the mine requires a Mining Permit in terms of section 27 of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) and will result in the cumulative clearance of more than 1 hectare of indigenous vegetation. The upgrading of the access road will result in more than 10m^3 of material being excavated / deposited into drainage lines. A Scoping and Environmental Impact Assessment process has been followed in terms of section 28 of the National Environmental Management Act (107 of 1998 as amended).

The Final Scoping Report was approved by the Department of Mineral Resources (DMR) on the 30th March 2017. The Draft Environmental Impact Report (EIR) follows this acceptance and includes specialist studies and detailed mitigation measures for the impacts identified during the Scoping Phase. The Draft EIR has been made available to all registered Interested and Affected Parties for further comment before the Final EIR is submitted to DMR for assessment.

The following key impacts and mitigation measures have been identified in the EIR:

- **Risk of collapse of the mining face:** Excavations are to be carried out in accordance with the site specific Mine Works Programme (Appendix C) to ensure there is no collapse of the mine face.
- **Impacts associated with blasting (flyrock, noise and dust):** The Blasting Impact Report (Appendix C) concludes that the nearest blast receptors will not be impacted by flyrock and therefore no mitigation measures are required. Perimeter monitoring of dust will be conducted to monitor dust levels to ensure they remain within legislated limits and dust control mitigation measures will be put in place. The operation of the quarry will generate noise although the significant distance to the nearest residential household / community is expected to reduce this impact. Where necessary, noise mitigation measures can be implemented.
- **Increase in heavy truck traffic in the area:** The nature of the activity will result in a localised increase in haulage truck traffic once vehicles exit Thornridge Farm. The Traffic Impact Assessment recommends access from the R102 via Allsop Road with a number of upgrades proposed for the exisitng asphalt road.
- **Leaving the quarry un-rehabilitated resulting in a safety and environmental risk:** The holder of the permit is legally bound to make financial provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of mining. The Annual and Final Rehabilitation Plans are included in section 3 of the EMPr in Appendix E.
- **Loss of indigenous vegetation:** The operation of the proposed Thornridge Farm Quarry and access road will result in the cumulative clearance of approximately 0.96 ha of disturbed grassland & secondary vegetation, 1.1 ha of thicket-grassland mosaic and 2.89 hectares of disturbed vegetation with little plant diversity. A further 0.72 hectares of good quality thicket and thicket-grassland mosaic will be cleared for the upgrading the access road. A number of protected *Aloe maculata* species will be cleared from within the road upgrade footprint and *Aloe pruinosa* species will need to be relocated from the northern corner of the quarry area. Apart from preventing unnecessary clearance of vegetation around the mine area and access road and ensuring continual rehabilitation of areas not in use, this impact cannot be fully mitigated.
- **Poor stormwater management increasing the risk of erosion and risk to water quality in nearby watercourses:** A berm will be created around the edge of the quarry to divert clean water away from the mine and prevent potentially contaminated run off from leaving the mine area. A sump/s are to be created at the low point of the quarry to capture runoff from within the mine area. This water is considered “dirty” and will be stored on the site and used for dust suppression. The wetland and aquatic specialists rated potential impacts on the water resources as “negligible to minor”.

Detailed mitigation measures for these impacts have been included in the Impacts Table in section 7.0 of the EIR and include recommendations and input from the various specialist reports, summarised under section 3 of the EIR and attached under Appendix C. No fatal flaws have been identified during the EIA process and therefore the EAP is of the opinion that the Mining Permit for the Thornridge Farm Quarry be granted, provided that the requirements of the EMPr, attached under Appendix E, are adhered to during the operation and rehabilitation of the quarry.

Contents

Appendices

Section 1: Scope of Work and Location of Activity

1.1 Project Title

Thornridge Farm Quarry located within the eThekwini Municipality.

1.2 Aim of the Environmental Impact Report

As per Appendix 3 of the Environmental Impact Assessment Regulations[1], the objective of the environmental impact assessment process is to, "*through a consultative process-*

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;

(c) identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) determine the--

(i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

(ii) degree to which these impacts-

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources, and

(cc) can be avoided, managed or mitigated;

(e) identify the most ideal location for the activity within the development footprint on the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;

(g) identify suitable measures to avoid, manage or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.

The Environmental Impact Report (EIR) follows the Final Scoping Report, which was accepted by the Department of Mineral Resources (DMR) on the 30th March 2017. The EIR provides more detail on the proposed mining operation, addresses comments raised during the "Scoping Phase" and includes specialist input on the impacts identified by the Environmental Assessment Practitioner (EAP) as well as new impacts identified by the specialists and Interested and Affected Parties (section 7.0 of the EIR for the impacts section).

All registered Interested and Affected Parties (I & APs) will be given a legislated 30 day comment period to comment on the Draft EIR. Meetings will be held on request, if needed, to clarify or discuss aspects of the application before the Final EIR is compiled and submitted to the DMR[2]. All comments are to be submitted to EnviroPro whose details are provided below.

1.3 Applicant and Independent Consultant Details

ITEM	APPLICANT CONTACT DETAILS
Name	Cato Ridge Quarry (Pty) Ltd
Tel no	032 947 1746
E-mail address	kgachoki@waldene.com
Postal address	PO Box 608, uMhlali, 4390

ITEM	CONSULTANT CONTACT DETAILS
Name	EnviroPro Stephanie Denison / Josette Oberholzer
Tel no	031 765 2942
Fax no:	086 549 0342
Cellular no	083 929 4662

[1] Environmental Impact Assessment Regulations published on the 07th April 2017 in Government Gazette No. 40772 notice R326.

[2] "Timeframes" are outlined in Chapter 2 of the 2014 EIA Regulations.

E-mail address	steph@enviropro.co.za
Postal address	P.O Box 1391 Kloof 3640

1.4 A Description of the Activities to Be Undertaken Including Associated Structure and Infrastructure As per Section 3 (d) (ii)

Cato Ridge Quarry (Pty) Ltd have applied for a Mining Permit in terms of section 27 of the Mineral and Petroleum Resources Development Act (No. 28 of 2002, MPRDA), to mine stone on a privately owned portion of land in Ward 1 of the eThekwini Municipality. Circle Irrigation cc own Portion 55 of Farm Uitkomst & Doornrug 852, where the mining will take place and support the proposal (proof of landowner is provided in Appendix B). The landowner is a shareholder in Cato Ridge Quarry (Pty) Ltd.

A 1:50 000 topographical map is provided in Figure 1 to show the location of the property and surrounding land uses. The entire property is 198 hectares in extent. The mining area, including all stockpile areas, offices, parking etc. will ultimately measure a total area of 4.99 hectares. The different phases of the project are described below.

Construction

There will be very little activity associated with the construction phase of the quarry itself apart from establishing a site office and setting up the screening and crushing plants in demarcated areas (southern corner of the quarry footprint).

The existing dirt farm road will be used to access the quarry (marked in white in Figure 2). The road is 1.77 km long and needs to be widened by 8m to safely allow heavy vehicles to and from the mining area. For steep banks, DMR generally require a berm to be constructed on both sides of the road, to catch falling rocks and the other berm to prevent vehicles from going over the edge. A 12m road is therefore required to accommodate these berm areas. Where the road crosses drainage lines, 600mm diameter stormwater pipes will be constructed to ensure free flow of water during high rainfall. Design drawings of the proposed pipes are provided in Appendix C (attached to the TIA). The heads of four non-perennial watercourses are crossed by the road which will result in the excavation and deposition of approximately 120m^3 of material in the watercourses. The surface of the road will be compacted G5 material.

The quarry is on private property therefore access to the mine area will be restricted and controlled during operation. The applicant will commence with removing material using excavators on approval of this application.

Operation

A Mine Works Programme, describing the mining methodology, has been prepared by the applicant and is attached under Appendix C. Mining will be carried out in phases so that only portions of the 4.99 hectare site will be cleared at any one time. In the long term, the activity will result in the clearance of more than 1 hectare of indigenous vegetation from the property, which requires Environmental Authorisation.

As per section 7.1.1 of the Mine Works Programme, open cast mining will take place. Topsoil will stripped and stockpiled separately to a height not exceeding 2m. The overburden thickness is approximately 10.7m (section 10.1.2 of the Aggregate Investigation attached under Appendix C). This will be used to create a berm around the mining area and the remainder will be stockpiled separately in a demarcated area. The quarry will be drilled, charged and blasted to a face height of approximately 12m and a bench width of approximately 15m. Excavators will be used to load rock from the muck pile into tip trucks which will move the blasted rock to the crushing plant to be crushed and screened. It will then be moved to the demarcated stockpile areas. Different aggregate products will then be loaded and removed to the point of sale.

A Vibration Information Report has been prepared and included in Appendix C. Blast hole diameters will be 102mm and will be spaced 3m apart. Blast hole depths vary but will go down to a depth of approximately 12m, depending on the particular bench height. The report concludes that the Peak Particle Velocity (PPV) at all blast receptors, identified on page 2 of the report, will be within the acceptable limit for private property.

The mining operation can be summarised as follows:

- The permitted area to be mined will be clearly demarcated using stormwater control berms.
- The engineer will establish access for the plant at the southern corner of the quarry and plan out the excavation approach.
- A topsoil storage site will be established for storage of topsoil removed during the initial clearing (berm formation). This will be retained for use in rehabilitation at a later stage.
- Overburden will be cleared using an excavator (used to create berm) and soft material cut back.

- Controlled blasts will loosen material to create benches.
- Blasting to be conducted during day light hours only, while trucks may operate 18 hours a day, depending on demand, Monday to Saturdays.
- Material will be transported to the crushing and screening plant on site for processing.
- Material collected by top-loaders and distributed to consumers.
- All activity will be monitored and managed by a site foreman and flag men will be placed to ensure safe operation of the earth moving equipment in and out of the quarry.

Rehabilitation/ Decommissioning
The Mining Permit will be valid for a 2 year period. It can be renewed three times for a year at a time allowing a maximum of 5 years validity of the permit. On expiration of the Mining Permit, the site is to be decommissioned and rehabilitated according to the Rehabilitation Plan, summarised below and outlined in more detail in section 3 of the EMPr attached under Appendix E.

On decommissioning, the processing equipment and offices will need to be removed, the roads ripped and rehabilitated. The quarry will need to be rehabilitated by shaping slopes and ensuring that there is no loose material or areas where slippage could occur. Topsoil will be re-laid over exposed areas and indigenous grassland species re-introduced.

Before the quarry is legally abandoned, the DMR requirements for long-term drainage, environmental and public access issues will be adequately considered and controlled. Adequate geotechnical data is normally available at the time of a quarry closure to address all long-term geotechnical concerns regarding the abandonment of the mine. By making geotechnical engineering input to the quarry planning and design process an integral part of the mining operation, improvements can be made to quarry safety, productivity, economic efficiency as well as closing concerns when abandoning the mine.

A number of environmental impacts may remain after a site has been mined as the area may be vulnerable to stormwater runoff and erosion. Stormwater flow must be managed by placing diversion berms and ditches at the top of the slope which will act to divert and slow water flow down the slope. The ditch and berms will be vegetated. Even with rehabilitation, an excavated area will remain on the hillside. The visual aspect of this will be mitigated as far as possible through shaping, re-vegetation and screening with vegetation.

The aim of the rehabilitation will be to reduce visual and safety impacts and to control risk of erosion and slippage in the long-term. The following key points must be followed to ensure appropriate closure.

- Rehabilitation will occur as soon as practically possible on completion of mining, following the cessation of the work in a specific section.
- No more than one month will pass between cessation of mining and rehabilitation.
- Any infrastructure erected for mining will be demolished and removed.
- All equipment, concrete footings, fencing, etc. will be removed from site.
- All waste will be removed from site and disposed of at an approved landfill.
- Soil contaminated with oil, grease, fuel may not be disposed of in the excavation but will be disposed at a permitted landfill.
- The floor of the quarry will be left level and ripped to allow re-growth of vegetation. Topsoil removed at the beginning of the process can be used to cover this area.
- Before placing topsoil, all visible weeds will be removed.
- The topsoil will be spread evenly over the prepared surface to a depth of 75 to 150mm on slopes of 1:3 or steeper.
- Topsoil placement will occur in a phased manner, concurrent with the phased operation of the quarry. Topsoil will be placed in the same area from which it was stripped.
- Where amounts are inadequate to cover the entire area, slopes will receive priority treatment.
- Site access will be blocked to ensure that other operators or opportunists do not re-visit closed areas and continue to remove material.
- Re-vegetated areas will be protected until vegetation has become established. No vehicles or equipment will be allowed access to areas that have been vegetated.
- Any erosion channels that develop after re-vegetation will be backfilled and consolidated and the areas restored to a proper stable condition. The erosion will not be allowed to develop on a large scale before effecting repairs and all erosion damage should be repaired as soon as possible.
- Any large rocks uncovered by the mining activity must be placed in the pit and covered with overburden material and topsoil.
- The site will not be used further once it has been closed. The area will be shaped and re vegetated to ensure that it does not pose a safety or erosion and environmental hazard.

Please refer to section 3.0 of the attached EMPr, which outlines the Annual and Final Rehabilitation measures to be carried out for the Thornridge Farm Quarry.

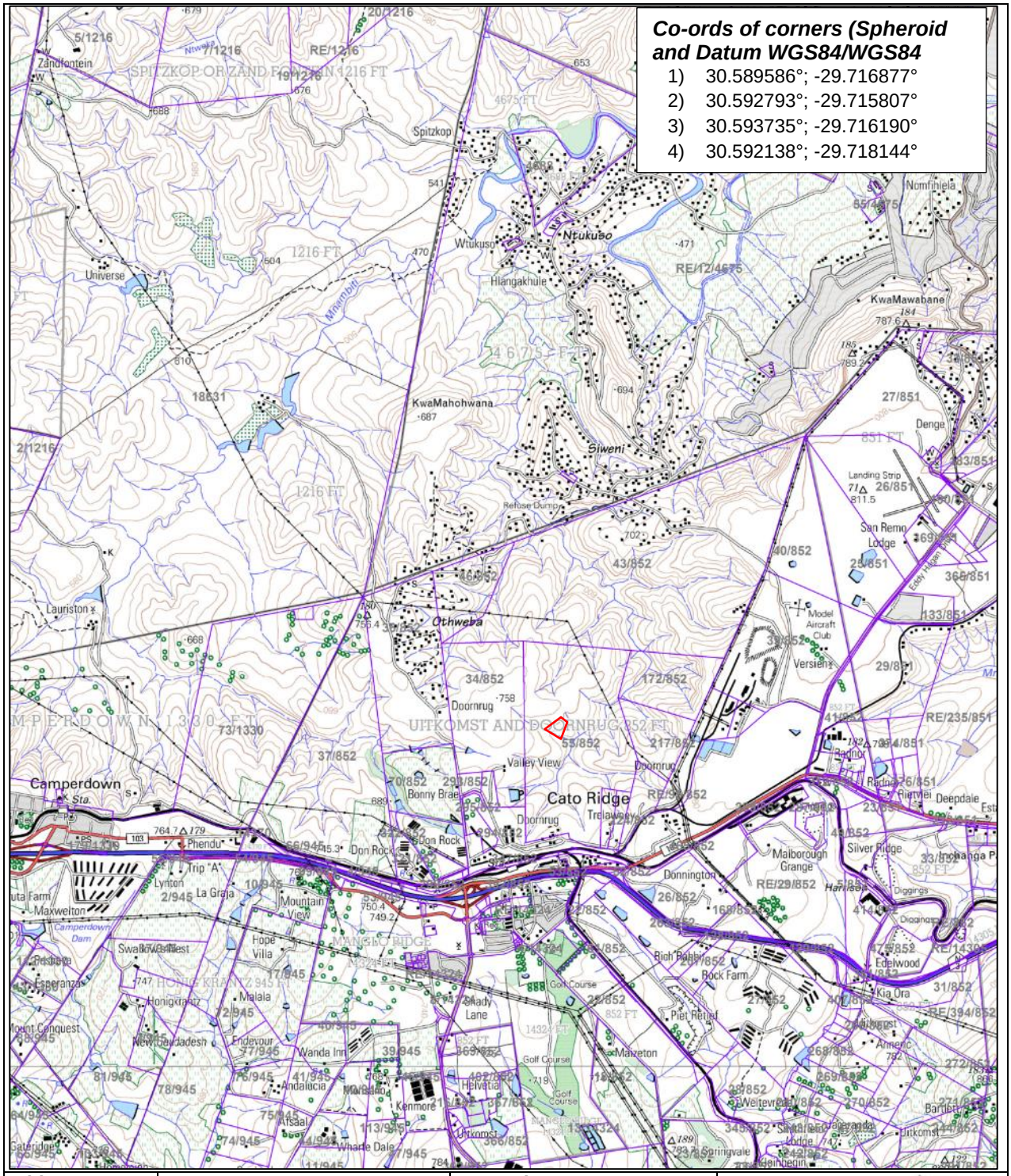
1.5 All Listed and Specific Activities to Be Triggered and Being Applied For as Per Section 3 (d) (i)

GNR	Activity Number	Activity as per the legislation	Activity as it applies to the proposal
GNR 327 Listing Notice 1; 07th April 2017	21	*Any activity including the operation of that activity which requires a mining permit in terms of s27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including –* *(a) associated infrastructure, structures and earthworks directly related to the extraction of a mineral resource; or* *(b) the primary processing of a mineral resource including inning, extraction, classifying, concentrating, crushing, screening or washing.*	A Mining Permit application was submitted to the Department of Mineral Resources and accepted on the 23rd November 2016. The Final Scoping Report was accepted on the 30th March 2017.
GNR 327 Listing Notice 1; 07th April 2017	27	*The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.*	The mining activities and upgrading of the access road will require the clearance of more than 1 hectare of indigenous vegetation. The entire quarry area, including parking, stockpiling and crushing plant, is 4.99 hectares.
GNR 327 Listing Notice 1; 07th April 2017	19	*The infilling or depositing of any material of more than 10m³ into, or the excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 m³ from-* *(i) a watercourse* *But excluding where such infilling, depositing , dredging, excavation, removal or moving-* *(a) will occur behind a development setback;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.*	There is existing access to the quarry however the dirt road crosses four drainage lines. The crossings will need to be upgraded to allow heavy vehicles travelling along the roads. Cumulatively, this will result in more than 10m³ of material being deposited / removed from the watercourses.

1.6 Location Of Activity As Per Section 3 (b)(i)-(iii)

District Municipality	eThekwini Municipality.	
Local Municipality	eThekwini Municipality.	
Ward	1	
Area / Town / Village	Cato Ridge	
Co-ordinates:	**Latitude**	**Longitude**
Quarry Corner 1	30.589586°	-29.716877°
Quarry Corner 2	30.592793°	-29.715807°
Quarry Corner 3	30.593735°	-29.716190°
Quarry Corner 4	30.592138°	-29.718144°
Property Description:	**Parent Farm:**	**Farm Portion:**
	Uitkomst & Doornrug 852	Portion 55
21 Digit Surveyor General's numbers:	N0FT00000000085200055	

Figure 1: 1 in 50 000 Locality Map Showing Proposed Quarry on Portion 405 of Vaalkop and Dadelfontein 885, Msunduzi Local Municipality, Umgungundlovu District Municipality, KwaZulu Natal. Applicant: Cato Ridge Quarry (Pty) Ltd. Property boundary in purple; Proposed Mining Area Shown in Red Measuring 4.99ha.



Title	Thornridge Farm Quarry	**Legend**	
Co-ordinates	29°43'41.56"S ; 30°35'33.97"E		Watercourses
Scale	1:50 000		Properties
Topographical Sheet No.	2930DA		Quarry site
Drawing No.	Thornridge Farm Quarry #01		20m Contour
Date Prepared	06th January 2017		Rural Settlements
Prepared By	Stephanie Denison		Urban Areas

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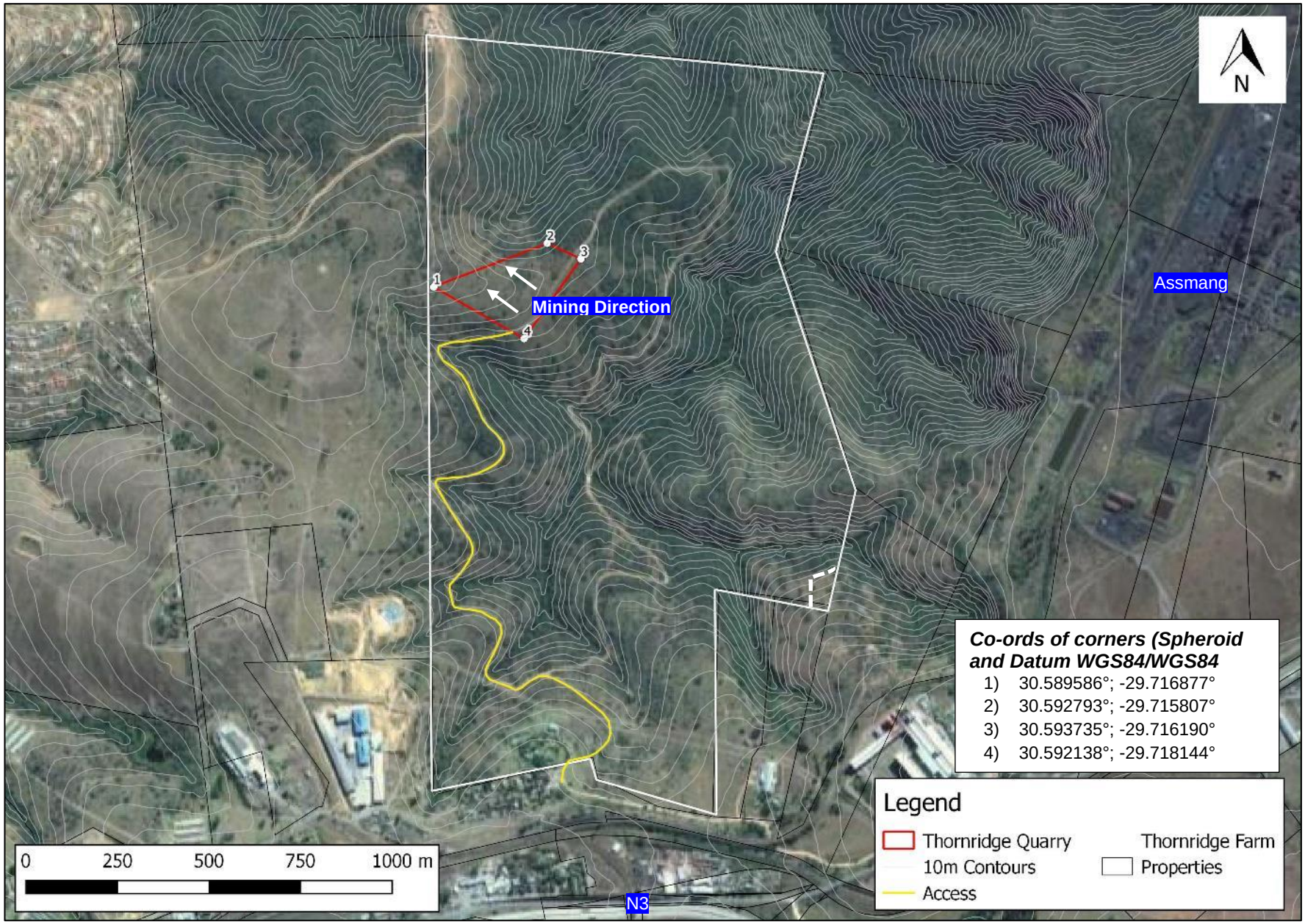
Figure 2: Aerial Photograph Showing Permitted Area (4.99ha) in the eThekwini Municipality; KZN; Portion 55 of Uitkomst & Doornrug 852. Applicant: Cato Ridge Quarry (Pty) Ltd. Property boundary in purple; Proposed Mining Area Shown in Red Measuring 4.99ha. The 5m contour lines are shown in white with access alternatives shown in white dashed lines (Plan is in terms of s3 (1) (c) of Appendix 3 of the EIA Regulations).



Section 2: Alternatives as Per Section 3 (h)

2.1 Description of Process Followed to Reach Proposed Preferred Activity, Site and Location within the Approved Site as Contemplated in the Accepted Scoping Report as Per Section 3 (1) (h) (i), (ix) and (x)

Site & Activity Alternatives

Circle Irrigation cc purchased this property after determining that it had development and mining potential. The mining operations have been outsourced to Cato Ridge Quarry (Pty) Ltd, who carried out initial investigations which indicated that a number of factors, including availability of material, made it feasible to commence a mining operation on the property. The proposal is therefore ultimately to clear and mine a 4.99 hectare portion of land to operate a commercial quarry.

An application for a Mining Permit at the co-ordinates provided in section 1.5 has been submitted, acknowledged and accepted by the Department of Mineral Resources (DMR). A preferred layout alternative for the quarry on the site was formulated prior to the initial submission to DMR based on the findings of the Geotechnical Investigation (Appendix C), which confirmed the location of the desired stone, as well as restrictions imposed by infrastructure and sensitive environmental areas across and adjacent to the property.

Layout Alternatives

Based on geotechnical investigations, which confirmed the location of the desired stone, as well as restrictions imposed by infrastructure and sensitive environmental areas across and adjacent to the property, a preferred layout alternative on the property was formulated by the applicant with input from the EAP. It is to be noted that, although alternative layouts on the property were considered at the beginning of the EIA process (see Figure 3), only one site can be lodged with DMR at the start of the Mining Permit application process. No amendments to the preferred quarry footprint can therefore be made at a later stage of the process without withdrawing the current application.

The following was considered by the EAP when identifying the preferred layout for the quarry on the property:

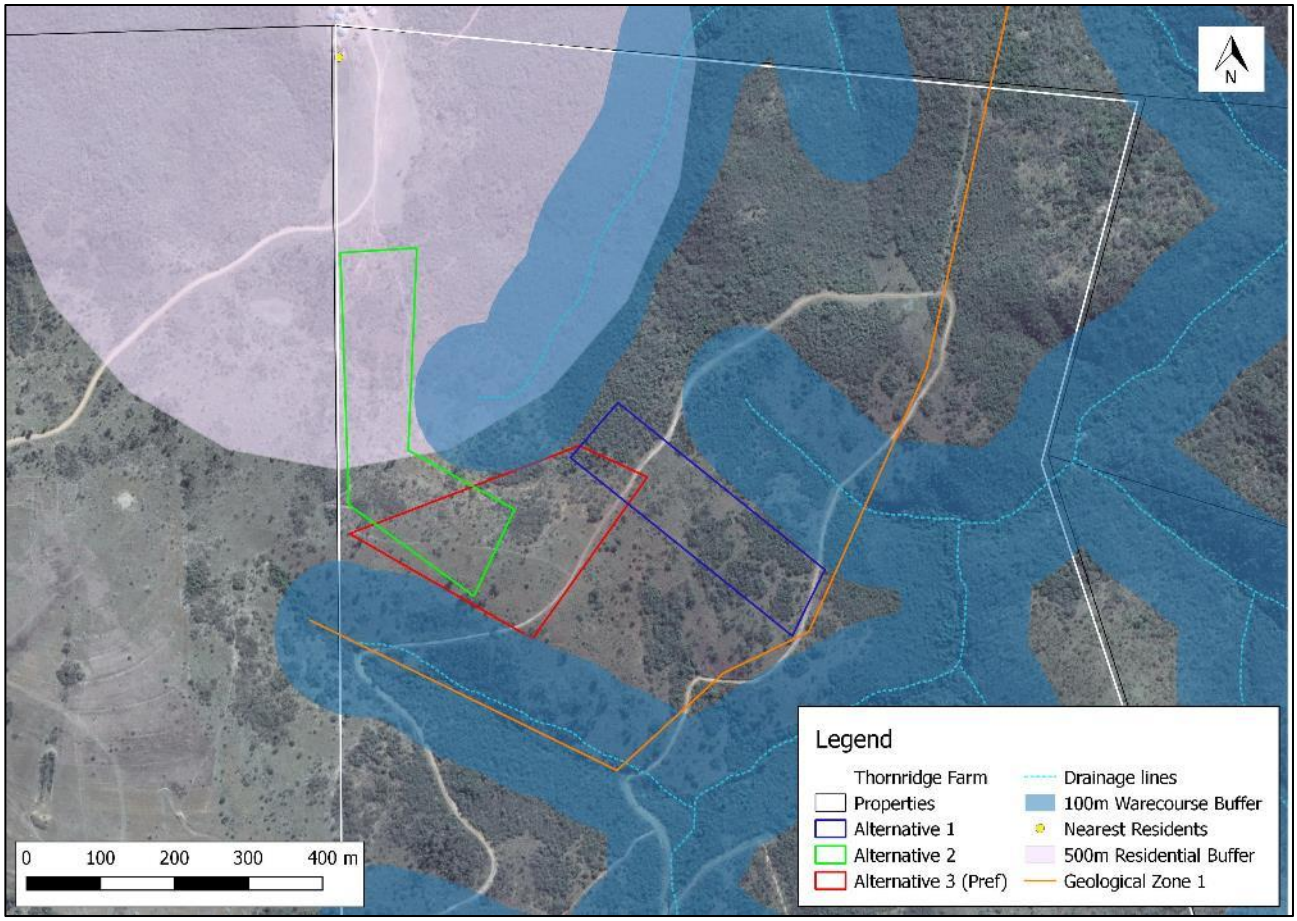
- Initial geological investigations indicated an eastward-north-eastward trending spur dominating the northern portion of the property (i.e. “Geological Zone 1” shown by the orange line in Figure 3 below). This portion of the property was regarded by geologists as the best area on the property to mine the desired tillite[3] material. Aggregate Investigation attached under Appendix C.
- An aquatic specialist delineated all watercourses in and adjacent to zone 1. As per Government Notice 704, mining is not permitted within 100m of a watercourse. Therefore a 100m buffer was placed on the watercourses to advise the preferred mining area (see blue shading in Figure 3). The Aquatic Assessment is attached under Appendix C.
- A vegetation specialist mapped the vegetation across the property (“Report on Vegetation of Thornridge Farm, Cato Ridge” attached under Appendix C). Degraded vegetation was plotted in the southern portion of the property, where industrial platforms are proposed, and in the middle of the property. As far as possible, the preferred site was located in this degraded area.
- As per Regulation 4.16(2)[4], no blasting operations are to be carried out within a horizontal distance of 500m of any structure unless a risk assessment is carried out to identify any required mitigation measures. A 500m buffer was therefore calculated from the nearest residential household, in the north-western corner of the property and this buffer avoided in the preferred layout. The 500m buffer is shown in white in Figure 3.
- Existing dirt farm roads to be used to access the preferred site.

The preferred layout alternative for the quarry (outlined in red in Figure 3 below), was accepted by DMR on the 30th March 2017, when the Final Scoping Report was approved. Since layout alternative 2 (green in Figure 3), falls within the 500m blast radius of the nearest residential household, this was not considered a feasible alternative and will not be assessed further in the EIA. Layout alternative 1 (purple in Figure 1), has been assessed under section 7 as an alternate layout for the quarry.

[3] “Tillite” is a sedimentary rock consisting of consolidated masses of unweathered blocks and glacial till in a rock matrix. The matrix is dark gray to greenish black in colour and consists of angular quartz and feldspar grains and rock fragments in a very fine-grained paste (https://global.britannica.com/science/tillite).

[4] Mine Health & Safety Act, 1996 (Act No. 29 of 1996): Regulations Relating to Explosives published on the 10th July 2015 in Government Gazette 38970 GNR 584.

Figure 3: Proposed Layout Alternatives for the Thornridge Farm Quarry. Layout Alternative 3 (preferred) is outlined in red with the other two alternate sites shown in green & blue (source: Google Earth Pro, 2017).



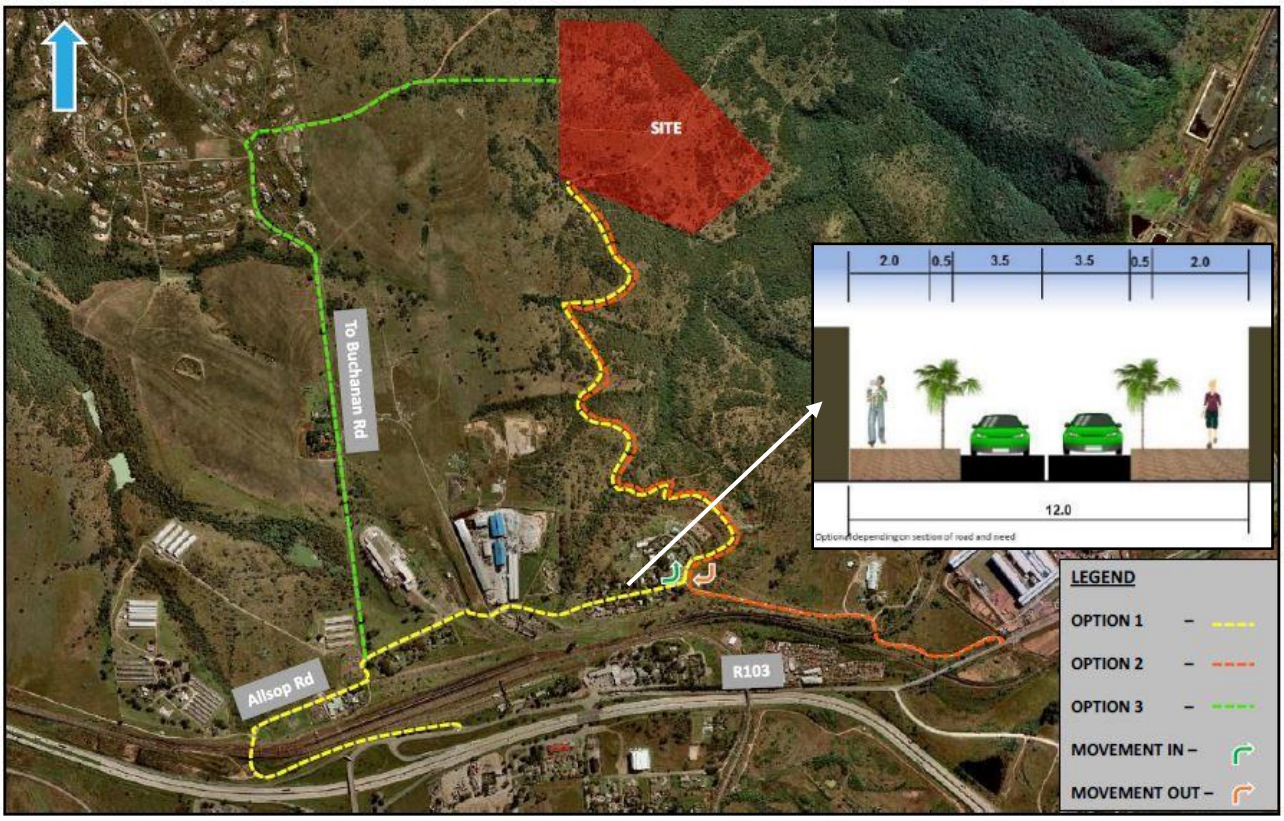
Access Alternatives

A Traffic Impact Assessment (TIA) was carried out by Arup to identify the best practical access to the site and recommend any upgrades that may be required as a result of the increase in traffic. The TIA has been attached under Appendix C. Three access alternatives were considered by the specialist (Figure 4 provides an overview of the various options):

- Alternative 1 (preferred): Approaches the site from the west and is an existing asphalt road. This route intersects with the R103 to form a formal intersection. The route crosses the rail line via a rail underpass that is two lanes wide. The route passes through a cluster of residential dwellings located south of the site.
- Alternative 2: Approaches the site from the east. The route is an existing gravel road. This route intersects with the R103 to form an informal (illegal) intersection. The route crosses the Assmang Spur rail line via a rail underpass that is a single lane wide. KZN DoT advised that there is no chance of formalising this intersection at this location as the intersection spacing is below the minimum requirements and therefore this alternative was not considered further.
- Alternative 3: Approaches the site, initially travelling north onto Buchanan Road and entering the site from the west of the site. This route travels through a cluster of residential dwellings located west of the site. Bunchanan Road is a 5m wide road, which consists of a single lane in each direction. A 5m road is too narrow for heavy vehicles and would need to be widened, a section of the route passes through a large residential cluster and the applicants would need to expropriate land for the new access from the neighbouring property. This alternative was therefore not considered further.

In order to accommodate the heavy vehicles from the mining area, Allsop Road is to be widened to 7.0m width with a 0.5m buffer and then a 2m side walk on either side (total of 12.0m road width). The current road reserve is 12m. The affected area of road passing through the small residential area is 250m long (section 15 of the TIA attached under Appendix C). An image of the upgrade requirement is illustrated in Figure 4 below.

Figure 4: Possible access alternatives to the proposed Thornridge Farm Quarry & recommended upgrade (source: Arup, 2017).



Technology Alternatives

In terms of the mining method proposed, overburden will be cleared using an excavator and soft material will be cut back. Work benches will be cut into the mining area and material will be removed using controlled blasts (see Mine Works Plan in Appendix C). The loosened material will be removed using excavators and transported to the crushing and screening plant area. This is the standard methodology used to mine hard stone material and is therefore the only feasible technology alternative considered throughout the EIA process.

An alternative method would be to crush and screen the material at an offsite location. The applicant would need to provide and retain proof at the Thornridge Farm Quarry that the site processing the material further is permitted to do so. It therefore does not make logistical sense to transport truckloads of material to be screened and then crushed at an alternative site. The Works Manager will have more control over the processing process, which will be located in the south-east corner of the preferred quarry site. There is therefore an opportunity to ensure that best practice measures are carried out during the processing (as per the Environmental Management Programme, to be attached to the EIR).

The No Go Alternative

No mine will be established on the property and the land will remain as it is. No impacts associated with mining activities will occur. There are a number of future developments planned for the Cato Ridge area (see section 5 for a further description on the need and desirability of the quarry), which will require a reliable, nearby source of construction material. Without the proposed Thornridge Farm Quarry in the Cato Ridge area, contractors will need to heavily invest in transportation costs to ascertain material for construction. There will be no positive economic benefits associated with employment or the establishment of a locally available source of material for construction and development. Material described by the geologist as “good quality”, will be sterilised[5].

[5] GeoZone “The Results of an Aggregate Investigation carried out on the Thornridge Farm in Cato Ridge, KZN” (2015). Attached under Appendix C.

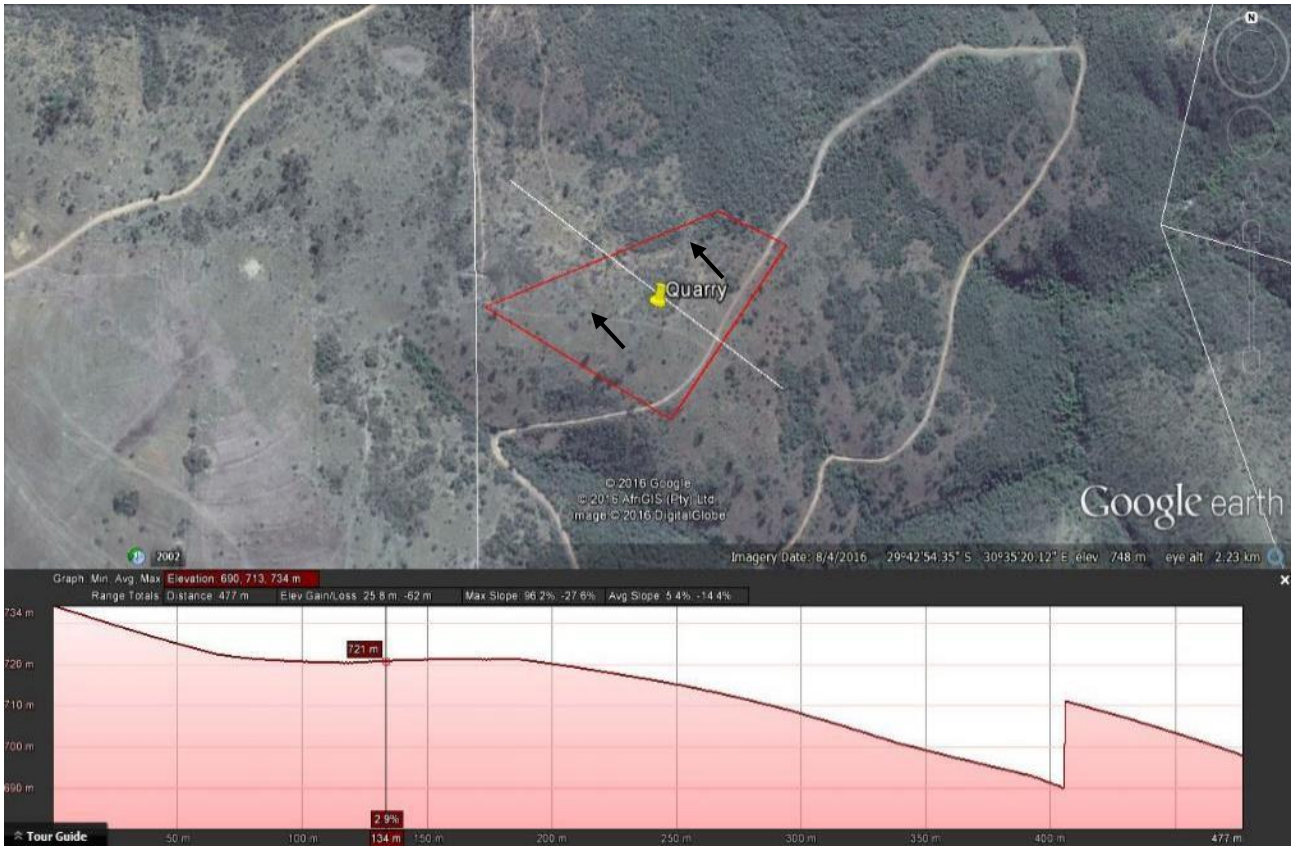
Section 3: Site Description and Surrounding Land Use as per Section 3 (1) (h) (iv)

A summary of the findings of the various specialist reports is included under this section as per section 3 (1) (k) of the NEMA EIA Regulations[6]. It is important to note that the specialists assessed the entire property to gain insight into the condition and biodiversity hotspots across the 198 hectare property. The specialists then concentrated on assessing the preferred 4.599 hectare quarry site in the context of the entire property. Impacts identified by the specialists as well as recommended mitigation measures are provided in section 6 of the EIR. Copies of all specialist reports are attached under Appendix C of the EIR.

3.1 Geographical, Physical Characteristics of the Site and Surrounding Land Uses

The property has an elevation range of 585 – 740m above mean sea level (Aggregate Investigation, Appendix C). An elevation profile of the hill, which is to be mined, is provided in Figure 5. The south facing side of the hill will be mined. Photographs taken of the proposed Thornridge Quarry showing the surrounding topography are included in Figure 6. The N3 Highway is located directly south of the quarry and easily accessed via the R103. The quarry itself is surrounded by vacant land with the nearest infrastructure located 620m north, where there is a small cluster of rural houses. There is a rural town 770m west of the quarry with the nearest industrial site 800m south-west of the quarry. Assmang Manganese is located 1.3km east of the quarry, across the valley. Surrounding land uses have been illustrated in Figure 7. There are no servitudes or services associated with the quarry site itself. There is a powerline 420m north-east of the quarry (illustrated in yellow in Figure 7).

Figure 5: Elevation profile of the hill where the proposed Thornridge Farm Quarry is to be located. Mining direction is shown by black arrows (source: Google Earth Pro, 2017).



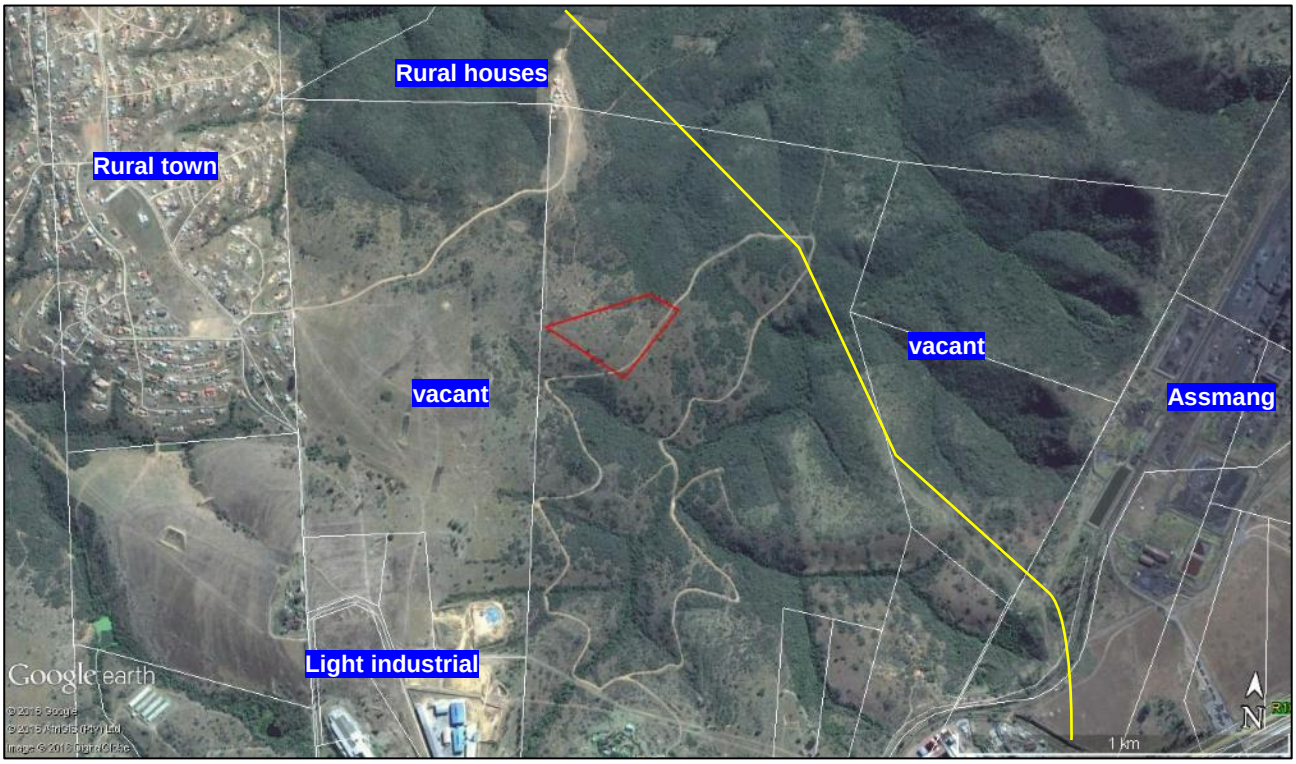
Section 5 of the Aggregate Investigation describes the geology of the site, which is largely underlain by tillite of the Dwyka Group, which has been downfaulted against granite of the Natal Metamorphic Province. This fault trends north to south and lies towards the eastern margin of the property. Sandstone of the Natal Group may outcrop in the extreme eastern corner of the site. The Dwyka Tillite is composed of an assortment of rock types deposited from the bed load of an advancing ice sheet. These pebbles, cobbles and boulders randomly occur in a fine grained greenish grey matrix.

[6] Environmental Impact Assessment Regulations (2014) published under sections 24(5) and 44 of the National Environmental Management Act, 1998, in Government Gazette No. 40772 on the 07th April 2017.

The Aggregate Investigation, prepared by GeoZone and attached under Appendix C, concludes that there is an estimated 13 902 000m^3 of material available for quarrying in Zone 1. The Aggregate Crushing Value (ACV) is less than 30 which indicates that the material is of good quality (section 10 of the Aggregate Investigation).

Figure 6: Photographs showing the topography and characteristics of the Thornridge Quarry site (a) Photograph taken facing north up the slope of the proposed quarry site, and (b) Photograph taken from the centre of the site facing south-east towards the existing access road across the property.

Figure 7: Aerial photograph showing the location of the Thornridge Farm Quarry in the surrounding landscape. The powerlines are indicated with a yellow line (source: Google Earth Pro, 2017).



3.2 Surface Water

The Biodiversity Company carried out Aquatic and Wetland Assessments across the property to delineate all watercourses, determine the current state of the aquatic systems surrounding the proposed quarry site and identify the risks associated with the quarry on the watercourses. The quarry falls within the U20J Quaternary Drainage Region within the Mvoti to Umzimkulu Water Management Area. The region has a mean annual precipitation rate of 800 to 1 500 mm and is considered humid.

It is important to note that the Aquatic and Wetland Assessments provide a holistic study of the entire property and includes mitigation measures and management plans provided for development of the proposed light industrial platforms in the southern portion of the property (not part of this application) and the proposed quarry. The information and mitigation measures provided in the report that are specific to the proposed quarry, have been included in the impacts section and EMPr attached under Appendix E.

There are a number of drainage lines on the property, which drain down the sides of the steep hills into a valley. A tributary of the Mshwati Stream flows in a northerly direction out the property towards the main channel of the Mshwati River. The drainage lines and tributary associated with Portion 55 of Uitkomst and Doornrug No. 852 are shown in light blue in Figure 8 below. The Aquatic Assessment concludes that the system is in a moderately modified state due the condition of the instream and riparian habitat, availability and continuity (section 10 of the Aquatic Assessment).

The National Freshwater Ecosystem Priority Areas (NFEPA) database shows two wetland systems within 500m of the quarry. Both of these wetland systems are however artificial ponds / dams. The wetland specialist delineated channelled valley-bottom wetlands areas associated with the drainage lines on the property however, due to the steep topography and shallow soils, the wetland areas are narrow and confined to the channels of these drainage lines (section 7.1 of the Wetland Assessment). The wetlands are shaded in green in Figure 8 and are in a largely natural state (section 9 of the Wetland Assessment). There will be no loss of wetland area associated with the quarry.

The existing access road crosses four drainage lines and associated wetland area (circled in yellow in Figure 8). There is little to no infrastructure currently in place at these crossings which will need to be formalised to accommodate heavy vehicles on the road. The road will be widened by 8m (total width of 12m) and 600mm diameter pipes will be used to allow drainage of water underneath the road. The design that will be used is attached under Appendix G of the TIA. Photographs of the crossings are included under Figure 9.

Taking into account the location of the preferred quarry site, the specialist stated that there are no direct potential risks to any of the wetland areas (see section 9 of the Wetland Assessment attached under Appendix C). The significance of the impacts resulting from the road crossing the wetlands is considered low with negligible impacts to the hydrology and geomorphology caused by the crossings. Apart from where the access road crosses the drainage lines and wetlands, the recommended buffer of 18m from the edge of the wetlands has be retained in the preferred quarry location.

All clean surface water runoff from surrounding slopes will be diverted away from the mining area using berms. Potentially contaminated run off from the mine area itself will be diverted into the onsite sump and will not be permitted to discharge into the surrounding environment or any watercourses. Water collected in the sumps will be treated as potentially contaminated and will only be used for dust suppression within the mine area. The dirt access road will also require dust suppression however clean water will be brought onto site for dust suppression outside of the mine area. The water will be obtained from a municipal source. A site specific stormwater management plan will be submitted to the DWS as part of the Water Use Authorisation application.

Figure 8: Aerial image showing the aquatic environments associated with Portion 55 Uitkomst & Doornrug 852. The access road crosses 4 drainage lines, shown in yellow (source: QGIS, 2017).

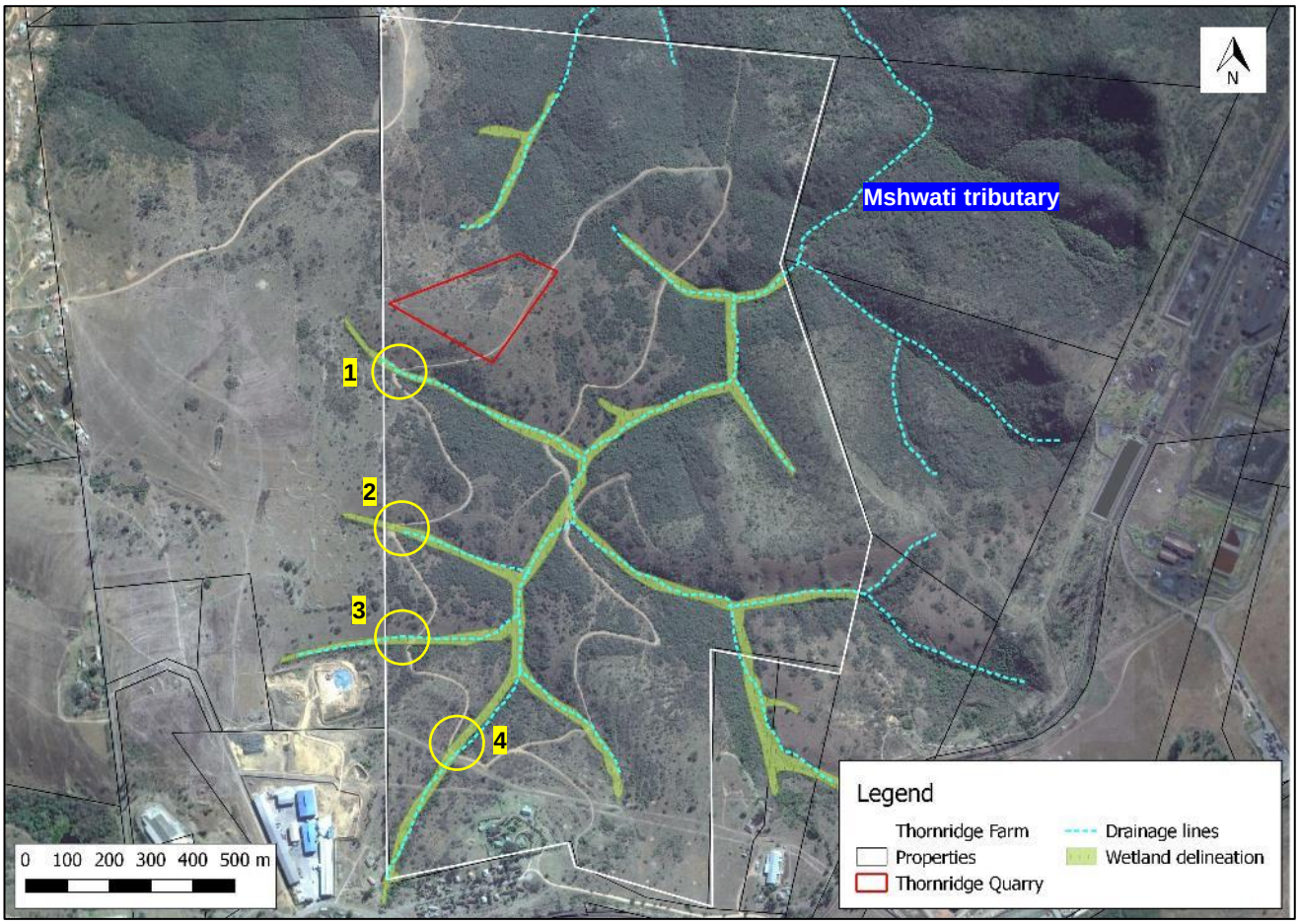


Figure 9: Photographs of where the access road crosses (a) Drainage line 1; (b) Drainage line 2; (c) Drainage Line 3; and (d) Drainage line 4.

3.3 Flora

The northern half of the property, where the quarry is proposed, falls outside of the South African National Biodiversity Institute's Geographical Information System (GIS) overlay. The GIS overlay is largely based on a desktop assessment (i.e. coarse scale) and therefore a vegetation specialist was commissioned to conduct site visits to assess the vegetation associated with the property at a finer scale. A Vegetation Assessment was initially conducted across the entire property to assist with locating the preferred quarry site (Report on Vegetation of Thornridge Farm, Cato Ridge) and an additional assessment was done within the preferred quarry site (Report on Vegetation within a Proposed Mining Permit area on Thornridge Farm, Cato Ridge). The second assessment is referred to as the Phase 2 Vegetation Assessment in the text below. The assessment also took into consideration the widening of the access road. David Styles' report therefore accurately plots the various vegetation types across the property and quarry site as well as the protected / red listed species. Both vegetation reports are attached under Appendix C and are summarised below. A species list is provided in Appendix 3 of the second Vegetation Assessment. Photographs showing the current condition of the vegetation on the property are provided in Figure 11.

Provincial mapping shows three vegetation types across the property, with the mine area falling within KZN Hinterland Thornveld. It is described as "open thornveld dominated by *Acacia* species on undulating plains found on upper margins of river valleys[7]". It is considered a "vulnerable" vegetation type by KZN Wildlife. None is statutorily conserved and about 22% is transformed to agriculture and urban development. Little of this vegetation type occurs within the eThekwini Municipality. Based on the survey, the vegetation within the proposed 4.99 hectare Mining Permit area is shown in Figure 10 and consists of:

- Degraded Vegetation (2.89ha)
  Little plant diversity value as the area has suffered disturbance in the past from cultivation, grazing and alien invasion. The area contains grassland species which flourish under conditions of disturbance and common indigenous species. Pioneer woody or shrubby plants are encroaching into the grassland. Alien plant invasion is present with the main invasive tree being *Acacia mearnsii* and the main shrub being *Lanata camara*.

- Disturbed Grassland & Secondary Vegetation (0.96ha)
  Grassland areas are dominated by *Aristida junciformis.* Varying herbaceous diversity with a number of red listed, endangered and "interesting species" (section 4.3 of the Phase 2 Vegetation Assessment). Five species protected under the KZN Conservation Ordinance were identified in grassland in tillite on the Thornridge Farm and are therefore likely to be present in the proposed mining area (*Aloe setosa, Cyrtanthus contractus, Eulophia clitellifera, Ledebouria apertiflora* & *Ledebourea ovatifolia*).

- Thicket-Grassland Mosaic (1.14ha)
  The grassland consists of larger or smaller patches amongst diffuse to closed thicket. There is also mixing between herbaceous grassland species and herbs of thicket, giving the grassland a rather unusual character. In addition to grassland species listed above, other species also occur in the grassy parts of the thicket-grassland mosaic at Thornridge Farm. Most are either not found or found rarely in grassland elsewhere at Cato Ridge. A population of *Aloe pruinosa* was found in the northern corner of the mining area (0.21 hectares). *Aloe pruinosa* is Red Listed as Vulnerable and protected under the KZN Conservation Ordinance. There are four other protected species in this vegetation component but not all occur in the proposed mining area.

The existing access road traverses grassland, grassland-thicket mosaic and thicket. There is a skirt of ruderal and alien vegetation along the proposed access road upgrade, which will be cleared. The widening of the road of the road from watercourse crossing 3 to the mine area (900m) will impact on some better quality vegetation either through clearing or because of dust generated by heavy vehicles. *Aloe maculata* was identified along the route and the species location illustrated in Figure 11. A single example of *Boophone disticha* (protected and red listed as Declining) was also seen next to the roadside as shown in Figure 11.

The operation of the proposed Thornridge Farm Quarry and access road will result in the cumulative clearance of approximately 0.96 hectares of disturbed grassland and secondary vegetation and 1.1 hectare of thicket-grassland mosaic at the preferred quarry site. The remaining 2.89 hectares of vegetation cleared is disturbed vegetation with little plant diversity. A further 0.72 hectares of good quality thicket and thicket-grassland mosaic will be cleared for the upgrading the access road. As per section 7 of the Phase 2 Vegetation Assessment, *Aloe maculata* species within the road upgrade footprint will not be relocated as this can also cause disturbance where excavations take place in good quality vegetation. Approximately 100 *Aloe pruinosa* species will need to be relocated from the northern corner of the quarry area, once mining commences in this section.

[7] Section 3.2 of David Style's "Report on Vegetation within a Proposed Mining Permit area on Thornridge Farm, Cato Ridge, 2017.

Figure 10: Map showing the vegetation associated with the Thornridge Farm Quarry (source: Vegetation Assessment, 2017).

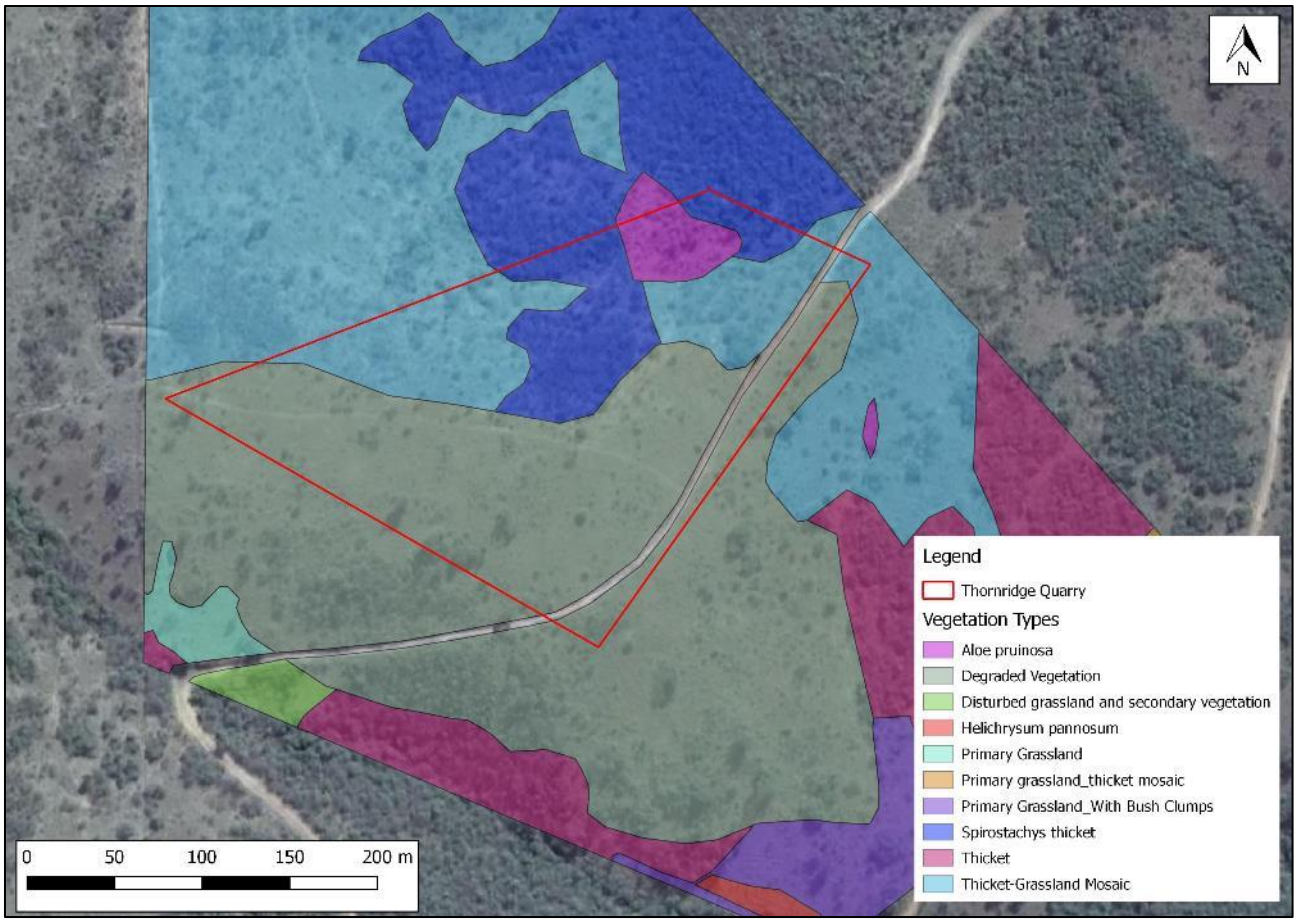


Figure 11: Location of Red Listed and Protected flora species associated with the preferred Anniedale Quarry site (source: Vegetation Assessment, 2016).

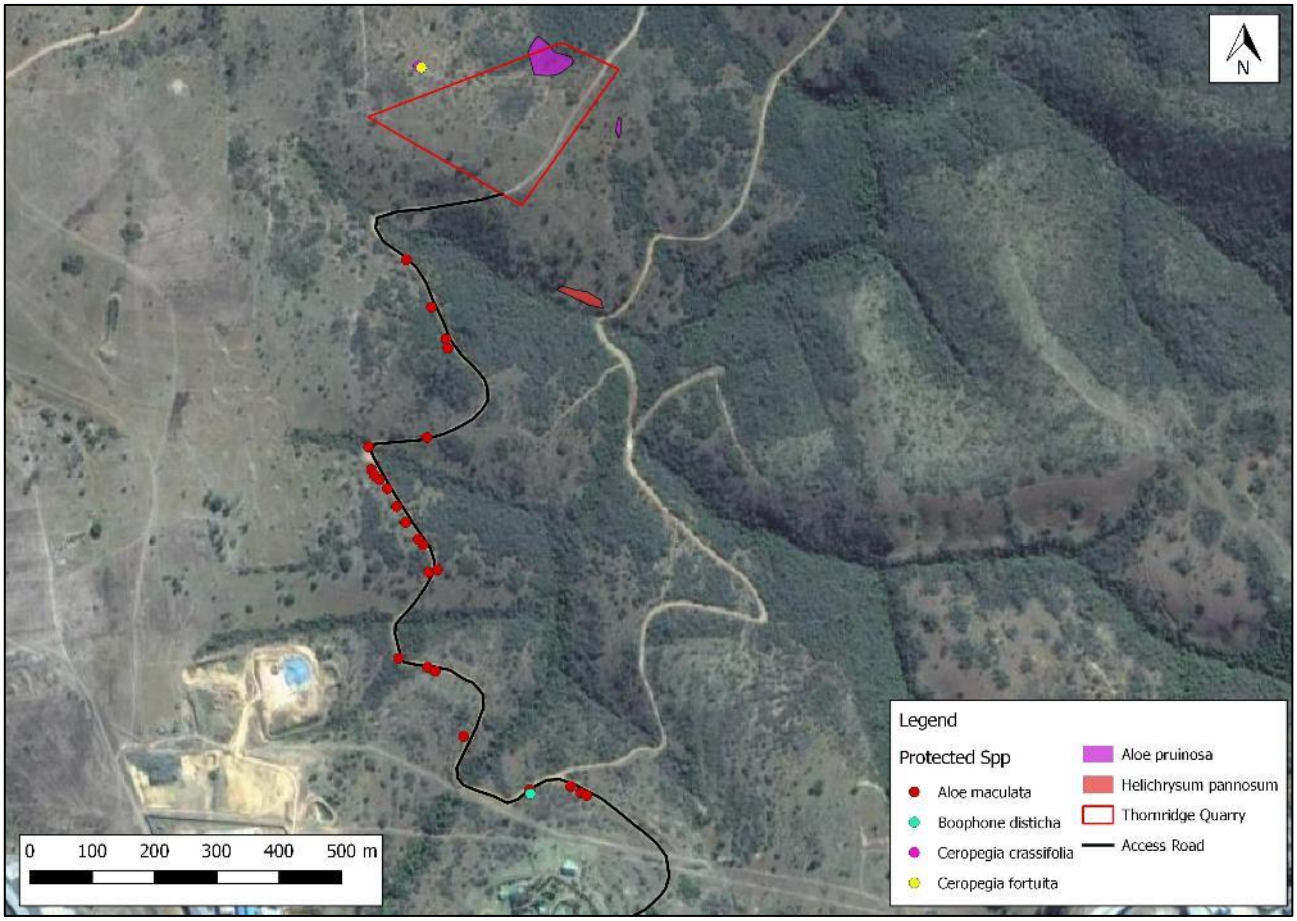
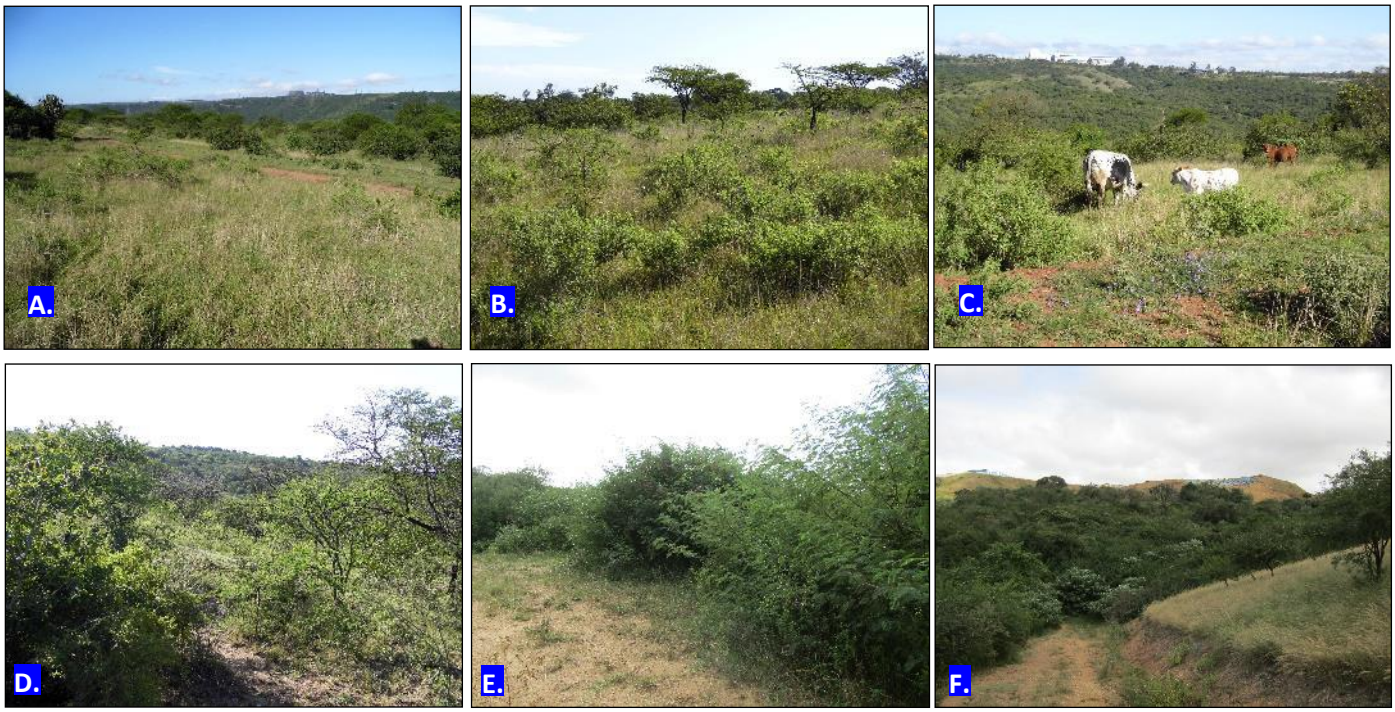


Figure 12: Photographs showing the general condition of the vegetation on the preferred Thornridge Farm Quarry site (a) Photograph of the centre of the proposed preferred mining area facing south; (b) Bush/thicket encroachment into the centre of the site; (c) Cattle grazing nearby the proposed quarry site; (d) Woody shrubs along the north-eastern boundary of the quarry; (d) Thick vegetation along the edges of the access road; and (f) Photograph of the access road as it leaves the quarry area. The transition between grassland and thicket is noted.



The entire property has been included in the Durban Metropolitan Open Space System (DMOSS; Figure 13). DMOSS covers a wide range of open space types (grassland, water, forests etc.) and physically links these open spaces to allow for flow of genetic material, energy, water and nutrients[8]. The open space also provides a link connecting rivers and catchments to the coast, maintaining biodiversity in the eThekwini area. DMOSS has been incorporated into the eThekwini town planning schemes as a control area / overlay. The applicant is to apply for DMOSS to be relaxed across this portion of the property.

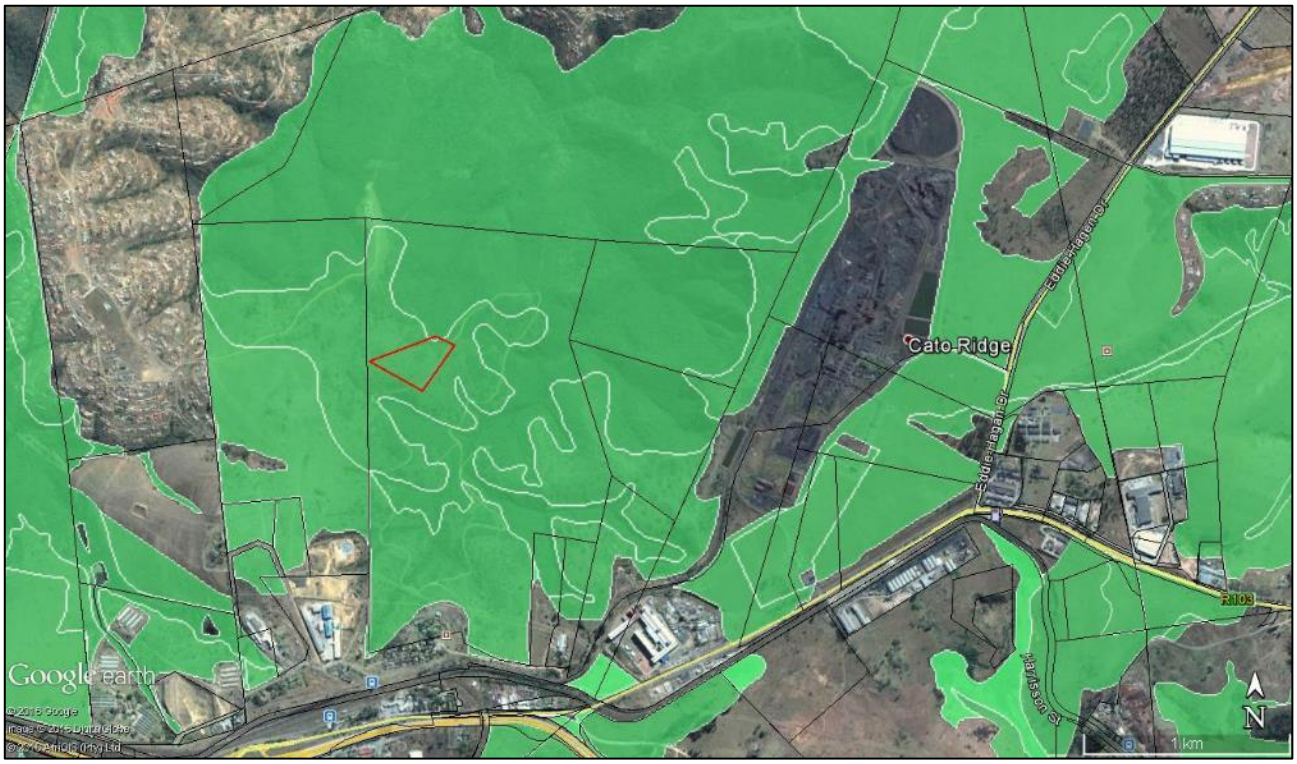
eThekwini Environmental Planning and Climate Protection Department (EPCPD) provided comment on the application during the Scoping Phase. EPCPD do not support the Mining Permit application due to the "ecological value and sensitivity of the site" (see eThekwini comments attached under Appendix B of the EIR). The edge effect of the quarry on the surrounding vegetation was also highlighted as a concern during the site visit with eThekwini on the 22nd March 2017. The southern portion of the property is currently undergoing rezoning for three light industrial platforms (area of approximately 28 hectares). EPCPD requested that the remainder of the property be formally protected as a conservation area (i.e. 170 hectares). The applicant is willing to come to an agreement with eThekwini EPCPD to donate a large portion of the property to conservation. With experience in the mining industry and the good quality stone on the property, a quarry has therefore been proposed. The landowner is aware that the remaining, undisturbed areas on the property provide valuable ecological services and will need to be formally protected for environmental conservation. The matter is being discussed between the town planner and eThekwini's Planning Department.

The quarry has been located at a horizontal distance of 100m from any delineated watercourses to reduce any risks to aquatic environments, as per DWS requirements[9]. The majority of the mining area (2.87 hectares) falls within degraded vegetation with little plant diversity. As per the recommendations of the vegetation specialist, if mining occurs, it will need to be linked to registering a conservation servitude over areas of good quality vegetation outside the development footprint on Thornridge Farm. A long-term Conservation Management Plan, including the exclusion of cattle from the property, with upfront agreement on costing and funding aspects will be implemented for the remainder of the natural area (further discussed in section 7.2). Please refer to the specialist studies attached under Appendix C, which have been used to identify the preferred quarry site on this portion of the property.

[8] D'MOSS boundaries and D'MOSS GIS (http://www.durban.gov.za/City_Services/development_planning_management/environmental_planning_climate_protection/Durban_Open_Space/Pages/D%E2%80%99MOSS-boundaries-and-D'MOSS-GIS.aspx). Accessed on 11/01/2017.

[9] Regulation 4(a) of Government Notice 704 published in government Gazette No. 20119 on the 04th June 1999.

Figure 13: Aerial image showing Portion 55 of Uitkomst & Doornrug 820 and the DMOSS overlay shaded in green (source: Google Earth Pro with eThekwini GIS overlay, 2017).



3.4 Fauna

Grazing by cattle was identified by the vegetation specialist as one of the main current impact on the vegetation at Thornridge Farm[10]. Cattle, not owned by the landowner, were permitted to graze on the farm by the previous owners, who did not maintain fences, lacked the resources to exclude them and feared security issues if they attempted to do so. According to the vegetation specialist, the number of animals grazing on the farm has increased since the original vegetation survey conducted in 2015. This grazing is not compatible with maintaining the natural vegetation on the farm in very good condition in the long term.

According to the Ezemvelo KZN Wildlife Minset Map there is the potential for 8 threatened species of Millipede, 2 threatened Molluscs species and one grasshopper species to be found in the study area. The species are as follows:

- *Spinotarsus maritzburgenis* (Millipede)
- *Patinatius bidentatus simulator* (Millipede)
- *Spinotarsus destructus* (Millipede)
- *Doratogonus falcatus* (Millipede)
- *Gnomeskelus spectabilis* (Millipede)
- *Camaricoproctus planidens* (Millipede)
- *Gnomeskelus tuberosus urbanus* (Millipede)
- *Spinotarsus glomeratus* (Millipede)
- *Gulella separata* (Mollusca)
- *Gulella euthymia* (Mollusca)
- *Odontomelus eshowe* (Grasshopper)

Apart from the construction of the light industrial platforms in the southern portion of the property and the quarry site, the remainder of the property will remain undeveloped and open to existing species occurring in the area. Once construction activities commence for the quarry, mobile species will naturally move away from the disturbance however there will be a loss of some of the species within the 4.99 hectare mining footprint.

3.5 Heritage and Cultural Aspects

A Heritage Impact Assessment (HIA) was carried out by Active Heritage in October 2016 to determine the impact of the mine on the site and surrounding outlook. The findings of the HIA are summarised below with the report attached under Appendix C.

[10] Section 5 of David Styles "Report on Vegetation within a Proposed Mining Permit Area on Thornridge Farm, Cato Ridge" (2017).

The Cato Ridge area is relatively well covered by archaeological surveys with the area containing mostly Early Stone Age material close to open water. Various buildings and homesteads belonging to the Victorian and Edwardian periods occur in the area. The specialist stated that although the greater Cato Ridge area contains an abundance of archaeological sites, none were located within the footprint. The area is also not part of any known cultural landscape. The Thornridge Farmstead, in the southern section of the property, contains some buildings with features that are older than 60 years. The proposed quarry will not impact the old Thornridge Farmstead and therefore the remainder of the property can be developed, from a heritage perspective (section 6 of the HIA).

3.6 Socio-Economic Environment

The area is rural in nature with the southern portion of the property being re-zoned for light industrial development. The N3 is easily accessible off Allsop Road and the R103. Thornridge Farm is surrounded by a mixture of light and heavy industry to the south and east with rural open land to the north and west. The nearest residential house is 620m north of the quarry site. Due to the close proximity of the N3, it is anticipated that light industry / mixed-use developments will be on the increase in this area in the future, in anticipation of the N3 “development corridor”. Please refer to Figure 7 above showing surrounding land-uses and section 5 on the future development of the immediate area.

Section 4: Policy and Legislative Context

4.1 Description of the Policy and Legislative Context and Compliance of Proposed Activity to the Legislation and Policy as Per Section 3 (1) (e).

National Legislation	Compliance of Activity
National Environmental Management Act 1998	The National Environmental Management Act (Act 107 of 1998) is South Africa's overarching environmental legislation. It includes a set of principles that govern environmental management and against which all Environmental Management Programmes (EMPrs) and actions are measured. These principles include and relate to sustainable development, protection of the natural environment, waste minimisation, public consultation, the right to an environment that is not harmful to one's health or wellbeing, and a general duty of care. The Environmental Impact Assessment (EIA) Regulations, 2014: GN R.327, R.325, and R.324 under Section 24 of the NEMA define the activities that require Environmental Authorisation and the processes to be followed to assess environmental impacts and obtain Environmental Authorisation. Environmental authorisation is required for the proposed mining activity including the processing of the raw material on site and clearance of vegetation. Therefore this application is in line with the requirements of NEMA.
Environmental Conservation Act 1996	Makes provisions for the application of general environmental principles for the protection of ecological processes, promotion of sustainable development and the protection of the environment. This Act has mostly been repealed by NEMA.
Mineral and Petroleum Resource Development Act 28 of 2002	Makes provisions for equitable access to and sustainable development of South Africa's mineral and petroleum resources. This EIA process forms part of the application for a Mining Permit, as contemplated in section 27 of the Mineral and Petroleum Resource Development Act (MPRDA).
National Water Act 1998	Provides for fundamental reform of the law relating to water resources in a water scarce country. Section 21 of the National Water Act (NWA) lists certain water uses requiring a Water Use License from the Department of Water and Sanitation (DWS). A Water Use Authorisation (WUA) will be required for the mining activities. The WUA application is running concurrently with the EIA process. The following water uses have been identified: s21 (g) – stockpile areas, sump and dust suppression; and s21(c) & (i) – development within 500m of wetland.
National Waste Management Act 2008	Reforms the law regulating waste management to prevent pollution and ecological degradation. Section 19 allows the Minister to publish a list of activities, which require a Waste Management License. The most recent list is published in Government Gazette 37083 Notice No. 921 dated 29 November 2013. The proposal will not trigger a Waste Management Activity.
National Environmental Management Biodiversity Act 2004	To provide the framework, norms, and standards for the conservation, sustainable use and equitable benefit-sharing of South Africa's biological resources. Section 52 allows for the publication of a list of threatened ecosystems in need of protection. The list was published in Government Gazette No. 34809 Notice No. 1002 dated 9 December 2011. This site is not located within an endangered ecosystem type and therefore does not require environmental authorisation for this aspect.
National Heritage Resources Act 25 of 1999	For the protection of South African Heritage to nurture and conserve communities legacy. The Heritage Impact Assessment did not identify any features of cultural or architectural significance associated with the quarry site.
Provincial Legislation	**Compliance of Activity**
KwaZulu-Natal Nature Conservation Ordinance No. 15 of 1974	The Ordinance provides measures for the management of nature conservation, not only within KZN but also within protected areas in the Province. The Amendment Act schedules specially protected indigenous

	animals and plants and provides certain legal protections for the scheduled species. It also sets out a system of permitting for certain activities. There are species on the property, identified by the vegetation specialist, that are protected by the provincial conservation ordinance. Plants protected by the provincial conservation ordinance may not be lawfully destroyed, damaged or relocated without permit authorisation from Ezemvelo KwaZulu-Natal Wildlife.
Municipal Planning Framework	**Compliance of Activity**
eThekwini Municipality Spatial Development Framework 2016/2017 (SDF)	The intention of the Thornridge Quarry is to supply material for future developments and service delivery within the Cato Ridge area and beyond. Cato Ridge has been identified in the SDF as one of the industrial expansion and potential dry port areas in the Municipality that can respond to the increasing demand for industrial land in eThekwini Municipality. By improving the infrastructure in the Cato Ridge area and upgrading the N3 the area can be unlocked for industrial and logistic development. According to the SDF, the development of Cato Ridge will also serve as a stimulus to unlocking the potential of the surrounding areas of Mpumalanga and Hammersdale. Traffic issues, particularly the limited accessibility off the N3 to vast portions of land, was identified as one of the key challenges in the Cato Ridge Area. The quarry will supply the Cato Ridge area with a legal supply of good quality construction material for future development and road infrastructure upgrading.
Cato Ridge Local Area Plan & Precinct Plans (May 2012; LAP)	The document prepared by Graham Muller Associates Consortium provides a development vision for the Cato Ridge area. According to the Conceptual LAP, the proposed quarry is located in an area with “steep topography” which is “environmentally sensitive”. The Cato Ridge Industrial Precinct Land Use Management Plan shows the property falling in Public Open Space / Conservation.

Section 5: Motivation, Need and Desirability

5.1 Need and Desirability as Per Section 3 (1) (f)

As per the NEMA Guideline on Need and Desirability, "the concept of need and desirability can be explained in terms of the general meaning of its two components in which *need* refers to *time* and *desirability* to *place* i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed?"[11].

According to the Cato Ridge LAP, the national and provincial importance of Cato Ridge stems from its location on the N3 national route between eThekwini and Msunduzi Municipalities. It is also astride the Transnet owned and operated Natal Corridor (Natcor) railway line and pipeline servitudes. The area is also important as it has the opportunity to provide large tracts of land for industrial purposes, a land use for which space is in extremely short supply at a metropolitan scale in the long term. Due to the large tracts of open land in this area, DMOSS covers 39%[12]. Locally, the area presents an excellent opportunity for public and private sector investment and the creation of employment opportunities for the region's largely unemployed population.

According to the Cato Ridge LAP, there are three broad development visions for the area:

1. Concentrating development along the outer west corridor (i.e. along the N3, Natcor railway line and Petronet pipeline);

Portion 55 of Farm Uitkomst & Doornrug No. 852, where the proposed quarry is located, is 250m from the N3 highway (as the crow flies). The N3 is the backbone of Durban's development of the west" and "forms part of Port City / Gauteng Corridor which is of national importance" (section 1.4 of the Cato Ridge LAP). The close proximity of the N3 highway provides an ideal access network to surrounding areas and the anticipated development corridor associated with this busy route. The entrance to the property lies directly adjacent to the Natcor railway line and the petronet pipeline runs through the property.

2. Development of an industrial node providing job opportunities for the local community and contributing significantly to the economy of eThekwini;

The mine will create job opportunities (skilled and unskilled) benefiting the local economy. This is in line with the National Development Plan (2011), which introduces the long-term vision for the future development of South Africa by identifying the need to activate rural economies through the stimulation of small-scale agriculture, tourism as well as mining investments. A meeting was held with the Ward Councillor, Mr Mkhize, who has shown support for the project provided that local employment is sought (see meeting minutes under Appendix B of the EIR). The applicants are aware and willing to engage with the community for local employment opportunities, once the quarry is operational.

3. A green and welcoming service centre to the outer west region of eThekwini.

The EIA process ensures that the planning and operational phases of the Thornridge Farm Quarry fall in line with sustainable development principles listed in Chapter 1 of NEMA. The EIA process, with specialist input, guides the applicant in contributing to sustainable development by identifying the preferred site alternative for the initial placement of the quarry and proposing mitigation measures to reduce risks to the environment during the operation of the quarry. The applicant has indicated a willingness to designate open space conservation areas on the site.

Both the eThekwini SDF and the Cato Ridge LAP identify the existing local road network as limited consisting mainly of priority intersections. The envisioned increase of new developments in the area would lead to the need for widening of the roads and upgrades to intersections. One of the proposed upgrades is for the R103 to become two lanes in both directions[13]. The proposed Thornridge Quarry is well located with easy access onto the R103 and will therefore have the potential to supply road and construction material to the immediate area increasing the development potential. eThekwini Municipality also proposes to upgrade Eddie Hagan Drive to two lanes in each direction (Industrial Precinct Project List). Eddie Hagan Drive is less than 2km east of Portion 55 of Farm Uitkomst & Doornrug No. 852.

Another large development opportunity in close proximity to the proposed Thornridge Farm Quarry is Transnet's Container Terminal and truck staging area. The location is shown in Figure 14 and is located directly south-west of Thornridge Farm.

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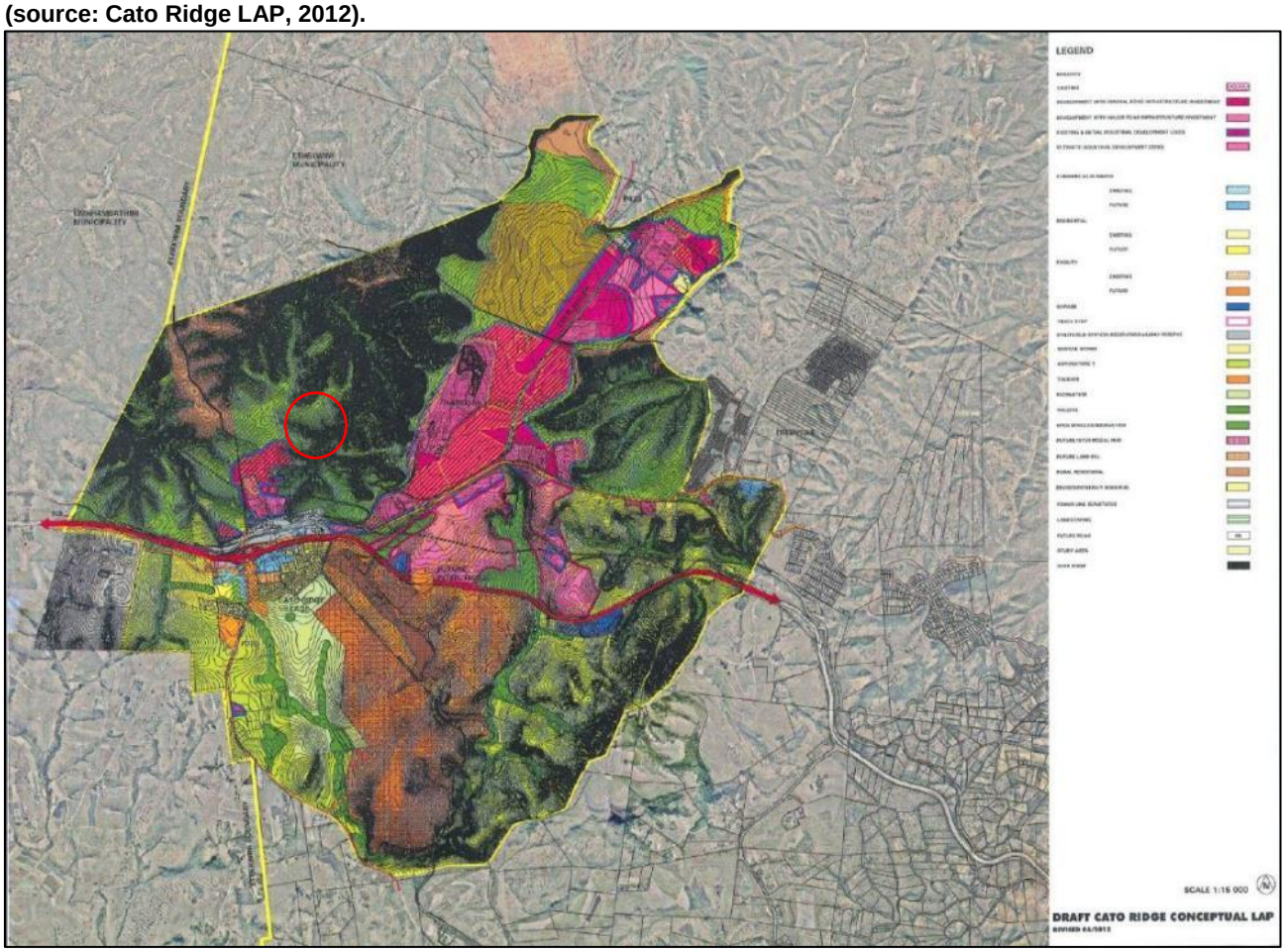
[11] DEA (2010), Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 9, Department of Environmental Affairs (DEA), Pretoria.
[12] eThekwini's Outer West Spatial Development Plan (2nd Draft) Executive Summary.
[13] Section 6.2.1 of the Cato Ridge Local Area Plan (May 2012).

Figure 14: Proposed Layout of Transnet's Container Terminal in Cato Ridge (source: Transnet Inputs to the Cato Ridge Development Indaba, August 2014).

In the Conceptual Local Area Plan for Cato Ridge, the property is identified as an "over steep area" with the valleys / aquatic environments being identified as areas allocated for open space / conservation (Figure 15). With input from the aquatic and vegetation specialists, the environmentally sensitive areas have been identified, buffered and measures included in the EMPr to reduce the risks to these environments during operation. As discussed in section 3.3 above, the applicant is willing to negotiate the zoning of large areas of the site to conservation. The location of the proposed quarry near to the N3 and Natcor railway line and within the immediate vicinity of anticipated important development projects, suitably justifies the need and desirability of the Thronridge Farm Quarry.

The material mined at the quarry will be used in the construction industry, which is an important contributor to municipal and provincial development and growth. Tillite is used for the manufacture of concrete and concrete precast products as well as in fill and road applications. As per section 5.1 of the Mine Works Program, aggregates are mainly required for the Readymix concrete industry and for road construction purposes.

Figure 15: Conceptual Local Area Plan for Cato Ridge with the location of the proposed quarry circled in red (source: Cato Ridge LAP, 2012).



5.2 Motivation for the Preferred footprint within the Approved Site as Contemplated in the Accepted Scoping Report as Per Section 3 (1) (g)

The site was selected for a Mining Permit on inspection of the underlying geology of the property and after an agreement was reached with the landowner. Since only one site can be submitted to DMR at the beginning of the process, there are no feasible site alternatives.

Layout Alternative 3 is considered the preferred layout due to the following aspects:

- It is more than 100m from any watercourse;
- It falls within “Geological Zone 1”, which has the largest volume of material resulting in a lower disturbance footprint in the long-term (i.e. don’t need to clear vegetation unnecessarily to access material);
- The location of the quarry is within “disturbed” vegetation, as mapped by the vegetation specialist;
- There is existing access to the quarry through the property; and
- The nearest residential households is located more than 500m from the boundary of the site.

Due to the nature of the material available at the Thornridge Quarry, there are no feasible technology alternatives. The technology / mining methodology is considered preferable as there is no excessive water use associated with the process. The only water used for the mining process will be that needed for dust suppression and water used by staff for drinking etc. Run off from the mined area will be collected in the sump and will be re-used in the mine are for dust suppression. Additional water may be needed for dust suppression and this will either be obtained from a municipal source or trucked in.

Section 6: Public Participation as per Section 3 (1) (h) (ii) & (iii)

As per Section 3 (h) (ii) and (iii), below is the details of the public participation process followed to date and a summary of the issues raised by interested and affected parties. Copies of supporting documents and inputs have been included in Appendices B – F.

6.1. Notification of Interested and Affected Parties

1) fixing a noticeboard at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of-

i. the site where the activity to which the application or proposed application relates is or is to be undertaken; and

ii. any alternative site;

A noticeboard was placed at the entrance to Thornridge Farm, where the proposed Thornridge Quarry will be located (English noticeboard). An additional noticeboard was placed in the nearby residential community to the south of the property (isiZulu noticeboard). Vehicles will travel through this residential area using the preferred access route. Noticeboards were erected on the 13th December 2016. The noticeboard detailed the applicant's proposed plan to mine 4.99 hectare of the site, subject to a Scoping/EIA process. See Appendix B for proof of placement of the noticeboards.

2) giving written notice, in any of the manners provided for in section 47D of the Act, to-

i. the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;

ii. the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;

iii. the municipality which has jurisdiction in the area;

iv. any organ of state having jurisdiction in respect of any aspect of the activity, and;

v. any other party as required by the competent authority;

Apart from the landowner, Circle Irrigation cc, there are no other occupiers on the property. The landowner is one of the directors of Cato Ridge Quarry (Pty) Ltd, who are applying for the Mining Permit. An official email of notification was sent to Circle Irrigation (see Appendix B). Ward Councilor Mkhize was notified of the application on the 09th January 2017 (see Appendix B for proof of notification). A meeting was held with the Ward Councilor on the 10th February 2017, where he showed support for the project. Meeting minutes are attached under Appendix B. The Ward Councilor was given a number of pamphlets which he agreed to distribute to his Ward Committee and members of the community (see attached signed letter in Appendix B). Representatives of eThekwini Municipality were notified by email. A number of stakeholders and authorities were also tracked down electronically and information has been provided to them via email on the 13th December 2016 (see Appendix B for proof).

All relevant authorities have therefore been notified of the application and were provided with copies of the Draft Scoping Report (SR). The Draft SR was circulated for a legislated 30 day comment period (16th January 2017 – 14th February 2017). All comments received within the comment period have been included in Appendix B of the Draft EIR. The Draft EIR has been made available to all registered I & APs for the legislated 30 day comment period (07th June 2017 – 07th July 2017). The Final EIR will then be submitted to DMR for assessment.

i. owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;

A map showing the properties directly adjacent to Portion 55 of Farm Uitkomst and Doornrug No. 852 has been provided in Appendix B. Notification emails were sent on the 13th and 15th December 2017 and 09th January 2017. Follow up emails were sent to all I & APs on the 07th February 2017 and the 13th February 2017. The EAP was made aware of a change in land ownership of an adjacent property on the 14th February 2017. The new owners were sent a copy of the Draft Scoping Report are now included as Registered I & APs. Please see Appendix B for proof of notification and all communications during the Scoping Phase to date.

3) placing an advertisement in-

i. one local newspaper; or

ii. any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;

4) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph I(ii);and

The project has been advertised in the Mercury (English) and Isolezwe (isiZulu). The adverts were published on the 13th and 14th December 2016 respectively. The adverts detail the proposed Thornridge Farm Quarry, Scoping/EIA process and provide contact details for EnviroPro should anyone wish to register as I & AP. Proof of adverts is provided in Appendix B.

6.2. Registered Interested and Affected Parties

42. A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of-

(a) all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;

(b) all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and

(c) all organs of state which have jurisdiction in respect of the activity to which the application relates.

The contact details of all I &A Ps that have registered have been provided in the Registered I & AP list in Appendix B.

6.3. Comments

Comments of interested and affected parties to be recorded in reports and plans.

1) The applicant must ensure that the comments of interested and affected parties are recorded in reports and plans and that such written comments, including responses to such comments and records of meetings, are attached to the reports and plans that are submitted to the competent authority in terms of these Regulations.

2) Where a person desires but is unable to access written comments as contemplated in subregulation (1) due to-

i. a lack of skills to read or write;

ii. disability; or

iii. any other disadvantage;

iv. reasonable alternative methods of recording comments must be provided for.

All comments received from I & APs to date have been recorded in the Comments and Response Table in Appendix B. The original comments provided have been provided together with a response to all comments provided in the table.

Section 7: Impact Assessment as Per Section 3 (1) (h) (v) – (viii) and 3 (1) (i)

7.1 Methodology to Determine and Rank Nature, Significance and Consequences of Impacts Associated With all Alternative as Per Section 3 (1) (h) (vi), (i) and 3 (1) (j)

Impacts are assessed qualitatively and quantitatively, looking at the duration / frequency of the activity and likely impacts associated with that activity during construction, operation and closure. If the activity happens frequently, the risk of the associated impact occurring is much higher than if the activity happens less frequently. The geographical extent of the impact is assessed i.e. will the impact be restricted to the point of occurrence or will have it have a local or regional effect. Impacts are also reviewed looking at severity levels and consequences should the impact occur i.e. will the severity be low, medium or high and then probability of the impact occurring is taken into account.

Whether or not the impact can be mitigated and the extent to which it can be avoided, managed, mitigated or reversed is assessed i.e. the probability of occurrence after mitigation has been applied. This also takes into account likelihood of human error based on construction and operational auditing experience i.e. even though spills can be completely mitigated against and prevented, there is always a small chance that spills will still occur (residual risk). Based on all of these factors, the impact is then rated to determine its significance. For example an impact can have a regional affect with severe environmental implications, however the probability of it occurring is very low and the implementation of the proposed mitigation measures means that the ultimate rating is medium or low.

Please see below a description of the scoring. The full impact scoring tables detailing how the significance rating was calculated can be found in Appendix G, as per section 3 (1) (i).

Table 1: Explanation of the scoring of the impacts identified in EIA

Scoring of Impacts	
Duration / Frequency of activity likely to cause impact	0 = No impact 1 = short term / once off 2 = medium term / during operation 3 = long term / permanent
Geographical Extent	0 = No impact 1 = point of impact / restricted to site 2 = local / surrounding area 3 = regional
Severity (level of damage caused) if impact were to occur	0 = No impact 1 = minor 3 = medium 5 = major
Probability of impact without mitigation	1 - 5 = low. 6 -10 = medium. 11 -14 = high.
Significance before application of Mitigation Measures	A score of between 1and 5 is rated as low. A score of between 6 and 10 is rated as medium. A score of between 11 and 14 is rated as high.
Will activity cause irreplaceable loss of resources?	10 = Yes 0 = No
Mitigation measures	0 = No impact - 5 = can be fully mitigated - 3 = can be partially mitigated -1 = unable to be mitigated
Probability of impact after mitigation	0 = No impact 1 = Low 2 = Medium 3 = High
Significance after application of Mitigation Measures	A score of between 1and 5 is rated as low. A score of between 6 and 10 is rated as medium. A score of between 11 and 14 is rated as high.

7.2 Preferred Site and Layout Alternative

See Appendix D for the full impacts scoring matrix, which assesses the impacts based on the above scoring system. The below impacts relates to the preferred layout, which has been approved by DMR in the Scoping Phase (i.e. Layout Alternative 3).

Table 2: Impacts and mitigation measures associated with the *preferred* layout.

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
Construction			
1. Site camp establishment. Fuel, lubricants and chemicals brought onto site as well as the setting up of ablution facilities for staff. This could lead to spills and contamination of soil / groundwater.	5 (low)	The area designated for the site camp is to be clearly marked to ensure that all mining equipment is retained in this area. It is unlikely that there will be a large amount of hazardous materials brought to site however these are to be stored in a designated area which is hard surfaced, bunded and covered. Adequate spill kits and containers for spilled and contaminated material to be on standby on site. If a spill occurs, stop the source, contain it, clean up in accordance with MSDSs and notify relevant authorities (procedure outlined in section 2.9 of the EMPr). The stormwater management system is to be established prior to any excavation taking place to ensure the separation of clean and "dirty" water. The construction of the berm around the mine area is to be established and the location of the sumps determined. The berm will divert water away from the mine area as well as containing water inside the quarry. During site camp establishment, the holder of the mining permit is mark out the boundaries of the permitted mine area (see co-ordinates in Figure 2) to ensure clearing and excavation does not encroach into the surrounding indigenous vegetation. This impact can be managed.	1 (low)
2. Clearance of indigenous vegetation during the upgrading of the access road (approximately 1.68 hectares).	10 (med)	The route follows the existing road alignment which consists of a dirt track. The road will be upgraded to safely accommodate trucks who are accessing the quarry. The surface of the road will be compacted G5 material and the existing road widened to 12m. The first 870m of the road passes through degraded vegetation with the quality of the vegetation improving over the next 900m towards the mine site. Regardless of the mitigation measures, a total of 1.68 hectares of vegetation will be cumulatively cleared during the widening of the road. In order to reduce the impacts, the following is to be carried out: • The portions of vegetation that will be cleared for the upgrade will be	7 (med)

[14] See Appendix H for more details.

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		restricted to the current road footprint and verges of the road shoulder. • Contractors must avoid damaging or removing any vegetation that is not within the footprint of the proposed road upgrade; • Heavy construction vehicles are to remain within the proposed upgrade footprint; • Regular dust suppression should take place during construction to reduce coating the adjacent vegetation with dust; • The ECO must be consulted should a tree or any vegetation outside of the designated construction footprint area require clearing; and • A suitably qualified botanist is to relocate the protected plant species, as described in the row below. This impact can be managed.	
3. Destruction of provincially protected plant species during initial clearing of the quarry area and access road upgrade.	7 (med)	The vegetation specialist identified two plant species that are protected under the KZN Provincial Conservation Ordinance within the upgraded access road footprint (*Aloe Maculata* and *Boophone disticha*). A patch of *Aloe Pruinosa* is located in the northern corner of the quarry area. The location of these protected species is provided in the EMPr as well as photographs of the plants, for ease of identification on site (section 2.3). • The relocation of *Aloe Maculata* requires substantial excavation which can cause significant disturbance to good quality grassland and therefore *Aloe Maculata* will not be relocated. The species is not threatened and occurs outside the project area on Thornridge Farm. • *Boophone disticha species are* to be clearly marked and avoided, where practical. Where this is not possible, the plants are to be relocated to another suitable habitat on the farm. • An additional site investigation is to be carried out by a suitably qualified botanist to further map the exact location of all the species within the quarry footprint prior to any clearing commencing. • The investigation and relocation is to take place in the summer months. • *Aloe Pruinosa* in the demarcated mining area are to be relocated to another suitable habitat on the farm by a vegetation specialist.	4 (low)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		• Species may not be lawfully destroyed, damaged or relocated without permit authorisation from Ezemvelo KZN Wildlife. This impact can be managed.	
4. Deposition of eroded material into the four drainage lines due to erosion.	5 (low)	Where the road upgrade takes place within close proximity to the four drainage lines crossed, the following measures must be carried out to mitigate against erosion on site: • Areas exposed to erosion must be protected through the use of sand bags, berms and efficient construction processes i.e.: limiting the extent (footprint) and duration period that areas are exposed. • No excavated material or fill material may be stored within the watercourse or within the 18m buffer zone associated with the watercourses. • Graded material that will be re-worked may not be stored within 18m of the watercourse before it is used. • Temporary stormwater measures should be implemented to ensure that material does not wash off the surface into any watercourses during construction. This impact can be managed and mitigated to a degree.	0 (no impact)
5. Erosion due to improper management of stormwater during construction.	5 (low)	Caution needs to be exercised when working near the four watercourse crossings on this road upgrade. Areas exposed to erosion must be protected. The following apply to erosion control on site: • The areas of the watercourses that are not within the direct project footprint must be demarcated as 'no-go' areas. No vehicles or site staff are permitted to enter these areas. • All construction activities occurring at the watercourse crossings must be carried out with extreme care to avoid damage to the watercourses. • Sand bags, berms, stone pitching must be used to control erosion from forming during construction. • Temporary stormwater measures should be implemented to ensure that material does not wash off the surface into any watercourse during construction. • Limited vegetation clearing should take place on the western side of the road, which is the steeper side. Vegetation will increase the stability of the slope and reduce the amount of	1 (low

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		sediment wash away off the slope onto the new road and below. This impact can be managed and mitigated to a degree.	
6. Careless operation and use of heavy vehicles in close proximity to the watercourse causing banks to erode and collapse, resulting in blockages and sedimentation of the watercourses and wetlands. The construction of the road and watercourse crossing structures will result in the alteration of the beds and banks of the watercourses within the construction footprint.	5 (low)	The construction phase of the road will see the heavy vehicles working near the watercourses and wetlands and therefore the following must be adhered to: • Only the area directly in the path of construction may be cleared and excavated; • Heavy vehicles are to remain on the access road footprint and not encroach into the surrounding vegetation. • Heavy vehicles must avoid working in the watercourses as much as possible. • The areas upstream and downstream of each watercourse must be demarcated as a 'no-go' zones for the duration of the construction process. No vehicles or site staff are permitted to enter these areas. • Non-essential equipment and vehicles are to remain at least 18m from the drainage lines at all times. This impact can be mitigated through the implementation of the EMPr.	1 (low)
Operation			
7. There is a risk of collapse of the mining face if the angle of removal is not correctly planned and managed. This could lead to slippage and collapse of the slope causing damage to the adjacent road as well as posing a risk to onsite workers and the surrounding environment.	9 (med)	If the appropriate mining technique is not used and slippage occurs, it could potentially have a significant impact in terms of risk to the workers on site, on-going instability issues and on-going erosion. The risk of this impact occurring is relatively low, provided proper mining techniques are used and the angle of removal is appropriately planned, implemented and monitored. Measures prescribed in the Mine Works Programme to prevent collapse of mine face: • The working bench widths will be a minimum of 15m and only reduced under special conditions. The 15m wide bench will allow machines to work safely providing ample turning space. • A safety berm will be erected around 3m from the crest. • The bench height will be 12m high. • The slope face must not be heavily undercut as this could lead to collapse of the slope. • Undercutting of the slope and creation of over-steep slopes must not be permitted. After a blast these soft	4 (low)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		areas, which are prone to back break, are excavated to a point where competent material is reached. No loose material is left in the face. • Mining activity needs to take into account the final shape of the excavated area so as to reduce the risk of potential collapse and shifting. • The slope angle and stability must be regularly evaluated by the resident engineer and adjustments made to the area and angle of excavation as needed. • The maintenance of proper drainage away from the working area. This impact can be prevented and managed.	
8. Generation of flyrock as a result of blasting causing damage or injuries to neighbouring property and people.	7 (med)	A Vibration Information Report was prepared and is attached to Appendix C. The explosives engineer calculated the Peak Particle Velocities (PPV) on the structures in the vicinity of the proposed quarry. The predicted blast vibrations for the nearest blast receptors are as follows: Nearest Residential House (620m) – 1.2 mm/s Nearest town (770m) – 0.84 mm/s Powerlines (420m) – 2.28 mm/s Railway Line (1500m) – 0.28 mm/s All PPV percentages fall within the acceptable limit and therefore no specific mitigation measures need to be applied. Blasting generates short duration events that are noticeable only by communities and individuals living in the immediate environment. The blasting is to be carried out by a suitably qualified Contractor. Typically this will comprise 102mm diameter blast holes with 3m spacing, drilled vertically. Blast sizes vary dependent on requirements. An assessment of ground conditions and desired fragmentation is to be done on each blast and blasting strategies and techniques are tailored to deliver the desired outcomes. For example: • The use of “shake up” blasts in the soft areas. The blasts have a wider drill pattern and are undercharged. • The use of bottom and mid hole boosters on high benches >15m. • The weathered zones and solution channels often have to be blasted using packaged explosive emulsion	3 (low)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		due to the clay and sometimes wet conditions. Ground vibration from blasting operations will be monitored after each blast by means of a PPV (Peak Particle Velocity) meter. Recordings will be kept of each blast in the Blast Analysis Sheet and filed in the Site Supervisor's office. Due to the isolated nature of the quarry as well as the distance from the receptors, flyrock is not anticipated to impact any neighbouring properties or structures. This impact can be prevented and mitigated.	
9. Generation of emissions from vehicles.	7 (med)	All construction vehicles will be fitted with the appropriate silencers and exhausts. Emissions generated from these vehicles is not expected to significantly affect the workers on site or neighbouring farmers. This impact can be managed and mitigated.	5 (low)
10. Dust generation during preparation of site and upgrading of the access road as well as the generation of dust during the operation phase impacting on air quality.	10 (med)	The greatest risk is dust settling on and coating the vegetation adjacent to the access road and boundaries of the quarry. Dust suppression is therefore to take place along the dirt access track as well as inside the quarry area itself. • Dust will require management and the applicant must comply with the National Dust Regulations (Government Notice R827, 2013) with regards to dust levels produced on site. • Mining benches are only to be cleared of vegetation as and when required for mining. This will reduce the amount of soil exposed to high winds creating dust. • Perimeter monitoring of dust will be conducted to monitor dust levels to ensure they remain within legislated limits. • Vehicle speeds must be reduced to 40kms within the quarry area and a water cart and water truck must be in operation to ensure dust is controlled. • Machines to be fitted with dust suppression equipment and localised water spraying with the addition of wetting agents will also reduce dust from specific activities and equipment. • If legislated dust levels are exceeded, shielding of this equipment (use of hoods or enclosing within shade cloth barriers) as well as placement of equipment so that it is sheltered from prevailing winds will be implemented to assist in managing dust.	7 (med)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		• The material being transported off site in the back of the trucks must be covered. • Dust generation will be primarily managed through application of water from the sump area, which will be created during mining. • Water will be obtained from a municipal source and bought to site by water tanker, if water in the sump runs low. Dust is an impact associated with on-going operation of a quarry and even with mitigation, some dust will still be released. It is therefore important that it is monitored to ensure levels remain within the legislated parameters and that all necessary mitigation measures are implemented.	
11. Noise generation during operation of plant equipment (crushing, screening and blasting) and trucks which may impact on staff and neighbours.	6 (med)	The nearest household is located 620m north-east of the quarry. Due to the distance from the site, and the topography, the noise from machinery (front end loaders, excavators, screener and crusher) and trucks will be greatly reduced. Regardless, all vehicles will be fitted with standard silencers and will be maintained regularly to prevent undue noise. The noise from machinery, trucks and loading of stone will be on-going during operation and can't be completely mitigated against but can be minimised. Typically, blasting is intermittent and at maximum capacity will only occur once a week. The smaller scale once off blasts will likely register in the vicinity of 140 dBA at source. As a point of comparison, traffic noise generates about 80-90dBA, the sound of breaking glass is 151dBA. The volume of noise will dissipate as one moves away from the blast area. In terms of topography, the site is cut into a hill and the work face will continue into the hill so sound will tend to be directed into the hillside. Blasting will only occur during daylight hours. The primary type of sounds expected will be fairly sharp, percussive sounds during operation of crusher and loading into trucks etc. which are more likely to travel longer distances. The surrounding vegetated hillsides will partially absorb this sound as it will be less likely to ricochet off these softened surfaces. The table below provides noise levels experienced by	3 (low)

<table>
<tr><th>Nature and Consequences of impact</th><th>Significance rating of impacts[14]:</th><th>Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:</th><th>Significance rating of impacts after mitigation:</th></tr>
<tr><td></td><td></td><td>operators of front end loaders and excavators[15].</td><td></td></tr>
<tr><td colspan="4">Table 4: Noise levels, L_{eq}, experienced in construction jobs in the UK[4].
<table>
<tr><th rowspan="2">Plant/equipment</th><th colspan="2">Operator, L_{EX}, dBA</th><th></th><th></th></tr>
<tr><th>Ave.</th><th>Range</th><th>Trades/Tools</th><th>L_{eq} dBA</th></tr>
<tr><td>Dozers, Dumpers</td><td>96</td><td>89-103</td><td>Plumber</td><td>90</td></tr>
<tr><td>Front end loaders</td><td>88</td><td>85-91</td><td>Elevator installer</td><td>96</td></tr>
<tr><td>Excavators</td><td>87</td><td>86-90</td><td>Rebar worker</td><td>95</td></tr>
<tr><td>Backhoes</td><td>86.5</td><td>79-89</td><td>Carpenter</td><td>90</td></tr>
<tr><td>Scrapers</td><td>96</td><td>84-102</td><td>Concrete form finisher</td><td>93</td></tr>
<tr><td>Mobile Cranes</td><td>100</td><td>97-102</td><td>Dry wall installer</td><td>90</td></tr>
<tr><td>Compressors</td><td>79</td><td>62-92</td><td>Steel stud installer</td><td>96</td></tr>
<tr><td>Pavers</td><td>101</td><td>100-102</td><td>Labourer – road construction</td><td>86</td></tr>
<tr><td>Rollers (compactors)</td><td>90</td><td>79-93</td><td>Labourers – formwork</td><td>88</td></tr>
<tr><td>Bar Benders</td><td>95</td><td>94-96</td><td>Labourers – shovel hardcore</td><td>94</td></tr>
<tr><td>Pneumatic breakers</td><td>106</td><td>94-111</td><td>Labourers – concrete pour</td><td>97</td></tr>
<tr><td>Hydraulic breakers</td><td>95.5</td><td>90-100</td><td>Hoist operator</td><td>100</td></tr>
<tr><td>Graders, trucks, concrete pumps & mixers, generators</td><td>< 85</td><td></td><td>Labourers-– drains & roughing concrete</td><td>100</td></tr>
<tr><td>Concrete batch plant operator</td><td>< 85</td><td></td><td>Tile setter</td><td>92</td></tr>
<tr><td>Poker vibrators</td><td>94.5</td><td>87-98</td><td>Pneumatic chipper/chisel</td><td>109</td></tr>
<tr><td>Saws</td><td>88.5</td><td>78-95</td><td>Compactor</td><td>108</td></tr>
<tr><td>Piledrivers (diesel & pneum.)</td><td>98</td><td>82-105</td><td>Electric drill</td><td>102</td></tr>
<tr><td>Pile drivers (gravity, bored)</td><td>82.5</td><td>62-91</td><td>Air track drill</td><td>113</td></tr>
</table></td></tr>
<tr><td>12. Increase in heavy truck traffic on Allsop Road impacting the small residential community (i.e. noise, pedestrian safety & traffic).</td><td>8 (med)</td><td>The nature of the activity will result in a localised increase in haulage truck traffic during operating hours of the quarry. Depending on the volume of material being mined, the quarry is likely to generate an average of 48 trips each during the morning and afternoon peak hour (section 8.1.3 of the TIA attached under Appendix C). Since the intersection onto the R103 at the eastern end of Allsop Road is illegal (i.e. Option 2), trucks will be passing through the small residential area using route Option 1. The affected area of road passing through the residential area is 250m long. Although there was minimal pedestrian activity observed within the residential area, a number of upgrades are required to improve the safety and traffic flow along this section of Allsop Road (as per section 15 of the TIA). This includes:
Widening Allsop Road to 7.0m
Including a 0.5m buffer on the road; and
The construction of a 2m side walk on either side (total of 12.0m road width).
During the public participation phase, members of this residential community have shown support for any development</td><td>4 (low)</td></tr>
</table>

[15] Workers Compensation Board of BC, Engineering Section Report; Stuart Eaton, February 2000
http://hearingconservation.healthandsafetycentre.org/pdfs/hearing/ConstructionNoise.pdf

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		in the area due to the potential for job opportunities. This impact can be managed and mitigated.	
13. Leaving the Thornridge Farm Quarry un-rehabilitated.	11 (high)	If the quarry is not rehabilitated upon completion of the operation, the quarry will create an on-going safety risk (especially children and animals who may fall off the cliff edges or be hurt by unstable collapsing rock faces). It will also have a visual impact on the landscape and there may be further slippage of unshaped slopes and erosion of soil above unstable slopes. The applicant or holder of a permit is legally bound to "make financial provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of mining, as contemplated in the Act and to the satisfaction of the Minister responsible for Mineral Resources"[16]. The Annual and Final Rehabilitation Plans are included in section 3 of the attached EMPr (Appendix E). Please refer to the EMPr for further details however a summary of the proposed rehabilitation measures is provided below. • The quarry must be rehabilitated after closure to prevent these impacts from occurring. • Rehabilitation should occur as soon as practically possible on completion of work, following the cessation of the work in a specific section. • Any infrastructure erected for mining must be demolished and removed from site. • All equipment, concrete footings, fencing, etc. must be removed from site. • All waste must be removed from site and disposed of at an approved landfill. • Soil contaminated with oil, grease, fuel may not be disposed of in the excavation and must be disposed at a permitted landfill. • The floor of the quarry must be ripped (if possible) and topsoil removed at the beginning of the process can be used to cover this area to promote re-growth of vegetation. • Before placing topsoil across the floor of the quarry, all visible weeds must be removed.	7 (med)

[16] Regulation 4 of the "Regulations pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operatios" published in terms of sections 24(5)(b)(ix), 24(5)(d), 24N, 24P and 24R of the National Environmental Management Act, 1998 in Government Gazette No. 39425 GN R1147 on the 20th November 2015.

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		• Slopes are to be "face wrecked", a method of blasting a face as close as possible to a natural appearance to affect a footing where vegetation can take hold. • The stockpiled topsoil must also be spread evenly over the prepared surface on slopes of 1:3 or steeper. • Topsoil placement shall occur in a phased manner, concurrent with the phased operation of the quarry. Topsoil should be placed in the same area from which it was stripped. • Where amounts are inadequate to cover the entire area, more gentle slopes are to receive priority treatment. • The requisite for permanent drainage works and erosion protection measures should be set in place[17]. • Ensure that other operators or opportunists do not re-visit closed areas and continue to remove material. • Re-vegetated areas should be protected until vegetation has become established. • No vehicles or equipment should access areas that have been vegetated. • Any erosion channels that develop after re-vegetation should be backfilled and consolidated and the areas restored to a proper stable condition. The erosion should not be allowed to develop on a large scale before effecting repairs and all erosion damage should be repaired as soon as possible. Please refer to section 9 of the EIR detailing the financial provisions which are to be set aside for the rehabilitation phase. Provided these measures are implemented the quarried area can be rehabilitated and long-term impacts avoided.	
14. Suitability of quarry with respect to surrounding land use i.e. visual impact and sense of place.	9 (med)	The portion of land ear marked for mining is currently vacant. There is the existing Thornridge Farm homestead, currently used as a wedding venue, in the southern portion of the property. This will be replaced in the near future with the construction of light industrial platforms. The nearest residential homestead, will not be able to see the quarry due to the topography and therefore there is unlikely to be any significant visual impact or sense	6 (med)

[17] Aggregates And Sand Produces Of South Africa; The Issue of Borrow Pits Being Used In The Aggregate And Sand Industry.

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		of place etc. No infrastructure or services running through this property will be impacted by the mining operations. The mine is ideally located in close proximity to the R103 and N3 highway where it is anticipated that development, will be increasing in the future. This impact has been mitigated.	
15. Petrochemical spills from mining operational machinery.	6 (med)	All mining equipment and vehicles are to be retained in the permitted mine area, which will be rehabilitated on closure. All spills must however be contained, placed in the hazardous waste removal containment area and removed off site to be disposed of at a licensed hazardous waste landfill site. Adequate spill kits and containers for spilled and contaminated material to be on standby on site. If a spill occurs, stop the source, contain it, clean up in accordance with MSDSs and notify relevant authorities. This impact can be avoided and managed.	2 (low)
16. Inadequate waste management on site.	6 (med)	The project will see an increase in workers on site and therefore an increase in waste in the area. The "percolation of litter and refuse" was identified as an indirect impact of the quarry on the surrounding vegetation. Waste material and refuse must not be allowed to percolate into the surrounding natural areas. • Littering will not be permitted in the study area; • Designated waste storage areas with appropriate waste receptacles must be set up in the site camp; • Waste will be removed from site and disposed of at a registered waste disposal site. • No dumping into the surrounding vegetation is permitted. • Regular checks and clean ups are to be scheduled at the quarry site and along the private access road to ensure that there is no waste in the adjacent vegetation. This impact can be avoided and managed.	2 (low)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
17. Insufficient number of toilet facilities on site resulting in the contamination of the environment.	7 (med)	Workers on site will require an appropriate number of toilet facilities on site. Initially chemical toilets will be used and the following mitigation applies: • Appropriate and sufficient toilet facilities (1 toilet per 15 employees) must be provided by the applicant; • All toilet facilities must be checked on a daily basis; • All toilet facilities must be emptied and cleaned on a weekly basis. • A registered waste removal contractor must remove effluent waste from site or effluent waste must be disposed of at a permitted Waste Water Treatment Site. Once the quarry is up and running, a septic tank may be installed to reduce the number of chemical toilets requiring servicing as the number of employees increases. Due to the distance from any surface and groundwater resources, it is unlikely that the septic tank will result in any contamination of any watercourses. The following mitigation measures will then apply and have been included under section 2.11 of the EMPr: • A qualified geotechnical engineer is to confirm the suitability of the site for use of a septic tank to ensure that the soil is permeable enough to allow effective sewage drainage. • The holder of the Mining Permit is to maintain the septic tank to ensure it functions efficiently. This impact can be avoided and managed.	3 (low)
18. Encroachment of alien vegetation into disturbed areas (i.e. quarry) and directly adjacent to the disturbed areas.	9 (med)	2.89 hectares of the quarry is located within degraded vegetation with a high number of alien species, which will be cleared during the mining process. The edge of the access road is comprised of “ruderal and alien vegetation” (section 4.7 of the Phase 2 Vegetation Report). This will also be cleared however alien species will establish along the edges of the freshly disturbed areas. These are to be managed to ensure that there is no further encroachment into the adjacent good quality vegetation. • The mine works manager is to be aware of the high potential for weeds to establish in the disturbed areas. • The 9m mining pillar (i.e. the 9m buffer around the actual mining area) will be regularly mowed and managed to suppress alien vegetation from establishing and encroaching into the adjacent vegetation.	5 (low)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		• The removal of alien vegetation along the edges of the access road is to be on-going as part of a Conservation Management Plan. This will include manually removing the newly established alien vegetation frequently. The removal of the alien vegetation will be more extensive in the summer months prior to the species seeding. • The alien vegetation clearance programme is described in section 2.3 of the EMPr, which is to be adhered to during operation and renewed on an annual basis. This impact can be managed.	
19. Loss of indigenous vegetation and fragmentation of habitat at this section of the property. There will be clearing of up to 4.99 hectares of indigenous vegetation as the mining area is expanded.	10 (med)	There will 2.89 hectares of degraded vegetation, 1.14 hectares of thicket-grassland mosaic and 0.96 hectares of disturbed grassland & secondary vegetation cleared from the preferred site (Phase 2 Vegetation Assessment, 2017). This impact cannot be avoided as the entire permitted mine area, will be cleared of vegetation. The preferred location of the quarry took into account the location of the disturbed area as far as possible, without encroaching into the 100m buffer associated with the watercourse south-west of the site. The following mitigations have been provided in the EMPr to ensure no further damage is caused to the surrounding vegetation. • The permitted quarry area is to be clearly demarcated to ensure that vegetation is only cleared from within the authorised Thornridge Farm Quarry footprint. • Once mining is completed, the site will be rehabilitated according to the Rehabilitation Plan in section 3 of the EMPr where indigenous grassland / shrubs will be re-introduced to the area. • When vegetation clearing takes place, the contractor is to stockpile the topsoil separately in a designated area, where it can be used again during rehabilitation. In this regard, it is to be kept fertile and protected from erosion using various measures that are included in the EMPr. It is to be noted that the vegetation type is represented on Thornridge Farm and its loss will not result in the isolation of any important vegetation or wetland areas. As per section 8 of the Phase 2 Vegetation Assessment, further mitigation has been included in section 2.3 of the EMPr. This includes:	9 (med)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		• A Conservation Management Plan (CMP) is to be developed for the remainder of the undisturbed vegetation. The CMP is to be approved by eThekwini EPCPD & KZN Wildlife prior to implementation. The CMP is to include the following: - Exclusion of cattle from the property (highlighted as a key concern for the long-term maintenance of the natural vegetation on the farm in section 5 of the Phase 2 Vegetation Assessment). A fence around the northern portion of the property will also prevent any further community encroachment onto the property (this was listed as a future threat to the vegetation in section 7.4 of the Phase 1 Vegetation Report). - Burning of the grassland every 2-3 years. - Manually cutting and herbiciding pioneer species (*Acacia natalitia*, *Dichrostachyc cinerea* and *Lippia javanica*) in the grassland areas to reverse bush encroachment; - Implementing a wider alien plant control programme for the remainder of the natural area, particularly along roadsides and watercourses. - Registering a conservation servitude over the remaining natural area on the farm, as agreed with eThekwini EPCPD (including upfront funding). This impact can be partially managed.	
20. Loss of provincially protected and red listed plant species associated with the quarry and access road footprints (Phase 2 Vegetation Report, 2017).	9 (med)	One red listed, endemic species was identified in the quarry area (*Aloe pruinosa*). There are at least 100 plants in the northern corner of the mine area, which will need to be relocated outside the disturbed area prior to mining commencing in this section. Approximately 24 *Aloe maculate* species (provincially protected) were identified within the upgraded access road footprint. As per section 7 of the Phase 2 Vegetation Assessment, *Aloe maculata* species are common and will not be relocated as this will cause unnecessary disturbance where excavations take place in good quality vegetation during relocation. *Aloe maculate* is represented in large abundances across the remainder of Thornridge Farm. A single example of *Boophone disticha* (protected and red listed) was identified next to the road, which should be avoided in the road upgrade however if will be relocated to a	5 (low)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		similar area of the property should it need to be. The following methodology is to take place prior to any construction activities commencing: • The development areas (and any adjacent area at risk of disturbance) should be searched for protected and red listed plants during the summer months, as some are inconspicuous or invisible during the winter. • The plants are protected under the KZN Provincial Conservation Ordinance and therefore permits from Ezemvelo KZN Wildlife are to be obtained prior to any relocation or clearing. • Relocation is to be carried out by suitably qualified personnel taking care not to damage the roots. • Relocation is to be carried out in the summer months. • The plants are to be relocated to suitable habitats on the property. • Section 2.3 of the EMPr shows photographs of the plant species which are to be relocated. Mine workers are to be aware of the plant species and recognise them from the photographs provided in the EMPr. • As per the vegetation specialist recommendation, if the quarry is not yet established by the early summer, or has not yet reached parts of the proposed footprint where these plants are located, it should be searched again for any more protected and red listed plants, as they will be more visible at this time. This impact can be avoided.	
21. Degradation of the vegetation surrounding the authorised mining area as a result of "edge effect"[18].	10 (med)	There will be an immediate difference from vegetation to a totally degraded area where mining has taken place, whereas in nature, there is generally a gradual change form one habitat to the other. The impacts to the vegetation associated with the mining activities will therefore not be confined to the permitted mine area but have the potential to degrade the surrounding vegetation due to the close proximity of the disturbance. There is a 9m mining pillar associated with the boundary of the authorised permit area and surrounding vegetation which will not be mined however this will be insufficient on its own to effectively manage edge	7 (med)

[18] "Edge effect" is the effect of placing side by side contrasting environments in an ecosystem (Implications of Edge Effect as a Tool in Assisting Ecological Succession, 2014).

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		effect. A 20m area around the edge of the boundary of the quarry is therefore to be effectively managed to reduce the significance of edge effect (total of 29m from where mining will be taking place). Within the 29m "management buffer", the following is to take place: • No clearance of vegetation is to take place within this area apart from the manual cutting and herbiciding pioneer species (*Acacia natalitia*, *Dichrostachyc cinerea* and *Lippia javanica*) in the grassland areas to reverse bush encroachment; • An alien plant control programme is to be implemented to ensure alien species do not establish adjacent to the disturbed area; • Perimeter dust monitoring to take place in this area to ensure that the vegetation is not coated with dust; and • The ECO is to do a site inspection during the quarterly auditing and make further management recommendations, where required. The impact of the edge effect of a quarry is not widely known however actively managing the 29m vegetation buffer, this should reduce the significance of this impact, which is to be monitored by the ECO.	
22. Impact on the long-term conservation plans for area as identified in the Cato Ridge Local Area Plan (June 2012; raised as a concern by the eThekwini Strategic Spatial Planning Branch during the Scoping Phase of the application).	10 (med)	The entire property has been included in DMOSS with it being identified as "steep topography" which is "environmentally sensitive" in the Cato Ridge LAP. As per Figure 15 above, the sensitive environments are mainly associated with the valleys/watercourses on the property, which have been assessed by specialists and well buffered from the quarry operations (100m buffer). The loss of indigenous vegetation and fragmentation of habitat in this section of the property cannot be fully mitigated apart from managing the edge effects of the quarry (see impact 20 above). By compiling an extensive CMP for the remaining natural area, all the current impacts identified by the vegetation specialist in section 5 of the Phase 2 Vegetation Assessment can either be avoided (e.g. exclusion of cattle from property) or managed (on-going alien vegetation removal), thereby ensuring the long-term conservation of the remaining natural areas on the property (>100 hectares). Since the property is privately owned, there needs to be a reasonable trade-off between allowing development	8 (med)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		on the property which will subsidize the long-term funding of the proposed CMP thereby not only ensuring the long-term conservation but also management of the remaining natural area. This impact can be managed.	
23. Poor stormwater management during operation resulting in "dirty" water from within the quarry mixing with clean water outside of the quarry.	6 (med)	Stormwater Management during operation of the mine will be discussed in detail in the Water Use Authorisation however the following measures will be taken to management runoff in and around the mine area: • Strategic placement of diversion berms and ditches around the mine area to divert clean water away from the mine and prevent potentially contaminated run off from leaving the mine area. • The ditches and berm area must be vegetated to reduce the risk of erosion during heavy rainfall. • A sump/s are to be created at the low point of the quarry to capture runoff from within the mine area. This water is considered "dirty" and will be stored on the site and used for dust suppression within the mining area. • The sump area may need to move as the mining area changes and moves. The aim of the stormwater management is to ensure that clean water running off surrounding slopes does not enter the mine area and "dirty" water from within the mine area does not leave the mine area. This impact can be avoided, managed and mitigated.	2 (low)
24. Poor stormwater management during operation and after closure leading to erosion of the site.	6 (med)	Provision must be made to control stormwater runoff, especially down the slope of the exposed mine face to prevent erosion and excess sediment entering the sump and surrounding environment. Temporary stormwater protection measures must be established before operational activities commence. • Install appropriate erosion barriers (berms or diversion ditches, sandbags) and other sediment control structures (grates or grids, geofabric) in order to prevent substances from entering exposed drains or channels. • Identify steeper areas where erosion is more likely to occur and ensure adequate protection of these slopes through planting of vegetation, placement of berms or use of hessian material. Regularly check and clean material from behind erosion barriers. This impact can be managed and mitigated.	2 (low)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
25. Blockages impeding flow of watercourses, resulting in flooding or drying out of drainage lines.	5 (low)	The access road crosses the head of the four drainage lines and therefore there is little risk of impeding water flow in the drainage lines, even during high rainfall events. The following is however applicable at the four drainage line crossings: • The crossings must follow the existing river bank alignment; • The crossings must not block or cause damming to occur within the watercourse; • The watercourse crossing will not cause any blockages or impedance to the flow of water within the watercourse; • No construction material must remain within the watercourse; • The Contractor must ensure that the crossing does not result in the flooding or drying out of the watercourses above or below the structures; The watercourse crossing must promote the free flow of water and must not create blockages that would result in sedimentation of the watercourses.	1 (low)
26. Risk to water quality on nearby watercourses and wetlands.	7 (med)	The greatest risk to the watercourses is sediment washing off the quarry area silting up the aquatic environment. Lubricants, fuels and other construction material could be transported in this runoff negatively impacting the water quality. There are two main aspects, which have greatly reduced the risk of this impact occurring through the planning of the quarry. These are: • The location of the preferred quarry site has been located more than 100m from any watercourse. The wetland specialist recommended a buffer of 18m between the quarry and any wetlands to suitably reduce the risks to the watercourses and therefore it is unlikely that any sediment runoff will reach the drainage lines more than 100 metres away. • The aim of the stormwater management, as described in impact 23 above, is to prevent run off from leaving the quarry at all (i.e. all run off captured and stored in the sump). In terms of further mitigation during the operation of the quarry, the following has been included in section 2.4 of the EMPr: • Slopes that fall towards the quarry workings will be identified and berms provided to deflect clean run off from	3 (low)

Nature and Consequences of impact	Significance rating of impacts[14]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		entering quarry operations, thereby reducing the risk of contamination. • Drainage from the quarry area and especially areas where blasting takes place will be directed into a sump. This water will then either be re-used on site i.e. for dust suppression which means it will drain back into the sump. • Only clean water will be used for dust suppression outside the mine area i.e. on the access roads. Risk assessments included in sections 9.0 and 8.0 of the Aquatic and Wetland Assessments respectively rate potential impacts on the water resources as negligible to minor. This impact can therefore be avoided.	
27. Potential pollution of groundwater from an increase in suspended solids and associated microbiological loading from surface water runoff which may result in localised runoff from the site.	6 (med)	Potential sources of groundwater pollution for the proposed quarry include the opencast pit, waste rock dumps, product stockpiles, sanitation facilities, workshop and fuel/chemical stores. Potential pollution pathways include movement through an aquifer, surface runoff, movement through mine voids or airborne migration of dusts. Stormwater water management is therefore key, which has been described above. Sumps will be created to contain runoff from within the quarry area minimizing high suspended solids load running off from key areas and also serve as a dust suppression water source. All stockpile facilities / stores will drain into the sump with no stormwater leaving the site. This impact can be avoided and managed.	2 (low)
28. Excavations and blasting impacting on potential heritage resources (Heritage Impact Assessment, 2016).	8 (med)	The HIA concluded that the mining operation may proceed as no heritage sites or features are in danger of being destroyed or altered. The area is also not part of any known cultural landscape. However, it must be pointed out that the KZN Heritage Act requires operations exposing archaeological and historical residues should cease immediately pending an evaluation by the heritage authorities. This impact has been avoided.	3 (low)
29. Positive impacts for local employment opportunities.	0 (no impact)	This is a positive impact however it is to be noted that local labour must be sought, where possible, for the mining of this site. It is further recommended that local labour be employed to implement the CMP (i.e. alien vegetation removal and waste collection etc.).	0 (no impact)

9.3 Preferred Site and Layout Alternative

See Appendix D for the full impacts scoring matrix, which assesses the impacts based on the scoring system described in section 7.1. The below impacts relates to the alternative layout (i.e. Layout Alternative 1).

Table 4: Impacts and mitigation measures associated with the *alternative* layout.

Nature and Consequences of impact	Significance rating of impacts[19]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
Construction			
1. Construction impact 1 listed in Table 3 above, remains the same for both layouts.	5 (low)	Impact significance and mitigation measures for construction impact 1 remain the same for both layout alternatives.	1 (low)
2. Clearance of indigenous vegetation during the upgrading of the access road (approximately 1.87 hectares).	11 (high)	The access road is approximately 237m in order to gain access to the alternative quarry site and therefore there will be approximately 1900m^2 of indigenous vegetation requiring clearing for the upgrading of the access road. Similar to the preferred alternative, regardless of mitigation, vegetation will be cleared however the footprint is greater (1.87 hectares compared to 1.68 hectares cleared to access the preferred alterative). Mitigation measures remain the same as the preferred alternative.	8 (med)
3. Construction impacts 3 – 6 listed in Table 3 above, remain the same for both layouts.	-	Impact significance and mitigation measures for construction impacts 3 - 6 remain the same for both layout alternatives.	-
Operation			
4. Risk of collapse of the mining face if the angle of removal is not correctly planned and managed.	9 (med)	Since both sites are located within Geological Zone 1, the underlying geology is the same. The alternative mine area is steeper than the preferred site which may increase the risk of collapse however the mitigation measures remain the same as the preferred layout alternative.	5 (low)
5. Generation of flyrock as a result of blasting.	7 (med)	The alternative location for the quarry is located closer to the blast receptors considered for the preferred alternative. The nearest homestead is located 600m north-west of the alternative site and the Eskom powerlines 340m east of the alternative site. The impact of flyrock and vibrations from the blasting are therefore slightly more significant compared to the preferred layout alternative. Other thean the Eskom powerlines, the other structures are still located more than 500m from the quarry footprint and therefore the mitigation measures remain the same.	3 (low)
6. Generation of emissions from vehicles.	7 (med)	Impact significance and mitigation measures remain the same as the preferred layout alternative.	5 (low)

[19] See Appendix H for more details.

Nature and Consequences of impact	Significance rating of impacts[19]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
7. Dust generation during preparation of site and upgrading of the access road as well as the generation of dust during the operation phase impacting on air quality.	10 (med)	Impact significance and mitigation measures remain the same as the preferred layout alternative.	7 (med)
8. Noise generation during operation of plant equipment (crushing, screening and blasting) and trucks which may impact on staff and neighbours.	6 (med)	The nearest household is only 20m closer than the preferred alternative site and therefore the impact significance and mitigation measures remain the same as the preferred layout alternative.	3 (low)
9. Increase in heavy truck traffic on Allsop Road impacting the small residential community (i.e. noise, pedestrian safety & traffic).	8 (med)	Since the same access road will be used for both quarry alternatives, the impact significance and mitigation measures remain the same as the preferred layout alternative.	4 (low)
10. Leaving the Thornridge Farm Quarry un-rehabilitated.	11 (high)	Impact significance and mitigation measures remain the same as the preferred layout alternative.	7 (med)
11. Suitability of quarry with respect to surrounding land use i.e. visual impact and impact on sense of place.	9 (med)	Impact significance and mitigation measures remain the same as the preferred layout alternative.	6 (med)
12. Operational impacts 15 – 18 listed in Table 3 above remain the same for the alternative quarry layout.	-	Impact significance and mitigation measures remain the same as the preferred layout alternative.	-
13. Loss of indigenous vegetation and fragmentation of habitat at this section of the property. There will be clearing of up to 3.62 hectares of indigenous vegetation as the mining area is expanded.	11 (high)	The main difference between the preferred and alternative quarry sites is the difference in the quality of vegetation. Less than 1 hectare of the alternative quarry site falls within the degraded vegetation. The remainder of the mine area is comprised of thicket, thicket-grassland mosaic and primary grassland-thicket mosaic (along the eastern boundary). Since the clearing of the vegetation cannot be avoided by this activity, the same mitigation measures apply for the preferred and alternative layouts, to ensure no further damage is done to the surrounding vegetation (i.e. managing edge effects). The significance of the impact is however higher due to the better quality vegetation requiring clearance.	11 (high)
14. Degradation of the vegetation surrounding the authorised mining area as a result of “edge effect".	10 (med)	Impact significance and mitigation measures remain the same as the preferred layout alternative.	7 (med)
15. Loss of provincially protected and red listed plant species associated with the quarry and access road footprints (Phase 2 Vegetation Report, 2017).	10 (med)	Due to time constraints, the vegetation specialist did not map all Red Listed / Protected species in the alternative quarry site, however there is a high potential for most of the same species identified in the preferred layout alternative to be found in this area as well. Since the quality of the vegetation is better, the higher the potential for more protected, red-listed or endemic species to be identified within the alternative quarry site, increasing the significance of this impact. Mitigation measures for impact 20 listed for the	6 (med)

Nature and Consequences of impact	Significance rating of impacts[19]:	Proposed mitigation and Extent to which impact can be reversed / avoided, managed or mitigated:	Significance rating of impacts after mitigation:
		preferred layout alternative remain the same.	
16. Impact on the long-term conservation plans as identified in the Cato Ridge Local Area Plan (June 2012; raised as a concern by the eThekwini Strategic Spatial Planning Branch during the Scoping Phase of the application).	10 (med)	Since the alternative layout is located on the same property, the impact significance and mitigation measures are the same as the preferred quarry alternative layout.	8 (med)
17. Operational impacts 23 - 29 listed in Table 3 above remain the same for the alternative quarry layout.	-	Impact significance and mitigation measures remain the same as the preferred layout alternative.	-

Section 8: Environmental Impact Statement as per Section 3 (1) (l)

10.1 Summary of the Key Findings of the EIA as Per Section 3 (1) (l) (i) – (iii) and 3 (1) (n)

The key impacts associated with the proposed Thornridge Farm Quarry relate to those associated with the operation period itself with the construction of the access road being the highest risk to the watercourses crossed (temporary impact). The key findings for the preferred Thornridge Farm Quarry site, as shown in Figure 16, have been summarised below:

- Widening of the access road

The upgrading of the access road will result in the clearance of approximately 1.68 hectares of vegetation, regardless of the mitigation measures applied. The first 870m from Thornridge Farm Homestead passes through degraded vegetation with the vegetation improving in the last 900m, towards the mine. A permit for the removal of *Aloe Maculata* along the route needs to be obtained from KZN Wildlife as well as a permit for the relocation of *Boophone disticha*, if the removal of the plant cannot be avoided. Where the road crosses the four drainage lines, 600mm diameter pipes will be used to allow water to travel underneath the road during high rainfall events. The road crosses the heads of the drainage lines and therefore there is not anticipated to be much water flowing through the watercourses (apart from Drainage Line 4, which is perennial). No excavated or fill material is to be stored within the recommended 18m buffer associated with the watercourse. No vehicles are permitted to work within the watercourses but must remain on the existing dirt road / within the upgraded footprint. The construction related impacts were all rated as low, after mitigation apart from the clearance of vegetation, which remains a medium rating.

- General quarry operations

Due to the distance from any residential areas, it is unlikely that the noise generated during processing (screening, blasting and crushing) and heavy vehicles moving around site will become a nuisance (nearest resident >600m away with the main community being 1.6km west of the quarry). Regardless, all vehicles will be fitted with standard silencers and will be maintained regularly to prevent undue noise. The noise from machinery, trucks and loading of stone will occur during operating hours (18 hours a day Monday – Saturday). The impact of noise during operating hours was rated as low, after mitigation.

Leaving the quarry un-rehabilitated after mining is complete, is not only a safety risk but will have an environmentally negative impact on the landscape (aesthetics, erosion, alien vegetation encroachment etc.). In terms of section 43 (1) of the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA) "*The holder of a mining permit, remains responsible for any environmental liability, pollution, ecological degradation, the pumping and treatment of extraneous water, compliance to the conditions of the environmental authorisation and the management and sustainable closure thereof, until the Minister has issued a closure certificate in terms of this Act to the holder or owner concerned.*" Procedures and requirements on mine closure will be stipulated in the environmental authorisation issued in terms of NEMA [s43 (8)]. The rehabilitation measures provided in section 3 of the EMPr are therefore to be adhered to once mining is complete. The EMPr also details the financial provisions for the rehabilitation of the site once mining is complete. The funds for the rehabilitation have to be deposited into DMR's account before they will issue the Mining Permit, as a guarantee that rehabilitation will take place.

- Vegetation

There will 2.89 hectares of degraded vegetation, 1.14 hectares of thicket-grassland mosaic and 0.96 hectares of disturbed grassland & secondary vegetation cleared from the mine area regardless of the mitigation measures applied. Prior to submitting the mining permit application, the preferred location of the quarry was identified by taking into account the location of the "disturbed vegetation" as far as possible, without encroaching into the 100m buffer associated with the watercourse south-west of the site. In order to reduce any further damage to vegetation around the edges of the quarry area, a number of mitigation measures have been included under section 2.3 of the EMPr however the loss of indigenous vegetation from the property can be mitigated through the registration of a conservation servitude over the agreed natural area on the farm and the development of a CMP to ensure the long-term management of the area.

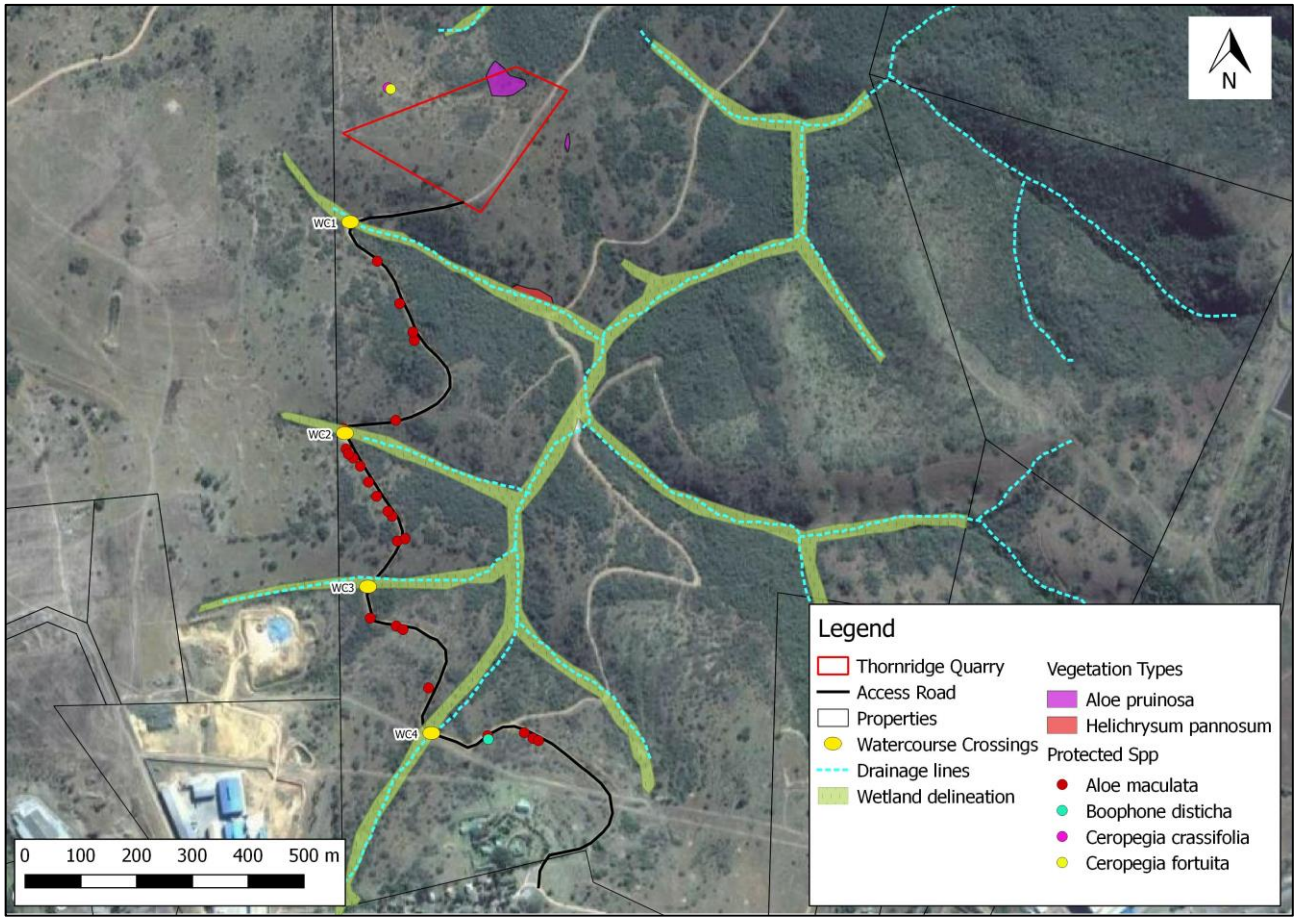
As per the vegetation specialists recommendations in section 8 of the Phase 2 Vegetation Assessment, the CMP is to include the exclusion of cattle from the property (highlighted as a key concern for the long-term maintenance of the natural vegetation on the farm), a burning programme for the grassland (to take place every 2-3 years) and a programme for the anually cutting and herbiciding of pioneer species (*Acacia natalitia*, *Dichrostachyc cinerea* and *Lippia javanica*) in the grassland areas to reverse bush encroachment. The CMP must also include the implementation of a wider alien plant control programme for the remainder of the natural

area, particularly along roadsides and watercourses. It is recommended that local labour be employed to implement the CMP (i.e. alien vegetation removal and waste collection etc.).

The entire property has been included in DMOSS with it being identified as “steep topography” which is “environmentally sensitive” in the Cato Ridge LAP. The sensitive environments mapped are mainly associated with the valleys/watercourses on the property, which have been assessed by specialists and well buffered from the quarry operations (100m buffer). Although the loss of indigenous vegetation and fragmentation of habitat cannot be fully mitigated, the compilation of the CMP, as described above, provides an opportunity for all the current impacts negatively affecting the vegetation to either be avoided (e.g. exclusion of cattle from property) or managed (on-going alien vegetation removal), thereby ensuring the long-term conservation of large tracts of natural areas on the property. Since the property is privately owned, there needs to be a reasonable trade-off between allowing development on the property which will subsidize the long-term funding of the proposed CMP thereby not only ensuring the long-term conservation but also management of the remaining natural area.

The significance of the clearance of indigenous vegetation after mitigation remains medium however the compilation of the CMP is a positive impact associated with the Mining Permit application for long-term conservation and management of the natural areas associated with Thornridge Farm.

Figure 16: Map showing the preferred Thornridge Farm Quarry site including the environmentally sensitive areas (source: QGIS, 2017).



10.2 Deviations from the Approved Plan of Study in the Scoping Report as Per Section 3 (1) (u)

Table 3 below provides the Plan of Study that was included in the Scoping Report. There have currently been no deviations from the Plan of Study approved in the Scoping Report. The table shows the Mining Permit application process for the remainder of the EIA according to legislated timelines provided in the Environmental Impact Assessment Regulations, 2014 published on the 04th December 2014 in Government Gazette No. 38282 Notice No. R.982.

Table 5: Plan of Study for the EIA process for the Thornridge Farm Quarry

Date	Description
23rd November 2016	DMR Acceptance of Mining Application received
28th November 2016	Extension request to submit Scoping Report in New Year approved by DMR
16th January 2017	Release of Draft Scoping Report to I & APs for comment
14th February 2017	End 30 day comment period
17th February 2017	Submission of Final Scoping Report to DMR. Final Scoping Report included comments received from I & APs during the Scoping Phase.
03rd April 2017	Deadline for DMR to accept or reject Scoping Report (within 43 days of receipt of Scoping Report).
30th March 2016	DMR acceptance of Final Scoping Report.
15th June 2017	EIR to be released for I & AP comment. EIR to include all specialist studies listed above and updated impacts table.
17th July 2017	End 30 day comment period.
19th July 2017	Submission of Final EIR to DMR (within 106 days of acceptance of Scoping Report).
06th November 2017	Deadline for DMR to accept or reject EIR (within 107 days of receipt of the EIR).

10.3 Proposed Impact Management Outcomes and Conditions of Authorisation as per Section 3 (1) (m) and (o)

The following objectives and outcomes must be considered for this project:

- Outcomes:
  - For there to be no lasting negative impacts on the environment post-mining operations.
  - For the holder of the Mining Permit to be responsible for the long-term conservation of the remaining natural areas on Thornridge Farm through the compilation and adhered to an approved CMP.
  - To practice responsible operation, 'best practice principles' with regards to housekeeping on site during operation (outlined within the EMPr) and enforcing the polluter pays principle. The applicant / contractor must be responsible for their actions on site during operation of the site.
  - The holder of the Mining Permit is to rehabilitate the quarry effectively to ensure that there is no long-term scar left on the hillslope.
  - To promote sustainable development. Create infrastructure and an environment that is healthy and sustainable for future generations to come.

- Recommended conditions of authorisation (specialist):

The only recommended conditions for the EA received by the specialists were from the vegetation specialist, who recommended the following:

- A CMP is to be developed in which all the mitigation measures suggested in the Phase 2 Vegetation Assessment are implemented. It is strongly recommended that the CMP be approved by the eThekwini EPCPD and EKZN Wildlife.
- The CMP is to include upfront agreement of a funding and implementation mechanism so that the CMP continues through and beyond the life of the mine, including the exclusion of cattle.
- A conservation servitude is to be registered over an agreed portion of the remaining natural areas of Thornridge Farm.

- Recommended conditions of authorisation (EAP):

Apart from the conditions already listed above, all other mitigation measures formulated during the EIR have been included in the EMPr attached under Appendix E and therefore there are no further specific recommendations to include under the conditions of the EA, apart from the holder of the Mining Permit adhering to the approved EMPr.

10.4 Assumptions, Uncertainties and Gaps in Knowledge Relating to the Assessment and Mitigation Measures Proposed as per Section 3 (1) (p)

The information in this report is based on the site assessments and findings of a number of specialist studies, attached under Appendix C of the EIR. The Vibrations Information Report, Mine Works Programe and the Aggregate Investigation have been provided to the EAP by the applicant. The EAP has visited the site on numerous occasions throughout the different season. The EAP is therefore satisfied that there are no gaps in knowledge relating to this assessment.

Section 9: Financial Provisions as per Section 3 (1) (t)

The provisions have been calculated using the "*Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations*[20]*".* The EMPr attached under Appendix E of the EIR provides details on the financial provisions for the rehabilitation, closure and ongoing post-decommissioning management of negative environmental impacts.

9.1 Financial Provisions

Financial provisions are required to determine the costs associated with the undertaking of management, rehabilitation and remediation of environmental impacts from the mining operations throughout the lifespan of the quarry and latent or residual environmental impacts that may become known in the future. The applicant is to make financial provisions to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of the quarry (Regulation 4 of the *Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations*). Rehabilitation and remediation measures identified during the EIA process, including specialist recommendations, has been included in the section 3 of the EMPr attached under Appendix E of the EIR.

As per the Financial Provision Regulations referenced above, three plans have been included in the EMPr: an Annual Rehabilitation Pan, a Final Rehabilitation, Decommissioning & Mine Closure Plan and an Environmental Risk Assessment Report. The costs for the rehabilitation is included in the relevant sections of the EMPr. It is to be noted that the adequacy of the financial provision must be reviewed and assessed annually by an independent auditor and submitted to the Minister. Any shortfall must be remediated but increasing the financial provisions within 90 days of the submission of the auditor's report[21].

The cost for the first annual rehabilitation and remediation activities amounts to R42 020 with the financial provisions for Final Rehabilitation, Decommissioning and Closure of the quarry amounting to R291 450. Due to the nature of the stone quarry, there is unlikely to be any latent or residual impacts requiring remediation in the future. For specific rehabilitation and remediation measures including a breakdown of the cost calculations, please refer to section 3 of the EMPr.

[20] The Regulations were published in terms of sections 24(5)(b)(ix), 24(5)(d), 24N, 24P and 24R of the National Environmental Management Act, 1998 in Government Gazette No. 39425 GN R1147 on the 20th November 2015.

[21] This is regulated under Regulation 11 (4) of the Financial Provision Regulations referenced in the note above.

Section 10: Conclusion as per Section 3 (1) (q)

10.1 Conclusion

Cato Ridge Quarry (Pty) Ltd have applied for a Mining Permit in terms of section 27 of the MPRDA for the Thornridge Farm Quarry. The Final Scoping Report was accepted by DMR on the 30th March 2017. The EIR follows this acceptance and includes specialist input (section 3 of the EIR) to suitably assess the proposed activity according to the principles set out in section 2 of NEMA.

No fatal environmental flaws were identified during the EIA process, therefore it is the EAPs reasoned opinion that the preferred location for the Thornridge Farm Quarry may be authorised. This is on condition that the holder of the Mining Permit is to put in place the various mitigation measures outlined in the EMPr to minimise the impacts identified in section 7 of the EIR. A Conservation Management Plan is to be compiled for the property and attached to the EMPr to ensure effective long-term management of the remaining natural areas on Thornridge Farm. The CMP is to include upfront agreement of a funding and implementation mechanism so that management continues through and beyond the life of the mine. The applicant is willing to come to an agreement with eThekwini EPCPD to donate a large portion of the property to conservation. This is to be agreed upon prior to mining commencing.

The location of the quarry in Geological Zone 1, which has the greatest potential for good quality material and the location of the property within close proximity to the expanding industrial node of Cato Ridge and N3 highway, supports the need and desirability for the quarry in this location. The tillite that will be mined at the Thornridge Farm Quarry will supply the anticipated increase in construction in the Cato Ridge area, contributing to municipal and provincial growth.

Appendix A: EAP Declaration and Curriculum Vitae

Appendix B: Public Participation

- Registered Interested & Affected Parties
- Comments & Responses
- Meetings
- Adverts
- Proof of Notification

Appendix C: Specialists

#	Title of Report	Author / s
1	Vibration Information Report	Brauteseth Blasting (Pty) Ltd
2	Mine Works Program	Cato Ridge Quarry (Pty) Ltd
3	Traffic Impact Assessment	Arup
4	The Results of an Aggregate Investigation carried out on the Thornridge Farm in Cato Ridge, KZN.	GeoZone
5	Cultural Heritage Impact Assessment of Portion 55 of Uitkomst and Doornrug (Thornridge), Cato Ridge, eThekwini Municipality.	Active Heritage cc
6	Report on Vegetation on Thornridge Farm, Cato Ridge	David Styles
7	Report on Vegetation within a Proposed Mining Permit Area on Thornridge Farm, Cato Ridge.	David Styles
8	Baseline Aquatic Assessment for the Proposed Thornridge Development.	The Biodiversity Company
9	Wetland Assessment Report for the Thornridge Development.	The Biodiversity Company

Appendix D: Impacts Scoring Matrix

Appendix E: Environmental Management Programme