

CONCURRENT REHABILITATION AT WORKING QUARRY

AfriSam's Coedmore Quarry, KZN

Some 6 000 m² of alien plants have been removed and approximately 10 000 indigenous trees and shrubs have been planted at AfriSam's Coedmore Quarry near Durban which has been in operation for 92 years. Although legislation dictates that mines and quarries be rehabilitated at closure, AfriSam has taken a more proactive approach to rehabilitation.

In 1989, quarry superintendent Henry Terblanche put in place a plan that would set a precedent for quarry rehabilitation. At the time, the quarry was very visible to the local community and the neighbours were understandably irate as they had been promised in 1927 that the quarry would be closed down once the main rail line between Durban and Pietermaritzburg was completed. However, a rich source of aggregate was discovered and it was deemed viable to continue mining operations for some years to come.

"From a visual, dust and noise perspective the quarry was a thorn in the community's side and we decided to pursue a path of conciliation by rehabilitating the quarry so it would become an asset rather than an eyesore to our neighbours," Terblanche says. He explains that not only does AfriSam ensure compatibility by replacing alien invader species with locally indigenous plants, but the company is very aware of the effects that excessive noise and dust can have on the environment.

"Aside from the social and environmental benefits derived from planned rehabilitation, there is a further economic benefit to AfriSam," says operations manager Jurgens du Toit. "By budgeting for and doing concurrent rehabilitation, we spread the financial burden incurred and by the time the quarry eventually closes its doors, we will have minimal work to do to ensure that it complies with environmental rehabilitation legislation.

"We use two vibro recorders – the first near our on-site offices and the second at the border between the quarry and our nearest residential neighbour – which record noise and vibration levels to ensure that the blasts are kept within acceptable limits," du Toit explains. "Further we have a comprehensive dust bucket programme measuring dust fall-out both on the mining property as well as in the neighbourhood. We do perimeter noise surveys to monitor the levels of noise created at the works and have found that the vegetation helps to reduce the transmitting of sound into the surrounding areas. We also place slope

monitor pegs at strategic points around the quarry and check these every six months to ascertain whether action needs to be taken if there is slope movement."

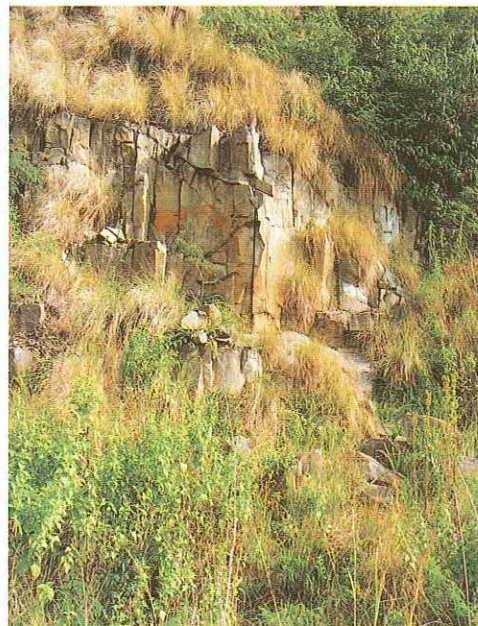
Terblanche adds that all blasts are designed in a contained manner. "During a site open day we held in February, we did a blast using AEL's Digishot electronic blasting system. This was a first for KZN and meant that we were able to blast 5m away from my office without any damage whatsoever to the structure."

"We employ an external environmental consultant Lynne Randall who takes the environmental management programme (EMP) we prepare for the Department of Minerals and Energy (DME) and compares it to the actual results of our work to ensure we are adhering to our plan," du Toit says. Randall of Umhlaba Environmental Consulting who visits the quarry biannually also offers advice on best operating practices.

"In addition, through industry bodies like ASPASA (Aggregate and Sand Producers of Southern Africa) there are both environmental and safety audits performed and I am proud to say that we



An overall view of Coedmore Quarry.



Face wrecking technology gives the rock face a natural appearance and provides a better surface for plant growth.

have achieved showplaces for both areas," Terblanche adds.

AfriSam's 63ha Coedmore Quarry is currently at a level of 45m below sea level and the intention is to mine it to 150m below sea level, if the water table will allow for this. "We

day. One of the areas where people come unstuck when attempting rehabilitation, is that they are impatient to see results and unwilling to put in the continued effort required to sustain the end result. New plants need to be watered for a minimum of two years to

ease in order to provide our staff with a better working environment."

Du Toit explains that the rehabilitation has been divided into four distinct categories with a number of related activities. "Firstly, the old workings are face wrecked, alien



During the blasting process.



A view of the quarry after the blast.

supply local construction sites and other customers with over 1 million tonnes of high quality aggregate per annum. Our standard product range includes sized aggregates from 53mm ballast down to crusher dust and graded products such as G2, G4, G5 and G7 material," Terblanche says.

The rehabilitation process began with the demolition of the old screening plant. Steel was removed and rubble broken up and this was covered with topsoil and replanted with indigenous trees about seven years ago. Gradually, AfriSam has introduced a variety of wildlife to the rehabilitated areas including duiker and other buck, and birdlife has come back with the plantings of indigenous plants. The wildlife does not seem to be disturbed by the quarrying operations. "We would like to place some zebra in the area as they are placid and gregarious animals but this is, of course, budget dependent," Terblanche adds.

AfriSam introduced 'face wrecking' technology to the rehabilitated areas. This involves drilling and blasting the rock in a random pattern to create a more jagged and sloping relief. "It's important that we achieve a rougher finish for the bench walls, firstly because this has a more natural look and secondly because it provides a more viable foundation for plant life and consequently helps to keep erosion to a minimum," comments Terblanche.

He emphasises the necessity of working to a masterplan with regard to rehabilitation. "You need to know what point to start at and where you are heading. Without a plan, your efforts will be worthless at the end of the

ensure survival and there must be continual removal of alien plants for a minimum period of three years before progress is noted. In reality, it will take at least five years of hard work before you achieve a result of which you can be proud."

The main alien invasive plants at Coedmore are Lantana, Chromolaena, Syringa, Bugweed and Leucaena. The trees are cut or ring-barked and then painted with the herbicide, Chopper, while the shrubs are cut down and the parts that coppice are sprayed with a glyphosate based herbicide. The follow-up treatments are done over a number of years by foliar spraying with glyphosate. The services of a contractor, Natal Landscapes, are outsourced and he employs five people on a permanent basis on site.

The plants selected to replace the invasive species are locally indigenous and include species such as *Ficus natalensis*, *Trema orientalis*, *Milletia grandis* and *Carissa bispinosa*. They are planted with fertiliser and compost. Some of the more remarkable bird species that have returned to the quarry are Fish Eagle, Crowned Eagle, Grey Heron and Little Bee-eaters.

"Wild fig trees lend themselves to planting as their root systems cling to growth surfaces. We need to remove alien invaders in a three-pronged attack which includes hacking, slashing and selective spraying. This process is repeated until we are happy that all signs of alien life have been eradicated," Terblanche says. "We have chopped down and removed 49 gum trees and over the years we have planted indigenous trees around the offices, plant and workshop ar-

invaders are eradicated and the area is revegetated; new workings and dumps are rehabilitated and revegetated; alien invaders are removed from open areas which are then replanted with indigenous species; and the Londonspruit is being diverted and rehabilitated."



The Londonspruit was previously diverted by AfriSam and the second diversion is currently underway. "We anticipate that the river will be flowing in this new channel by November 2009," du Toit says. "The entire diversion, complete with three waterfalls and plunge pools, is due for completion by mid 2010."

"It is necessary to rehabilitate and revegetate this area before mining commences because once the area is mined it will be impossible to reach the opposite side. Face wrecking is limited in this section due to the fact that the working area is very narrow and maximum extraction is necessitated," Terblanche says. Some of the material that has been excavated will be crushed and sold, while the remainder will be utilised to build berms as part of the rehabilitation process.

It is constantly necessary to clear rubbish which drifts downriver from outside the quarry area into the Londonspruit. "Of the overall 4km length of the river, 2km run through

quarry property and I can honestly say that the quality of the water leaving the property is better than the quality of the water that enters it," Terblanche comments. The vegetation planted on the banks of the river as well as the vegetation which grows on the river bed helps to purify the water as it wends its way through the quarry and constant vigilance by the rehabilitation team, through measurement of the water quality at five different points, ensures clean healthy water.

"We are currently developing three gauging weirs for the Londonspruit according to the conditions of the Record of Decision under EIA Regulation No 386. The purpose of the gauging weirs is to allow the quarry to calculate streamflows prior to entering the quarry and on leaving the quarry. This will allow for the calculation of water seeping into the quarry itself, thereby making pre-planning within the quarry possible with regard to dewatering as well as ensuring



slope stability," du Toit explains.

Other tasks undertaken by AfriSam's Coedmore team include

LEFT: The Londonspruit with its riverine vegetation.

BELOW: The Londonspruit will be diverted into this area in the coming months.

BELOW RIGHT: A rehabilitated section of the quarry with locally indigenous plants. Mined out areas are rehabilitated while the quarry is in operation.

well as a sufficient supply of topsoil to cover the wrecked faces. "With companies pushing for production to add to the bottom line, it's hard to justify hauling a machine off the job to beautify the area," Terblanche says.

Another problem is that because new plants need a constant supply of water to survive, any hint of drought can set the team's efforts back substantially. "We currently have a gravity feed irrigation system in place in the areas where mining does not take place and we use five bulk water containers around the mined and rehabilitated areas to alleviate any water shortages," Terblanche says.

Another way in which AfriSam has approached the water shortage issue is by using a terracing method when dumping material. "We have avoided using the end-tipping method of dumping which leads to erosion and water run-off. "By building terraces using the natural weight of the dump trucks to compact the ground, we provide a growth surface for plants and trees which in turn forms a natural water catchment area, thus eliminating erosion and capitalising on the collection of rainwater," he adds.

Terblanche is not one to rest on his laurels, so he is currently instituting a number of plans to take the quarry rehabilitation programme into the future. First on the agenda is the construction of a lookout point in an area overlooking the quarry and the plant. The long-term plan is to utilise this area as an informal information centre for the groups of secondary and tertiary visitors hosted every year.

"We are also busy designing a walking trail which will wind throughout the whole

bush bags into the quarry property, AfriSam chose to remove 600m of the old fence, along with hundreds of filled dustbin bags, and move the fence perimeter back 1,5m into the quarry's property. "This means that it is easier to clear out any rubbish thrown over the fence as it will now land in a forced 'no man's land'."

Du Toit mentions that there are several options available for the rehabilitated quarry when it finally does cease operations. "The most attractive one is the conversion of the quarry into either a hydroponics or conventional nursery which could provide subsistence to the poorer areas around Durban. Another is to make the quarry into a reservoir, but unfortunately it would be difficult to control the quality of the water coming into the reservoir.

"Naturally, some of the quarry's neighbours have been vocal in their criticism of the potential success of the rehabilitative process, because until you can provide concrete evidence of your efforts, it is really all just lip service," du Toit says. "However, the last 20 years of concerted effort by Henry and those who have helped him with the process are indisputable and the feedback we have received from the community is that the quarry is now an aesthetically pleasing enhancement to the area. Rehabilitation needs to have a plan in place, coupled with passionate and enthusiastic people like Henry and a dedicated budget," du Toit says.

"The best part of mining is the successful rehabilitation of the area. You mine for profit and your salary is paid out of these profits so it's natural to restore the balance by giving



tagging trees; maintaining a bird list; recording observations of wildlife on the property and maintaining pathways and firebreaks.

Rehabilitation does not come without its own unique set of problems. Foremost is the availability of machinery to undertake the earthmoving and face wrecking aspect, as

extent of the rehabilitated quarry," Terblanche adds. "We have already fenced off 3,5km around the quarry and the plan is to fence off the remainder of the quarry in order to protect the wildlife from poaching," he explains.

Du Toit says that in order to eliminate the issue of certain neighbours throwing rub-

something back to both nature and your local community. By leaving a legacy behind, you can then stand back and feel justified that it's a job well done. This will be the mark you make!" Terblanche concludes. 🌱

Article and photographs by AfriSam