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Proposals for the utilisation of redundant mine infrastructure for the benefit of local communities



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Proposals for the utilisation of redundant mine infrastructure for the benefit of local communities

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1. Executive Summary

The Matjhabeng community is overwhelmingly dependent upon the jobs and wealth generated by the gold mines in its area. As these mines have a finite life the sustainability of the Matjhabeng community will be decided by its ability to develop a commercial base that is independent of mining. This report provides a high-level inventory of the mining infrastructure that is or will become available for commercial or community re-use. It therefore argues that the creative conversion of much of this infrastructure could play a critical role in creating the employment opportunities necessary to sustain the community beyond mining. In doing so it would capitalise upon the high level of awareness of the potential opportunities that exist among the Matjhabeng community, particularly community-based organizations and small businesses.

At present, however, little of this awareness goes beyond the desire to acquire access to places of business or activity. Interest in these assets up until now appears to have been constrained by an inability to access the assets via the municipality or the mining company.

For this purpose the report provides a list of possible commercial projects that could be considered for the re-use of components of each category of mining infrastructure (including specialised shafts and plants).

It outlines the commercial benefits associated with the responsible transfer of redundant mine assets to new business ventures for the mining company, the new business ventures and the Matjhabeng community, thereby building a business case for the pursuit of the abovementioned projects. It makes a number of recommendations required for this business case to be realised:

- The recognition of Welkom's location 250 kilometres away from South Africa's economic heartland, and off the country's main transport and communications arteries, as a disadvantage that must be overcome by means of incentives for new businesses,
- The need for municipal incentives for business development aimed primarily at servicing non-Matjhabeng markets, in order to secure sustainable business development beyond mining,
- The targeted use of dedicated, contracted and incentivised individuals to oversee the conversion of individual redundant mining assets on a project basis to kick-start new business ventures aimed at servicing non-Matjhabeng markets.
- The management of future developmental initiatives should be driven by structures not primarily concerned with political inclusivity.

2. Introduction

This study arises from the mission of the Free State Province Premier's Economic Advisory Council (PEAC) to consider a range of options that could assist in facilitating the economic development of the province. For this purpose it commissioned Markus Reichardt of Thabiso Mining Services to research ways in which the existing mine infrastructure in the Matjhabeng/Welkom Goldfield (comprising Virginia-Welkom-Odendaalsrus-Allanridge) could be utilised for the benefit of the community, rather than be destroyed as part of the conventional mine closure/rehabilitation process.

The project was initially scoped to include all mining operations located within the Free State Province; namely the gold mines of the Klerksdorp goldfields on the border with North West Province, the coal mining operations of the northern Free State border as well as the diamond mining operations within the province. All of these areas were ultimately removed from consideration for the following reasons: the gold mines of the Klerksdorp goldfield are long-life operations, expected to operate at least until 2020; the redundant infrastructure in the northern Free State coal mining operations is at present already utilised fully; and the closure period of the diamond mining operations could not be anticipated with accuracy. As a result, the study was formally limited to the existing mine infrastructure in the Matjhabeng/Welkom Goldfield as this combines a critical mass of such infrastructure in one location. (Beatrix gold mine, though considered part of the Matjhabeng/Welkom goldfield was not considered, as it is a long-life operation located some distance away.) Due to the finite life of its mining operations Matjhabeng has to consider a range of policies and projects to sustain and grow its economic base beyond its currently heavy reliance on mining. A key area for investigation is the use of redundant mining and mining-related infrastructure for the benefit of the local (business) community.

This project report will list this infrastructure, as well as its potential future usage, in a manner that highlights the benefits to both the mining companies that make it available, as well as the communities and authorities who will seek to make use of it. For the purposes of this proposal we define 'for the benefit of local communities' as meaning commercial and non-commercial benefit.

The research for this study consisted of the following:

- An internet-based search and hardcopy literature review of how mining communities cope with the downscaling and closure of mines in both the developed and developing world.
- A desktop and interview-based review of the developmental activities already put in place within the Matjhabeng community by mining companies, the local authorities, as well as other members of civil society.
- A desktop review of the state of mines within the project area to determine which have been closed, which are marginal (i.e. vulnerable to closure under current economic conditions) and which are likely to close due to exhaustion

of their resource in the foreseeable future.¹ The mining companies via the Chamber of Mines of South Africa made the bulk of the information relating to aspects of this study available.

- A series of site visits to assess the availability, physical state and accessibility of specific elements of redundant infrastructure associated with the mines and their support infrastructure.
- A series of community meetings to gain an understanding of community needs and aspirations, in addition to determining constraints such as access to transport, credit, training, housing and communications within a local setting. In this manner, we sought to gain a local stakeholder view of the infrastructural needs in the local communities or authorities.
- A series of engagements with mining players not currently considering closure of their mining operations but nevertheless engaged in the reuse of redundant mining, or mining-associated infrastructure for community benefit or business development.

It is the view of this report that the re-utilization of redundant mining infrastructure in a variety of business ventures can be to the benefit of the non-mining business development urgently needed if the Matjhabeng community is to be sustained beyond the life of the present gold mining operations. Awareness of the potential associated with the redundant infrastructure appears to be widespread among the members of the Matjhabeng community. In order for this to be realised, the implementation of any projects arising from this study needs to proceed prior to the decline of mining operations in the community.

3. The Setting – The Welkom Goldfield

3.1 The Free State Province

The most recent economic data for the Free State Province suggests that it is a poor province with a gross annual household income of R 42 500 per annum as opposed to a national average of R 56 740.ⁱ The economy of the province is diversified with mining being the largest sector contributor at 19%, followed by Government at 14% and agriculture at 11%. Measured against all other municipalities in the province the Matjhabeng Municipality makes the single largest contribution to the Gross Geographical Product (GGP) of the Province, accounting for nearly a third of GGP. Any decline in the economic fortunes of this Municipality will affect the entire province.ⁱⁱ

3.2 Matjhabeng Municipality

Matjhabeng Municipality, previously known as the Free State Goldfields, consists of the towns of Welkom, Odendaalsrus, Virginia, Hennenman, Ventersburg and Allanridge. It is centrally located within the Free State about 250 km south of

ⁱ For the purposes of this report we define ‘foreseeable future’ as a time frame of 5 years. This is based upon the reality that the mining companies are sensitive to commodity prices and are thus forced to materially revise the Life-of-Mine plans on an annual basis.

Gauteng. The population has already reflected the decline of mining, dropping from 477 411 (1996 census) to 408 166 (2001 census). The populace is concentrated in the main nodes of Welkom, Odendaalsrus, and Virginia where the bulk of the mining infrastructure is found. Almost 90% of industries and supplier agencies based in the Municipality are linked to the mining sector and would thus be directly or indirectly affected by its demise.

4. Re-Using redundant mining infrastructure – the experience

The Welkom gold mines were developed in the 1940s with an original view to closure in the mid-1980s. Technological improvements and the discovery of new payable deposits extended the life of the mines, but psychologically the gold mines were in closure mode after the slide in the gold price of the late 1980s. As a result some effort was devoted, especially at the Anglo-associated mines, to the conversion of selected mine buildings to commercial use. Alongside the gradual conversion of a limited number of hostels to family units, some office complexes and training centres were handed over to non-mining entities for non-mining usage; for example one of the office complexes was handed over to the SA Police.

By the mid-1990s, the mining company property departments (formerly estate departments) began selling off surplus land, office complexes and residential accommodation on a limited scale. Although it is not possible to establish exactly how many assets were sold by AngloGold, Goldfields and the other operators, it is suggested that it exceeded 200 residential properties, six training centres, two office complex in central Welkom as well as over 2 800 hectares of land for residential development.ⁱⁱⁱ The AngloGold mine accommodation complex, known as Protea House was privatised in the late 1990s, a number of golf courses were sold off for nominal amounts, and some of the upmarket residences of executive mine management were sold to private individuals. Although these activities transferred substantial assets from the mining companies' books into community hands, this had no effect on the community's dependence upon mining, as the businesses created remained focussed on supplying the needs of the mines.

In addition to these activities, small business development initiatives, supported since the early 1980s by the then Small Business Development Corporation (SBDC), established a 'Hive' in the industrial area of Welkom in an effort to 'incubate new business ventures.' While there have been some successes over the years, the majority of businesses that grew out of the SBDC hive were aimed at servicing the growing outsourcing opportunities that accompanied the shrinkage of the mines in the mid- and late 1990s when the gold price squeezed margins. When the hive was visited in March 2004 all the businesses operating from its premises serviced primarily the Welkom market.

Recognizing the realities, the local authorities of the Matjhabeng region created the Free State Gold Field Development Centre as a Section 21 company and mandated it to market the economic potential of the region to attract industrial growth. Later the mandate was expanded to consider all means of promoting economic growth in the

area. While the Centre has had some success (for example SA Gems and Crafts which exports 80% of its production, Aristel and an ABI facility^{iv}), and has devoted substantial energy to the promoting of various projects designed to overcome infrastructural or locational constraints, it is not widely seen by the community as a driver of growth but rather as a champion of individual projects such as the current initiative to promote large-scale paprika growing and processing.^v

This pattern of business development, aimed at servicing the mining operations rather than seeking new markets beyond the goldfield, continues until the present. The result is that the eyes have been picked out of the inventory in the sense that structures built as part of the mining operations, and that could be easily converted to non-mining usage, appear to have been sold. Today, Welkom is left with a situation where there is:

- An oversupply of commercial training and educational facilities many of which are not deemed accessible to the under-privileged,
- An oversupply of golf courses,
- A gradual but inconsistent conversion of hostels to family units without a clear vision of how the new residents will support themselves,
- A limited conversion of redundant workshop complexes into small business hives,
- No systematic effort to find new commercial uses for mining assets.

In the perceptions of the Matjhabeng community, however, the issue of redundant and unused mine infrastructure looms large, resulting in a build-up of hopes and expectations. For their part, the mining companies operating in Welkom confront a looming legacy of substantial liabilities associated with the closure of their infrastructure after years of mining. Against this background, the Matjhabeng Municipality has over the years sought to encourage non-mining business development but with only partial success.

As early as 1991 the then Welkom Municipality, and other role players in the area, identified the need for a formal development strategy in order to reverse the economic decline in the area experienced as a result of the decline in the mining industry. A recent Department of Minerals and Energy (DME) initiative sought to bring together all local stakeholders to explore ways of themselves participating in the formal development process.^{vi} It also sought to align with, and supplement, a number of existing development initiatives in Matjhabeng, namely:

- The Free State Development Plan 2002-2005
- The Free State Gold Fields Development Centre
- Economic Rejuvenation Study for the Welkom, Odendaalsrus, Virginia and Hennenman area,
- The 5-sector Plan

The lastmentioned, summarizing many of the project proposals considered to date, identified interventions in five key sectors as critical for non-mining dependent economic development: distribution, agriculture, training and support, gold jewellery and tourism.^{vii} However, to date no systematic effort has been devoted to the exploration of the synergies between the needs of the communities for access to

infrastructure and those of the mining companies for the responsible removal of redundant infrastructure from their list of closure liabilities.^{viii} Any efforts that may have been undertaken have not been such as to have reached the awareness of the community.

5. Redundant mining infrastructure as a factor in Matjhabeng community thinking

Communities seek economic opportunity, with the overwhelming majority seeking an opportunity to take up employment or self-employment (based upon the acquisition of a trade). The existence of redundant mining structures, particularly offices, hostels and workshops, features prominently in the plans of the members of the Matjhabeng community. It is commonplace to encounter ideas about converting mining infrastructure, perceived to have been abandoned, or closed, for the purposes of business development or community usage. However, very few of these ideas have evolved to the level of even a conceptual business plan.

This stems largely from the fact that neither of the mining companies (Harmony and President Steyn) is viewed as being amenable to community access to redundant infrastructure. Not a single individual, proposing a project involving the re-use of redundant mining infrastructure, had any idea of how to approach the mine concerning the potential transfer of the asset. Although mentioned in its 2003 annual report^{ix} as a means of addressing many of the social issues associated with mine closure, the Harmony Social Plan, which apparently considers these options, is not known to the Matjhabeng community. Despite the company's substantial efforts in the field of gold beneficiation ventures,^x Harmony Gold Mining remains a nebulous entity to those members of the Matjhabeng community considering projects involving the re-utilisation of redundant mining infrastructure. Similarly, President Steyn Gold Mine are seen as opaque to individuals from the community seeking to engage on the issue of re-using infrastructure. The problem appears to arise from both sides with the frequent ownership and personnel changes on the mines confusing community members, and companies not deploying capacity dedicated to exploring the re-utilization of mine infrastructure.

At the same time, very few people felt comfortable approaching the municipal structures regarding proposals for business or project development due to a widespread perception that members of those structures had in the past stolen the ideas submitted to them for their own personal gain. In fact the community (both white and black), although very conscious of the issue of using redundant mining infrastructure to secure their post-mining future, appeared to be very remote from, or unaware of, the various development initiatives undertaken to promote non-mining business in the region.

In this setting, it has been religious community groups who have been the more active in considering the re-utilization of mining infrastructure. By their very nature their interest has been focussed on accessing structures for use as shelters, crèches and schools. Although their proposals involving the re-use of mine infrastructure respond

directly to the social and developmental needs of the community, very few of them can muster the resources required for the sustainable utilisation of these structures.

Within the Matjhabeng community there are, however, clear differences on the issue of mine infrastructure in the context of community needs. They can be summarised as follows:^{xi}

The **Virginia** community appears as the most passive, with individuals seeking jobs rather than self-employment opportunities. This is the part of Matjhabeng traditionally disproportionately dependent upon mining and with the least diversified local economy.^{xii} Community awareness of mine closure is non-existent as the mines are expected to provide employment for generations to come. However, unemployment of the youth is considered an issue, as educational qualifications do not appear to assist in securing a job. The absence of local vocational training centres requires people seeking such skills to make use of Welkom's facilities. A hostel complex has been converted into a sports academy but locals do not see this as accessible. Any conversion of mining infrastructure in this area would have to be driven by roleplayers other than the community.

The community of **Welkom/Thabong** is by far the most entrepreneurial-minded. In part this is based upon having access to the greatest number of vocational and educational training facilities, as well as recreational facilities in the area. It is among this group that business and project plans are the most developed, and where redundant mining infrastructure actually features as a component in these plans. However, the ability of this community to access mine company information concerning redundant infrastructure is as limited as in the rest of the Matjhabeng community.

In **Allanridge**, mining ceased being a major employer nearly a decade ago, and the low wages paid by contract miners make this form of employment less attractive. The community therefore is psychologically the least mining dependent. This manifests as a great desire for access to mechanisms for business establishment, as well as training facilities for business and vocational skills, but other than for mine-focussed electrical skills. The community believes itself well serviced with hospital and school facilities but deplores the shortage of recreational facilities. Although there is understanding that there is little redundant mine infrastructure left in the immediate vicinity, awareness of the potential for re-use is high. This extends to redundant assets in other Matjhabeng areas.

The community of **Odendaalsrus/ Kutlwanong** represents a mixed picture: although the community believes itself to have suffered more than others from the job losses on the mines, the proximity to Welkom's schooling, health care and recreational facilities has held back the development of this sort of infrastructure. While most still appear to look towards the mines for opportunities, there is a small but vibrant section of the community active in the establishment of informal businesses, schools and social service centres. Statistically Odendaalsrus is also the most diversified area insofar as it possesses the best-developed trade sector (18% of total economic activity in 1997)^{xiii}. All of these could benefit from the use of redundant mine infrastructure but almost no understanding of how to access this exists.

Finally, all communities believe themselves adequately serviced in terms of local transport. Local taxi rides throughout the area cost three Rand and the main routes connect all residential (formal and informal) areas to the industrial and mining zones. Community mobility does not pose a constraint to the majority of people seeking access to opportunity or employment.

This suggests that despite local differences, and with the exception of Virginia, the Welkom community is aware of the potential role that redundant mining infrastructure can play in their upliftment and business plans. What is lacking is a mechanism to bring them, the mining companies and the municipality, together to put some of the ideas into effect.

6. The business case for the re-use of redundant mine infrastructure for purposes of commercial/community development

In the present legislative and accounting framework, mining infrastructure is unique in that it is the only asset class that is not 'consumed' i.e. depreciated to zero value during its commercial life. Rather, mining infrastructure at the end of the life of the mining operations becomes a liability to its owners. This is due to the requirement, contained in mining legislation the world over, that the company restore the mining site to a stable, non-mining condition, preferably one resembling the status quo prior to mining. As an alternative the liability may be sold or transferred to another entity but only after it has been determined that this new owner possesses the means to manage (ie. if need be to rehabilitate) the impacts upon that land. In the case of a business being the new owner, its ability to generate a positive cash flow over a period of years (usually three or more), and on a scale capable of dealing with the impacts, is deemed adequate assurance.

In the case of the Welkom/Matjhabeng community, the mining infrastructure built for the exploitation of the goldfield represents a substantial liability to the mining companies as the ore body nears the end of its life. Although the estimate is revised annually, the liability to the mine operators controlling the entire Welkom goldfield is of the order of R 1-billion. This figure must be provided for in annual instalments out of the mine's revenues. Removing even just some of this liability would result in an immediate commercial benefit to the mining operation as well as a lengthening of the life of mine.

At the same time, any business that could acquire the premises from which it operates at a near-zero cost, has an inherent competitive advantage. Redundant mining infrastructure, if passed on at nominal to new businesses could provide these ventures with a substantial advantage vis-à-vis their competitors. New business ventures in the Matjhabeng area therefore would have a major incentive to consider utilising redundant mine infrastructure if this could be acquired at minimal cost.

Finally, the municipal authorities of Matjhabeng, in their concern over the sustainability of the community beyond the life of the mining operations, would

benefit from any business development where the new ventures possessed a competitive advantage that would improve the chances of their commercial survival.

All three players – the municipality, the entrepreneur, and the mining company – therefore have a commercial incentive to consider a partnership framework in which the mine can legally divest itself of individual components of the closure liability to a new owner who could satisfy the legislative requirements, ie. to keep the site and infrastructure safe, stable and non-polluting. This would reduce the amount of closure funds the mining company would need to divert from profits. For the mining company to receive this commercial benefit the mere removal of the infrastructure from its list of liabilities would be sufficient; it does not require a cash injection from the transfer to benefit. This opens the way for any new business to acquire business premises that require limited conversion at near-zero cost and confers an immediate advantage as it frees the venture from having to lease or purchase a substantial capital asset. For the municipality, any increase in new business development would be beneficial in that it would increase its tax base.

In order for this mechanism to contribute to the sustainability of the Matjhabeng community beyond the life of the current mining operations, the transfer of redundant mining infrastructure at nominal cost should occur preferentially to new businesses whose putative markets lie outside the Matjhabeng region and who are therefore not primarily dependent upon the disposable income of mine employees. It should also generally be limited to assets that are not situated on heavily impacted sites, or are themselves the source of environmental impacts. The following section outlines a number of possibilities for the re-use of the different forms of redundant mining infrastructure that exist in the Matjhabeng area.

7. Options for infrastructure usage by category

In the original scope of work, the intention was to identify specific items of redundant mine infrastructure and determine potential usage for them on the basis of social and business information acquired. A key constraint to this methodology however is that the gold price as well as the exchange rate of the South African Rand and the US Dollar are increasingly seen as too volatile for detailed long-term closure planning of mine lives on the Witwatersrand formation. While there is a certain amount of infrastructure that has already been removed from active service, and is thus immediately available, the timing of when additional assets would – with certainty - become available is likely to change from year to year. The inventory presented below therefore covers both the assets currently available as well as those that will become available over time, in order to demonstrate that, in absolute terms, there is enough of a critical mass of this category of assets for them to play a key role in the diversification of Welkom’s economy beyond mining.

Assets potentially available:

	Harmony Gold Mine ^{xiv}	President Steyn Gold Mine
Shafts	15	2

Workshops	5	4
Metallurgical Plants	4	1
Office Complexes	16	2
Boarding Houses	5	1
Recreational Facilities	25	2
Security Barracks	4	1
Warehouses	8	2
Hostels	14	1
Other buildings	17	3
Trading Stores	11	0
Training Facilities	7	0
Villages	4	0
Vacant Land		

7.1 Shafts

Mine shafts are generally deemed to be specialised infrastructure incapable of conversion to other, non-mining uses. There are, however, at least two operating examples where commercial ventures have been able to benefit commercially from them.

In the Far West Rand/ Carletonville area Goldfields explored the value of warm air from the vent shafts of Kloof, and Driefontein, goldmines for agriculture. A pilot project was established whereby the warm air was used to stabilise temperature within hothouses where vegetables and flowers were grown partly by hydroponic methods. The project revealed the potential for a large-scale investment in terms of which Goldfields partnered with the Industrial Development Corporation (IDC) and the Department of Trade and Industry (DTI) as well as the Greater West Rand District Municipality. Total investment for the facility amounted to R 70-million and the project will produce 25-million rose stems annually for the European and North American flower markets. Along with its partners Goldfields invested in the most up-to-date technology encompassing ten hectares of sealed, plastic covered greenhouses with artificially controlled climates. While the initial project – named Living Gold – focussed on flowers, another stage of the venture will expand the growing of vegetables by hydroponic means for local markets. Living Gold created 250 direct and 100 indirect jobs in the Carletonville area.^{xv}

The underground environment of the mine workings themselves is a potential asset for any business requiring such a stable climate. In North America, former shallow coal and base metal mines have been used for the growing of mushrooms and specialised vegetables and flowers.^{xvi}

South Africa's only operating underground mushroom farm can be found in a drainage tunnel that surrounds the Big Hole of Kimberley at a depth of 60 meters. Built by De Beers as a means of draining away water from the Big Hole's wall and thus reduce erosion, the tunnel was in 1996 identified as possessing the optimal temperature and humidity conditions for the commercial growing of an edible mushroom known as the oyster mushroom. With technical support from both De Beers and the University of Pretoria, a group of entrepreneurs established an

operation that began production (after an 18-month trial period). The venture's capital costs were of the order of R 600 000 with a turnover of R 850 000 per annum. The product was distributed fresh via the national network of Denny Mushrooms to South Africa's major population centres. Marginally profitable, it employed 11 fulltime staff that were mostly former miners familiar with the underground conditions. De Beers purchased the operation in 2002 and showcased it as a sustainable venture for the Johannesburg World Summit. It continues to operate in 2004, although on a slightly smaller scale. Clearly underground conditions would be different in Matjhabeng's deeper mines but these ventures illustrate the stable underground climate of the former gold workings could well prove to be an asset for specific business ventures.^{xvii}

At the same time the possibility of a geothermal power station using the thermal gradient of the deeper Welkom mines should be considered in partnership with Eskom. In such a scenario, the lower, hotter levels of a mine would be filled with water and sealed. Geothermal energy would gradually bring and maintain such water near boiling point giving rise to pressure in the form of water vapour. Channelled through low-pressure turbines this vapour could form the basis for substantial power generation. The operation would be made sustainable by the capture of the vapour after its passing through the turbines and allowing it to cool before returning it to the underground facility in a closed circuit. The same effect could be achieved using compressed air instead of water. Equally, the potential of the underground workings could be explored for use as pump storage facilities. Either of these options would require large-scale capital investment but would be employing proven technologies implemented in the United States.^{xviii}

7.2 Workshops

There are at present at least five workshop complexes that are or will become available for re-use. The majority of these complexes were designed and built as a result of the ring-fencing legislation that required individual mines to operate in a stand-alone manner. Thus each mine acquired *inter alia* a workshop complex complete with parking facilities, ablutions, and access to the electrical, sewerage and water grid. At present, the majority of these complexes are in a reasonable to good condition. One such complex, although owned by Harmony Gold Mining Company is operated by the AngloGold Small Business Initiative under the name of Full Output 121 (Pty) Ltd. It presents an example of the popular model of converting such workshops into small business hives. At present there are 16 businesses operating from its complex with space for an equal number still available. The ventures range from light engineering to cooking and baking, laundry services and paper recycling. However all, with one exception, are limited to the Welkom market. The exception, Eucalyptus Environment CC, is discussed below as it presents a model of the kind of venture required to give Matjhabeng a post-mining economic base.

Eucalyptus CC is the only venture operating in the Full Output 121 hive that does not have customers in the Matjhabeng area. Eucalyptus' business is based upon the extraction of timber classified by Department of Water Affairs and Forestry (DWAf) as invasive aliens (primarily *Eucalyptus*) from land within the Matjhabeng Goldfield. Based upon an initial survey, the business has access to a minimum of 20 years supply of material across the region. The markets for Eucalyptus' products (underground

railway sleepers, mining timber packs and garden furniture) are in Rustenburg and Gauteng. What potentially makes Eucalyptus' business plan sustainable beyond this 20-year horizon is the existence of an afforestation programme (designed by the University of the Witwatersrand's Botany Department) based upon indigenous tree species supplied by community-based nurseries financed and supported by DWAF. The purpose of this afforestation programme is the removal of water-borne pollutants originating from mine wastes (tailings). This programme, supported by DWAF, the Department of Environmental Affairs, and the DME, envisages the targeted planting of more than 3-million indigenous trees in the areas impacted by mining activities in the Matjhabeng Municipal area and surrounds.

Assuming a doubling of extraction rates on the part of Eucalyptus CC the available timber would be exhausted within 10 years. Within that period a substantial portion of the indigenous trees currently planted for the purposes of ground water rehabilitation would have passed their peak-performing years in terms of pollutant extraction. They would thus be available for harvest. The afforestation project which is currently financed two-thirds by Harmony and one-third by AngloGold (to the extent of R 2-million per annum) envisages up to three generations of tree planting will be required in order for the bulk of the mobilised (waterborne) mine pollutants to have been absorbed by the vegetation. Eucalyptus CC therefore is likely to have access to a sustainable resource.

Members of the local taxi association have an especial interest in redundant workshop infrastructure due to an anticipated change that could require taxi operators to establish formal, corporate entities. Should this eventuate, many taxi drivers identified the former mine workshop complexes as potentially key assets insofar as they would require premises from which to operate, service and park their vehicles, as well as for administration.

7.3 Metallurgical Plants

At least five metallurgical complexes should become available for re-use. Although designed for a specialised processing purpose, these structures are essentially large water tanks and thus have potential for any business venture requiring large volumes of liquids in its processes.

AngloGold Ltd investigated and piloted the re-use of such a plant for the purposes of farming ornamental fish from 1998 to 2001. This involved the conversion of the No. 3 Old West Gold Plant of AngloGold's West Rand Operation into an ornamental fish farm. The plant, which included eight large circular tanks, had been operated for the enrichment of gold and uranium ore for twenty years prior to its decommissioning in 1997. AngloGold staff, assisted by members of the Fisheries Department of Rhodes University, developed a business plan based upon the production of both Koi carp and goldfish for the ornamental fish market. The tanks were to be provided with translucent roofs to allow for passive solar heating of the water thus increasing the growth rates of the fish. A workshop building associated with the plant was converted to function as a water purification facility and as a hatchery. Mindful of the specialised nature of the skills required for the operation of such a venture, AngloGold partnered with an established operator in the ornamental fish business. The plant was converted at a cost of about R1.5-million and at full operation

employed 30 people with a turnover of R2-million per annum. The project, nicknamed AngloGoldFish, operated successfully for a year before skills bottlenecks with respect to fish rearing constrained its ability to generate a steady income. This led to the dissolution of the partnership and the cessation of operations in 2001. Although the venture incurred a loss for the mining company, it demonstrated the soundness of the project principles while highlighting the critical need for access to specific skills for the operation of such a specialised farming operation.^{xix}

Other uses for such units would include variations on the AngloGoldFish theme such as crocodile farming, barbel farming or the production of algae used in industrial processes. In addition these units could perhaps form part of the sewerage treatment facilities for Matjhabeng Municipality.

7.4 Office Complexes

The majority of the 16 office complexes at issue were designed and built as a result of the aforementioned ring-fencing legislation that required mines to operate in a stand-alone manner. Each mine acquired a head office building complete with parking facilities, ablution blocks, meeting rooms, strongrooms and associated garden areas. Each of these complexes has between 50 and 70 offices, including some larger executive offices with secretarial areas. At present, the majority of these complexes are in a reasonable to excellent condition. All of them retain their access to the electrical, sewerage and water grid. In most cases the work required for putting these structures to active use is minimal.

What is proposed for a limited number of these office complexes is their conversion into dedicated offices for office-bound service providers, in particular call centre businesses or centralised office services. The business case would be as follows: The office complex currently represents a demolition liability of between R100 000 and R250 000 on the books of the mining company. It would therefore be in the mining company's interest to pass on this complex at a nominal sales price. Larger service providers in the financial services industry with substantial numbers of office staff could be approached with a proposal to acquire such a complex. They would thus gain access to an asset where they could locate office workers dedicated to a particular administrative task. For example a large, nationally represented insurance company might be persuaded to centralise all members of a currently decentralised function into a single facility, or to locate all members of the call centre function (or claims enquiries) in such a building. The cost for the company would consist of a once-off refurbishment of the complex to its requirements. The acquisition of such a structurally sound office block at virtually no cost would represent a considerable saving to the company. The municipality in turn would commit to a rates and taxes grace period (whose details and length would need to be negotiated) for the new operator on the condition that the bulk of the customer base would not be drawn from the Matjhabeng community. The municipality would easily recover any forgone revenues in the form of increased residential levies paid by the new salaried employees of such an operation, as well as in the multiplier benefits to the businesses of the region deriving from these employees.

What would be required would be a structured and formal approach on the part of the provincial Premier's Office to the executives of an agreed list of large, national financial service providers to seek offers for the implementation of such projects.

7.5 Boarding Houses

There are five boarding houses that are or will become available for re-use. Each house comes complete with parking facilities, ablutions, and limited garden areas around them. Each of these houses provides accommodation for between 20 – 50 individuals. At present, the majority of these complexes are in a reasonable condition. All of them retain their access to the electrical, sewerage and water grid. Although in most cases the work required for restoring these structures to active use is minimal, the question of what role such structures could play for future business ventures faces the same constraints as the hostel conversion plans (see below). If these units are in any way to be converted into family- or apartment units, their sustainable operation will require occupation by individuals in formal employment.

7.6 Recreation Facilities

There are a variety of recreational facilities (mainly associated with golf courses) that were built during the days when the mines sought to attract skilled individuals to the area. While most of them have the potential for sustainable usage, any option for the successful operation depends upon continued access to the disposable income of meaningful numbers of locally employed individuals. Previous efforts to develop upmarket golf estates have failed in the area in part due to its location. By themselves these facilities do not provide adequate pull to bring tourists or investment. No further effort has therefore been made to consider alternative uses for these facilities.

7.7 Security Barracks

There are four security barrack complexes that could become available in the future. Each contains office building(s) complete with parking facilities, ablutions, meeting rooms, archiving/strong rooms and garden areas around them. Each of these office complexes encompasses from four to eight structures, as well as, in two cases, stable facilities for horses. All of them retain their access to the electrical, sewerage and water grid. At present, these complexes are all leased out to local security operators, all of whom have signed long-term leases. Should the leases ever lapse, it is suggested that for some of these complexes their conversion into dedicated offices for office bound service providers be considered along the lines of the call centre businesses, or centralised office services, proposals already detailed in section 7.4 above.

7.8 Warehouses

There are at present at least eight warehouses that might become available for re-use. Each retains its access to the electrical and water grid as well as limited access control infrastructure, parking facilities and garden areas. At present, the majority of these complexes are in a reasonable to excellent condition and in use. Future business

ventures could benefit from their usage either by continuing their utilization as warehouses for storage or for light industrial purposes.

7.9 Hostels

There are some 14 hostels that could become available in due course. In terms of the information provided by Harmony officials, these hostels are a key element of the Harmony Social Plan projects. It was therefore requested that they be excluded from consideration for this project. It is envisaged that over time these structures will be converted to apartment complexes and family units. The timing of this will depend upon the fortunes of the mines currently operating the individual hostel complexes. Potentially this could add as many as 15 000 family units to the Matjhabeng housing stock.

A concern has been raised that in order for such conversions to be sustainable from a community and business perspective, the occupants will need to find formal employment opportunities in the Matjhabeng area in a post-mining setting. Thus the conversion will only contribute to the community's sustainability if other, non-mining employment opportunities are created.

A possible commercial use investigated for a hostel was done by AngloGold in the Klerksdorp area where a hostel built for 3 500 workers, that had fallen into disrepair was evaluated for conversion into a private boarding school for children from the surrounding community. In 2000, a feasibility study was prepared which envisaged a commercially viable operation based upon a R3.5-million capital expenditure for the conversion and upgrade of the hostel facility to a standard acceptable as a boarding and school facility by the Department of Education. According to the study, equity-financing would be required to ensure the commercial viability of such a boarding school. If this could be secured a school for 600 children would be viable - one effectively paying state school rates, and employing 70 teachers, minders and other staff drawn mainly from the spouses of the mine employees. The project was not implemented, as the company was unable to identify a business partner to operate the venture.

7.10 Other buildings

There are ranges of smaller structures such as local post office buildings formerly run by the mining operation, that are no longer used. All of these buildings are small structures that while possibly of interest to a small retail venture are not of sufficient size or number to warrant detailed project exploration.

7.11 Trading Stores

There are 11 trading stores that are or will become available for re-use. As a rule they consist of structures of no more than 800 square metres under roof (usually half that) in various stages of disrepair. The majority of these appeared to have suffered major vandalism. As potential assets for re-use they also are saddled with their historical legacy of generally being located on the route between hostel and shaft and thus currently not conveniently located near residential areas they could service in a retail

or service provision role. Their limited size makes them generally unsuited as production/manufacturing facilities. This combination of limited size and generally poor location limits the value of these structures for any commercial re-use, and no proposals for commercial usage are made for them. There could however be opportunities for community usage of these structures provided the resources could be found to rehabilitate them.

7.12 Training Facilities

Seven training facilities can be taken into consideration. Most stakeholders appear to assume that following their release from mine usage these facilities will continue to function training individuals in a variety of skills and trades. The Matjhabeng context however poses severe limitations on this option. Over the years a great number of mine and other structures have been converted for use as training facilities. This research identified a substantial number of already existing training facilities across the Matjhabeng region many of which showed signs of excess capacity. Although the need for primary, secondary and ABET teaching does not appear to be completely met, a number of vocational training facilities were identified which had been shut down for lack of demand. Even the Mineworkers Development Agency (MDA) training facility which is free from commercial considerations had ceased functioning. Any plans for future usage of the training facilities following the cessation of mining should therefore be considered with great caution.

7.13 Villages

There are four mine villages that will eventually become available for possible alternative usage. Although no plans exist, it is likely that they will be disposed of by selling off the residential units to private, non-mining interests. As in the case of the hostels, there is a concern that in order for such sales to be sustainable from a community and business perspective, the new owners will need to find formal employment opportunities in the Matjhabeng area in a post-mining setting. Thus the sales will only contribute to the community's sustainability if other, non-mining employment opportunities are created.

7.14 Vacant land

Vacant land was included in the inventory of redundant mine assets of Harmony properties system. It does not however form part of the scope of this brief and is therefore not discussed further, other than that the availability of certain vacant properties may offer opportunities for commercial or residential development for Matjhabeng development initiatives. However, access to open land is cited by some community members as a constraint on the development of their projects and consideration should be given to publicising the availability of any such unpolluted land for commercial sale if it is no longer required by the mine. For example, a businessman operating successfully in the Matjhabeng area identified a project for the commercial farming of rabbits for the purposes of selling skins and furs to Far Eastern markets. Despite having access to markets and most of the requisite finance, his failure to secure the substantial piece of land required, at a reasonable rate, was identified as the main reason for the failure of this project to get off the ground.^{xx}

Other proposals concerning the use of vacant mine land have focussed on bee farming, raising goats on municipal garden wastes, and community sport facilities.

7.15 Tailings Dams

Though not initially included in the scope of this work, it became apparent that the more than 3 500 hectares of tailings dams are a major factor in the future of the community. From a mine closure perspective they represent the principal source of groundwater and dust pollution, and as such the bulk of the mine closure funds set aside in trust funds are dedicated to their rehabilitation. At present the objective for their rehabilitation is to stabilise their surfaces either through extensive grassing or the planting of trees. This rehabilitation effort is unlikely to transform them into productive areas.

It is during their decommissioning that tailings dams have their most immediate impact upon the community in the form of dust. Nevertheless the period between decommissioning and grassing or tree planting is often quite long, as the heavy machinery required for the planting cannot be brought onto site before the dam is dried out.

During this period the tailings dams should be considered as a potential asset as they present a much sought-after landform – ie. acidic well drained soils. Such soils are found in the Western cape and generally support the high levels of bio-diversity associated with fynbos. At present fynbos, though declared a protected eco-system, is being cleared to gain access to such soils for the fattening of flower bulbs for the European market. Bulb fattening involves the placing of small bulbs into acidic, well-drained soils to allow the small, young bulbs to triple their size without producing substantial foliage or flowers. After a period of three to four months the bulbs grow to a size where they can be dug up and packaged for export to the growing European market for flowers (presently around R20-billion).

If suitable areas were selected and the appropriate trials conducted, this venture would offer the potential for employing a workforce that initially would have a low skills requirement but which during the first production cycle could be trained to add the value to make these bulbs into the export grade product the Western Cape producers are delivering.

8. The international experience of mining towns surviving the end of mining

Mines are a finite resource and must be treated as such on a site-by-site basis. Mining as a sector can contribute to sustainable development if the capital (physical, financial, human or infrastructural) generated from the ore body is used to advance the development of society in a sustainable manner. In order to become sustainable, a mining community must itself develop economic sectors not associated with or dependent upon mining. From the desktop research done for this study, it emerges that mining-dependent communities become sustainable only if they manage, during

the life of the existing mining operations, to develop alternative sectors. If they fail to do this they will at best continue to exist at a much reduced level.

It is often argued that in order for mining-dependent communities to survive and prosper beyond mining, the ore body must exhibit a longevity that creates the economy of scale necessary for the development of secondary industries. This is however a fallacy as most such secondary industries tend to remain focussed on supplying the needs (directly or indirectly) of the mining operation, and are therefore unlikely to survive its demise. There are exceptional cases such as the coal deposits of the Ruhr valley of Germany or the central Witwatersrand goldfields that are characterised by such longevity that the scale of human habitation associated with them created adequate and sustained demand for non-mining products and services to a degree that allowed those sectors to export beyond the local economy. Proof that size or longevity alone are not necessarily the answer can be found in the fate of the Zambian/Katangan Copperbelt, Kalgoorlie in Western Australia or the Broken Hill area of Victoria, Australia. Here, despite nearly a century of mining on a scale involving up to 30 000 employees, no secondary industries grew up alongside the mining operations. In the Copperbelt, the communities therefore remain utterly dependent upon mining related activity, while in Broken Hill the scaling down of the community, after the cessation of mining, to less than a quarter of its former size is proceeding. The Copperbelt experience also strongly suggests that the unilateral promotion of SMME activity will not reduce poverty levels among the marginalised members of mining dependent communities nor is it in itself the likely mechanism for creating the necessary economic activity that would make the community sustainable beyond mining.^{xxi}

By contrast, areas such as Sudbury in Canada (where iron ore and base metal deposits were mined over nearly three generations) have succeeded, via a sustained tri-partite development effort, to develop substantial non-mining sectors during the life of the mines.^{xxii}

For a mining dependent-community to continue to sustain itself satisfactorily after the cessation of mining requires,

- The ability to implement policies that facilitate the establishment and retention of businesses in non-mining sectors during the mining operations,
- The mechanism to capture a share of the wealth generated by the ore body for the purposes of developing and financing the non-mining sector.

Despite highlighting these recommendations, the literature does not present adequate case studies detailing how communities have avoided a steep decline associated with the cessation of mining. However, the literature is clear that *mining-dependent towns that do not develop non-mining dependent industries during the life of mining operations do not survive.*

9. The Cost of doing nothing

The gold mines of the Welkom Goldfield were originally designed to close in the mid-1980s but technology and the volatile gold price sustained some of the operations

beyond this point. This has led to a sense of complacency, common in large mining communities, that the impacts of closure are not issues the community members will have to confront in their lifetimes. Given present levels of knowledge, most Free State mining operations will cease around 2015. The technological improvements that allowed for the extension of mine lives took place over a period of more than 30 years. The technological improvements required for the extension of the existing operations beyond 2015 are larger and there is only one decade left. The Matjhabeng community therefore has less than ten years to deploy the resources required to develop a new economic base.

The alternative will mean the decline of the community within less than 20 years. Today 85% of jobs depend, directly or indirectly, on mining. This situation has not changed over the past 20 years during which period more than 25 000 mining jobs disappeared. It is these remaining jobs that sustain the Matjhabeng community. Should they not be compensated for by other sustainable employment opportunities the following factors will characterise the ensuing economic decline:

- Demand for goods and services from Matjhabeng's retail sector will decrease by 80%, resulting in further lay-offs in that sector,
- Vital medical and professional skills for which there will no longer be any economical demand will move away,
- Demand for welfare support and social services will triple, while the funds to support social services will be cut by at least two-thirds,
- Funds from civil society to support less fortunate members of the community will dry up as disposable income from business and individuals drops by 85%,
- Unemployment will spiral among those not able to move away to other work,
- About 80% of the municipal income from rates and taxes will disappear, and with it the resources to maintain Matjhabeng's social services, transport and residential infrastructure.

In short, Matjhabeng will move from being the economic engine of the province to being a burden to the state. The massive assets that could be leveraged to the benefit of the country will be lost. Matjhabeng will move from a community of about 400 000, to one supporting barely 80 000 at a much lower standard of living. Most of the remaining jobs will be restricted to public service positions as well as a small sector supporting the surrounding agricultural industries. Much of this reduction will come in the form of migrant workers departing the mines to either return to their rural homes (especially Lesotho and southern Mozambique thus further adding to poverty there) or seeking employment in other urban centres of the country.

Matjhabeng's ability to begin the conversion to a non-mining dependent economy prior to the cessation of mining is critical in another context. The termination of mining in the Welkom field is expected to coincide with the cessation of mining in other traditional gold mining areas of South Africa such as the Evander gold field, the East Rand, and the West Rand. Over the next decade other mining operations are also expected to scale down their operations, creating similar impacts on communities dependent upon their wealth. Should Matjhabeng not have consolidated at least the initial components of its post-mining economy by the time other mining-dependent communities across South Africa are impacted by mine closure, it will face even greater obstacles in its efforts to attract outside investors. In the absence of any

distinguishing economic features, it will then be just another defunct mining community among many that squandered its capital infrastructure.

10. Recommendations for building a post-mining economy for Matjhabeng

Matjhabeng Municipality has over the past decade done many of the conventional things to attract non-mining business to the area. However, the Municipality remains critically dependent upon mining, with 58% of its GGP being derived directly from that sector and almost 90% of the remaining, non-agricultural GGP linked to the mining sector. Mining in the Matjhabeng Municipal area is projected to cease on a significant scale between 2015-2020. Despite notable successes at diversification, the area has so far not managed to attract non-mining business on a scale sufficient to mitigate the impact of mining downscaling.

Past policies and methods of attracting non-mining business to the area have perhaps been hampered by the fact that there is little to set them apart from similar efforts by other municipalities seeking to attract economic development. This report recommends that Matjhabeng should consider reviewing its approach to take greater advantage of redundant mining infrastructure as an asset base for new innovative businesses. It argues that this should be done in a manner that formally brings together provincial and local government, the mining company as well as civil society to steer the process outlined below.

It is the conclusion of this report that the creative, responsible transfer of mining assets to members of the community able to make commercially sustainable use of them presents a major opportunity for Matjhabeng in its search for new economic directions.

Economic development initiatives in the region have only just begun to focus on the need to develop business ventures commercially independent of mining. Such ventures should become the exclusive objective of any further development initiatives. A key limitation for business development in the Matjhabeng area is its location - 250 kilometres from South Africa's economic heartland and off the country's main transport arteries and communications nodes. Special incentives are required to overcome this locational disadvantage. Making mining assets available to such businesses at near zero cost would be such an incentive.

Those benefiting from the transfer of such assets (the mining company and the municipality) should acknowledge that this novel approach would require successful examples to gain acceptance. They should therefore make dedicated capacity available to oversee and ensure feasibility studies for the projects outlined above.

This would also overcome a further limitation of previous development initiatives: the fact that most were managed by committees representing a variety of stakeholders. While this may assist in legitimising the process, it does nothing to focus entrepreneurial talent needed to run new ventures. Committee structures driving development initiatives for Matjhabeng should limit themselves to acquiring the funds and providing the framework for entrepreneurial individuals tasked with taking a

conceptual feasibility study all the way to a functioning business that is independent of the Matjhabeng market. In order to secure access to funds and business skills along the way, institutions such as the Industrial Development Corporation (IDC) could be drawn in. The individuals deployed should be given a clear timetable, with milestone deliverables such as the completion of the feasibility study, completion of conversion work, beginning of trading, etc. in order to make their projects succeed. As a further incentive they should be given the option to take an equity stake in the venture once it has begun to trade.

The cost associated with this would be comprised of the salaries of the entrepreneurs, the cost of developing and testing the feasibility study, and the cost of building the business (partly by converting a mining asset). Based on the kind of projects outlined above, the cost per venture would be of the order of two to four million Rand. Some of these funds should come from infrastructure development funds set aside by the government for economic development purposes, others should come from the mining companies who will derive benefit from the removal of such infrastructure from their liability register.

The feasibility studies should be designed for ventures that seek to provide goods and services to customers outside of the area, preferably outside of the province. The scale of these projects should be conceived on a meaningful level in terms of employment generation. The feasibility studies should be contracted out to management individuals or companies with a track record of delivering such studies within fixed timeframes and to an appropriate standard.^{xxiii}

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ⁱ Du Toit 2001 p.14

ⁱⁱ *Matjhabeng Diverse City* pp.5-8.

ⁱⁱⁱ Interview December 5, 2003 Jacques Wessels, former Properties Manager Anglo American Corporation Gold & Uranium division Free Gold Operations, later AngloGold Free State Operations, then AngloGold Properties Manager SA Operations.

^{iv} *Urban Economic Development Review* p. 5.

^v *Urban Economic Development Review* pp.9-48, *Matjhabeng Development Strategy* pp.11-12.

^{vi} *Matjhabeng Development Strategy* p.1.

^{vii} *Matjhabeng Development Strategy* p. 14.

^{viii} *The Urban Economic Development Review* p. 6, made passing mention of the issue but did not explore it.

^{ix} *Harmony Annual Report 2003* p. 61 The Report mentions the conversion of a Virginia hostel complex into a sports academy. This facility was visited and found to be empty. No member of the Matjhabeng community interviewed was aware of the facility's purpose.

^x As detailed in interview 3 December 2003, Khetiwe McClaine Social Development Manager Harmony Gold Mine

^{xi} This section is based upon interviews conducted by M J Kekana with a wide range of community members in March 2004.

^{xii} *Economic Regeneration Study* p. 7.

^{xiii} *Economic Regeneration Study* p. 6.

^{xiv} Data based upon Harmony Freegold Surface structure Plan/Status Document dated February 2004, Harmony

^{xv} *Goldfields Ltd Sustainable Development Report 2003* p. 44

^{xvi} Bramwell Ryan 'Roses from Rock' *Equinox*, January/February 1995; pp.50-55

^{xvii} The author was the project initiator and MD of the company that operated this venture prior to its sale to De Beers Consolidated Diamond Mines in 2002. Project details contained in the feasibility

study document '*Diamond Mushroom Farms – a business proposal*' Anglo American Corporation 1996 are available on request from the author.

^{xviii} R Millard *Background on Compressed Air Energy Storage as a Potential Electricity Generation Resource in South Africa*; Environmental Impact Management Services (EIMS); 2003

^{xix} The author, then employed by AngloGold Ltd was the project originator and part-time project leader of the entity created to operate the fish farm. Feasibility Study '*AngloGoldFish AngloGold 1999*' available on request from the author.

^{xx} S Ngcizela interview with J Kekana – contact details 057 357 3552/082 210 4338

^{xxi} World Bank & IFC Mine closure and its impact for a summary of this argument.

^{xxii} World Bank & IFC Large Mines... p. 12

^{xxiii} Following the successful launch of any one of the above as a venture capable of supplying markets beyond Matjhabeng, two projects to improve the areas transport linkages should be revisited: the creation of a cargo airport and the rerouting of the N1.