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The East Rand: a geographical analysis of the transition of the economic base of the region from gold mining to manufacturing, and its effects upon future economic and spatial development

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Table 2

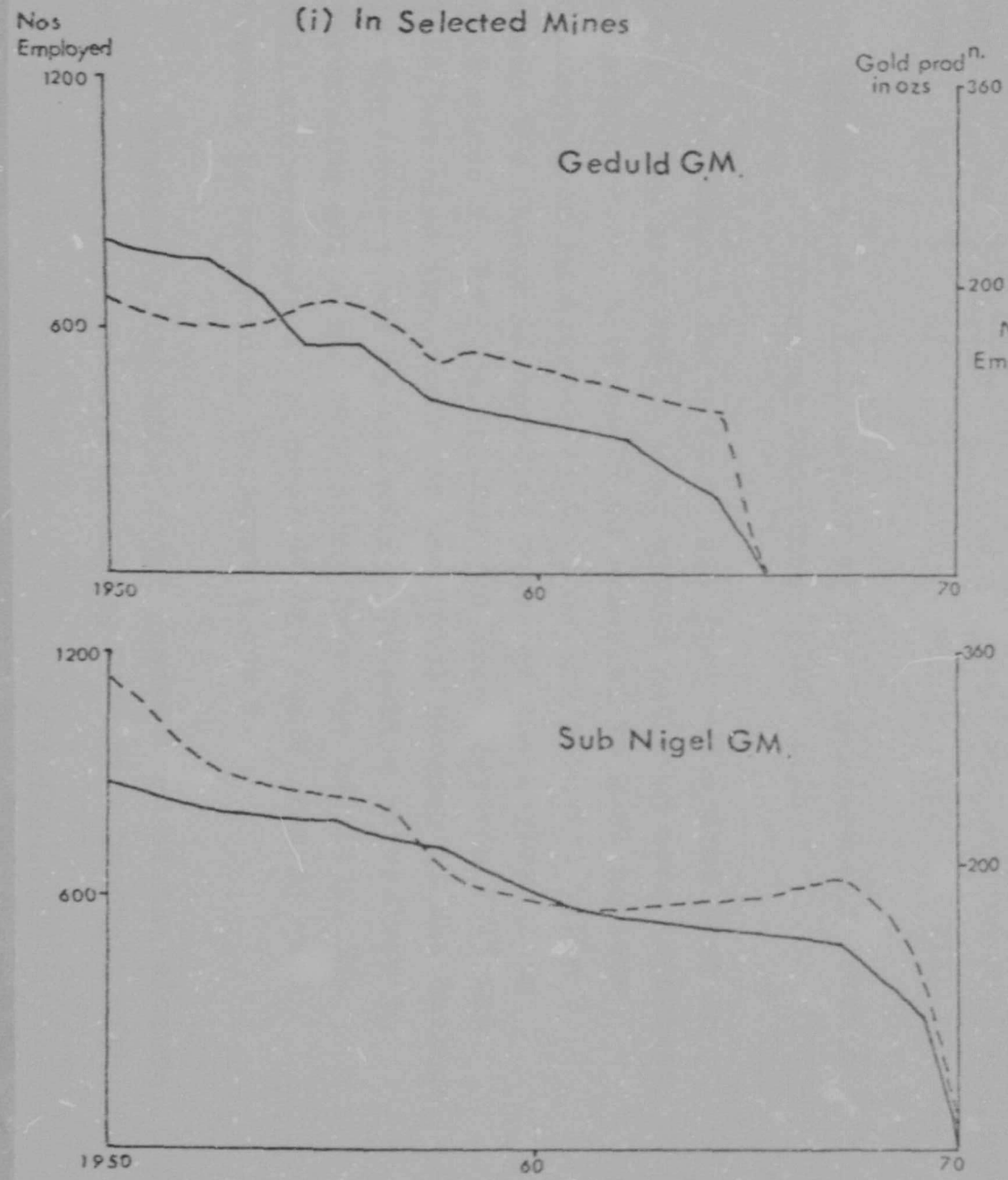
EMPLOYMENT & WAGES IN THE GOLD MINING INDUSTRY OF THE EAST RAND

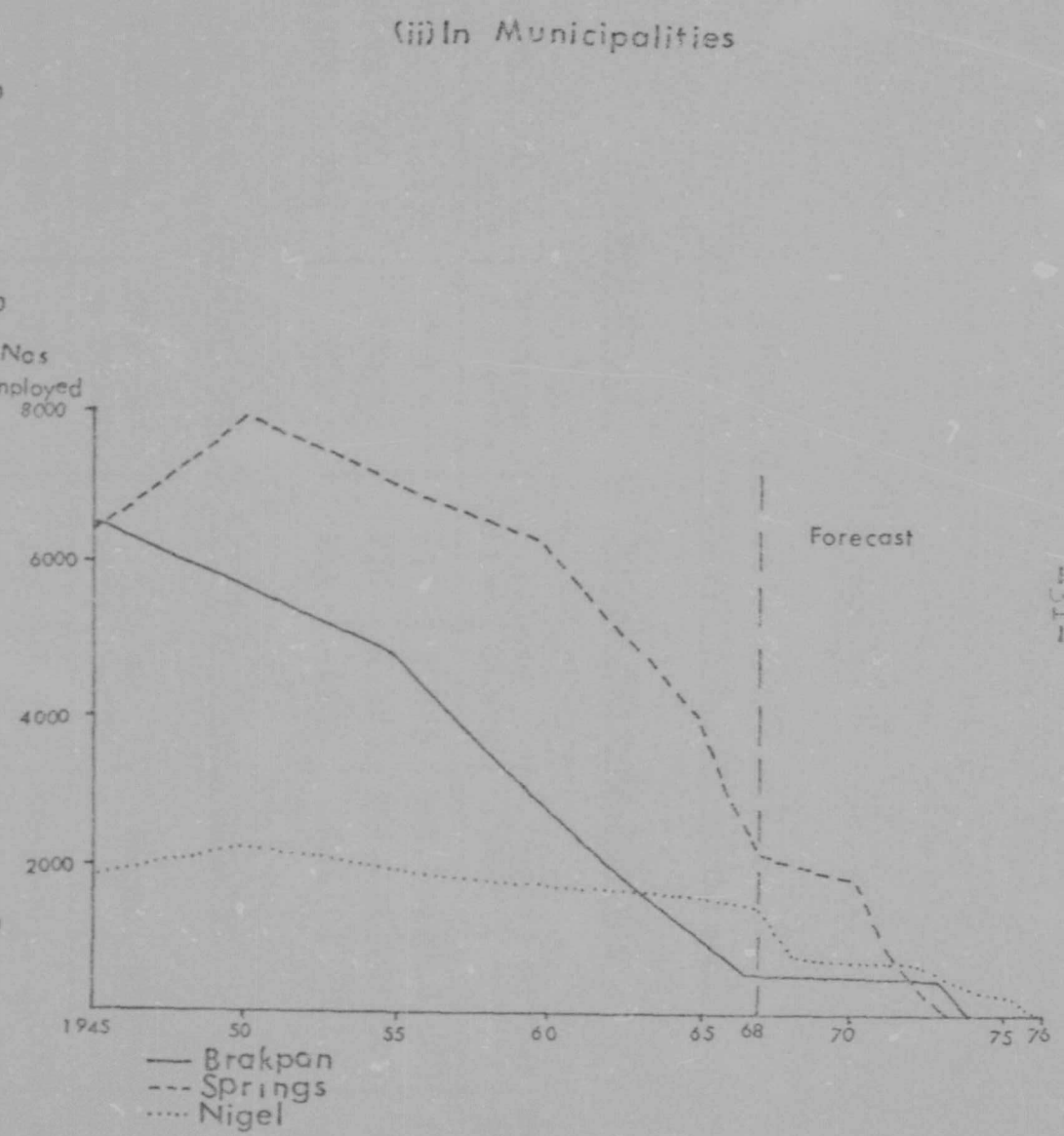
	BRAKPAN				SPRINGS				NIGEL			
	Av. number of employees in service		Total Wages R		Av. number of employees in service		Total Wages R		Av. number of employees in service		Total Wages R	
	white	non-white	white	non-white	white	non-white	white	non-white	white	non-white	white	non-white
1945	6,506	57,131	7,436,000	4,979,448	6,426	57,531	7,451,426	5,161,390	1,936	15,000	2,552,420	1,422,740
1950	5,741	44,321	8,663,584	4,482,560	7,910	62,037	11,618,056	6,175,882	2,270	15,017	3,524,994	1,532,690
1955	4,749	33,045	9,084,926	4,169,078	7,036	49,932	13,133,654	6,260,272	1,990	13,262	3,977,968	1,688,552
1960	2,770	23,723	6,629,794	3,284,002	6,207	48,923	13,659,186	6,503,050	1,720	13,342	4,069,440	27[illegible]8
1965	1,068	10,471	3,236,124	1,598,192	3,989	36,171	11,621,138	5,913,943	1,644	13,342	4,774,613	2,666,735
1968	585	6,398	2,244,060	1,115,650	2,165	20,666	8,109,344	3,519,442	1,448	12,844	5,345,632	2,116,335

Source : Chamber of Mines

Figure 11

RUN-DOWN OF WHITE EMPLOYMENT IN GOLD MINING IN THE EAST RAND





Forecasts based on Table

Sources : Annual Reports of the individual Mines
Chamber of Mines Annual Reports

TABLE 3

RUN-DOWN OF EMPLOYMENT AND WAGES
IN NIGEL & MODDERFONTEIN 'B' GOLD MINES

The Nigel Gold Mining Company Limited

Year	Ozs. Gold	Revenue £ I000's	Labour White	Labour Bantu	Wages £	Stores	Total Spending £
I950	6I,639	778.4	29I	2,489	345,29I	238,638	583,979
I956	37,I45	470.3	II0	I,I83	I95,63I	I45,808	34I,439
I957	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Modderfontein 'B' Gold Mines Limited

Year	Ozs. Gold	Revenue £ I000's	Labour White	Labour Bantu	Wages £	Stores	Total Spending £
I950	75,358	964.0	399	3,5I9	446,000	233,000	679,000
I956	5I,296	6II.0	220	2,I90	336,000	I90,000	526,000
I957	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Source : N.R.D.C. Report of the Witwatersrand Interim Planning Committee I960 p.I8

As Table 3 shows it is not just employment that is lost to the area when a mine closes but even more important, spending power, which would be expected to have serious consequences on several sectors of the economy. Table 2 shows the change in spending power of the employees in gold mines in Brakpan, Springs and Nigel between I945 and I968, but also important for the local economy is the decline in the money spent by the mining companies themselves in purchasing goods and provisions from the locality. The full consequences in respect of the local economy will however be examined in Chapters 4 and 5.

Similiarly, the other major consequence of the closure of the mines, the release of mining land, will be dealt with

/ later ....

later in Chapter 7,in respect of its adaptation to the new forces governing the spatial pattern of the local economy.

Future of Gold Mining in the East Rand

As can be seen in the preceding paragraphs gold mining in the Witwatersrand has undergone a very chequered history of profitability due largely to the exogenous factors influencing this profitability.

Gold assumes a peculiar position in comparison with other minerals. The main determinant of profitability,the price of gold,is not determined by the normal factors of supply and demand,but,due to gold's special position in the world's monetary economy,it responds mainly to political rather than supply factors. In the past not only changes,directly and indirectly,in the gold price, have affected profitability,but also technological innovations and internal price movements. Consequently forecasting future production and employment in the gold mines is a precarious activity.

For various social,economic and political reasons many gold producing countries, e.g. Canada,Australia and lately South Africa,have tried to counter the effects of increasing mining costs in relation to the fixed price of gold. The arguments have been based mainly on the direct and indirect dependence of the country,or at least certain sectors of its economy,on these mines.

The full significance of the rate of inflation upon the future of gold mining was shown in the Chamber of Mines Report of 1966 (Chamber of Mines,1966),which demonstrated a strong correlation between the annual working costs of gold mining and the G.N.P.,that is,the economic health of

/ the ....

the country. They concluded that,

> " ...too abrupt a change in this pattern as a result of mine closures will have disruptive effects on other industries and on the general economy, and that everything possible should therefore be done to lengthen the period of transition during which other industries will have the opportunity to achieve the enormous advances necessary before they can take over the role of gold mining."

This report and its consideration of various methods of subsidisation to support marginal mines led directly to the Gold Mines Assistance Act of 1968 (Gold Mines Assistance Act, 1963 ; Krige, 1968). From the motivation of the effects upon the national economy rather than the local economic depressive effects to be caused by the mine closures, the Act aimed at prolonging the lives of the marginal mines (mines with lives of less than 8 years), by downgrading the 'pay limit' of assisted mines by 16%. The 'pay limit', that is, the minimum recovery grade (in dwts. per ton), which will enable revenue to balance working expenditure when applied to the reserves of gold bearing ore in the mine will give the 'pay ore reserves'. Hence a lowering of the pay limit represents an increase in the tonnage of payable ore reserves. Under the Act mines which lower their pay limit are subject to a preferential taxation formula.

The Assistance Scheme has, and will continue to have, a significant impact upon the lives of marginal mines. To date fourteen mines have been accepted under the Scheme, but none, as yet, in the East Rand. The reason for this is the nature of the ore reserves in the East Rand Basin, being mainly payshoot ores which have largely been worked out. Only Grootvlei and perhaps Marievale, with their large reserves of low-grade ore deposits, are suited to becoming 'assisted mines', but even in these cases the influence of company policy seems likely to prevent the

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application for incorporation under the Scheme.

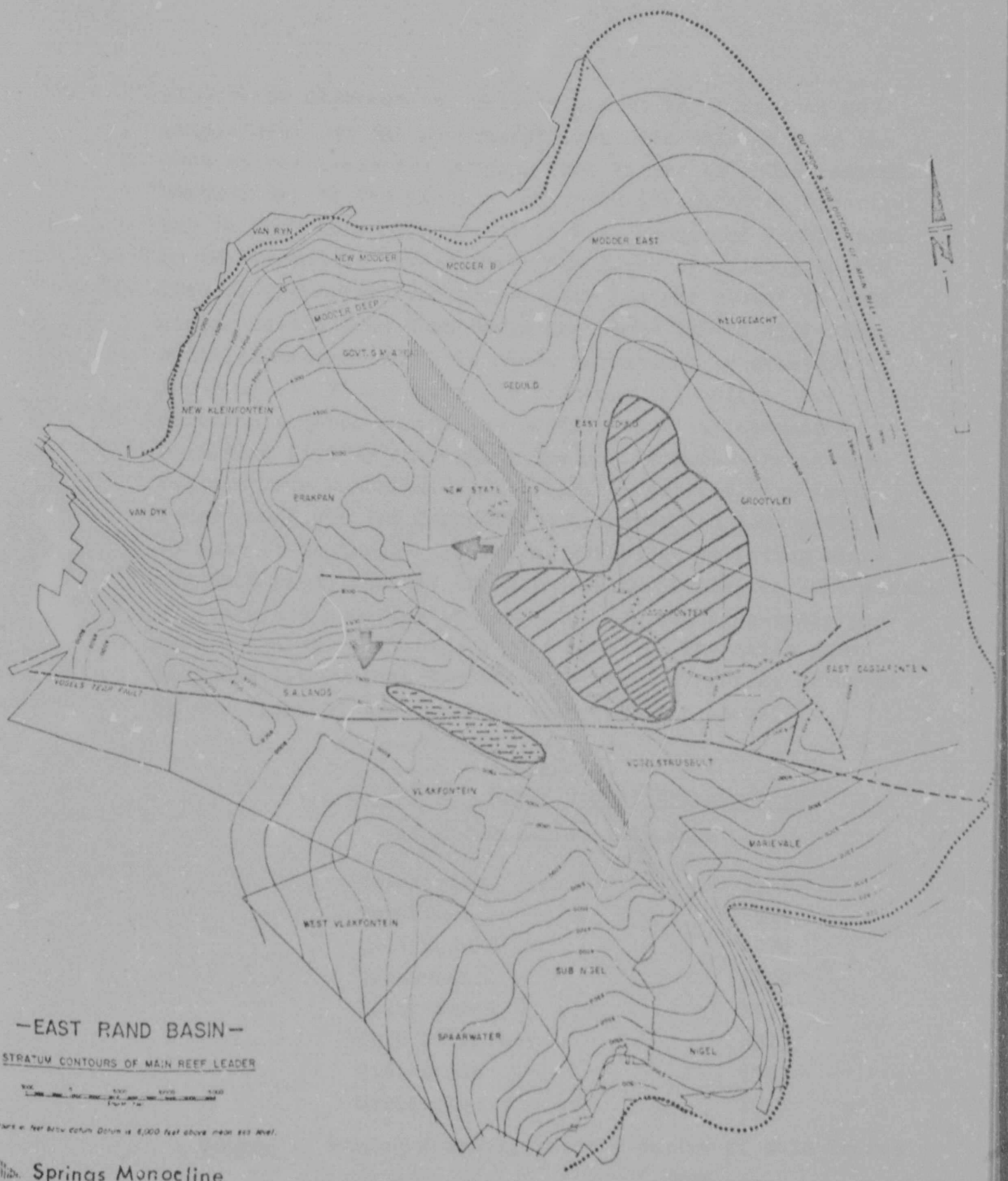
Hence government assistance, as such, is a relatively unimportant factor in the future of gold mining in the East Rand. It is not the place here to speculate on the possibility of an increase in the price of gold, but were this to happen, to have any effect upon the future of gold mining in the East Rand, it would firstly have to occur very shortly, before decisions on closure were taken, and secondly to be of a very substantial nature to have any effect upon existing mines or the re-opening of closed mines. The costs of extracting more gold are such that even a doubling of the official price of gold would not have any real long-term significance in a new and prolonged period of prosperity, except perhaps to the large ore reserve fields of Grootvlei and Marievale.

Today it is not so much the economic factors of cost that are determining the lives of the East Rand mines, but the physical factors of ore reserves and the flooding of the Basin.

As mines have closed in the East Rand Basin, water is no longer pumped from them. This water builds up in the underground workings and eventually flows into other workings. There has in the past few years been some government assistance to Eastern and Central Rand mines to defray the costs of pumping water that threatens them from neighbouring closed-down mines. Since its introduction in 1963 the overall sum allocated for this subsidy has been reduced whilst at the same time the cost and extent of pumping is increasing. At present three mines in the East Rand are receiving pumping subsidies ; S.A. Lands, East Geduld and Grootvlei. When East Geduld and Grootvlei close however (see Table 4), the water to the north of the Springs monocline will build up and eventually overflow through the northern workings of S.A. Lands before causing the

/ closure ....

Figure 12 ESTIMATED FLOODING PROGRESSION IN THE EAST RAND BASIN



-EAST RAND BASIN-

STRATUM CONTOURS OF MAIN REEF LEADER

Springs Monocline
Area already believed to be flooded
Flooding Progression:
First Basin to be flooded
Second Basin to be flooded
Directions of flooding after overflow of Springs Monocline

Adapted from Whiteside

closure of Vlakfontein. This is due to the fact that no single mine (or the government), would be able to bear the cost of the necessary pumping (see Figure I2). The capital expenditure of the pumping equipment installed at Grootvlei has in fact been largely met by S.A. Lands and Vlakfontein in an attempt to extend their own lives by prolonging the life of Grootvlei. The foreseeable 'watery grave' of gold mining in the East Rand Basin has hence led to differing policies amongst the gold mines threatened by eventual flooding. At Vlakfontein, for instance, all efforts are directed towards maximising profits over the company's remaining life by extracting the most payable ore at the fastest rate possible. S.A. Lands, by contrast, with their lower grade ore are forced to concentrate on some sections to extract in large quantities. For other operating mines in the East Rand, with the exception of Marievale, the last months or years are a matter of searching for odd high-grade pay-shoots and of 'cleaning-up' the mine. [I] The dates given in Table 4, below, can therefore be taken as fairly accurate in the light of the circumstances outlined above.

TABLE 4

UNOFFICIAL ESTIMATES OF THE LIFESPAN OF MINES IN THE EAST RAND

Spaarwater	I969
Sub-Nigel	I970
East Geduld	I970
Grootvlei	I97[illegible]
Vlakfontein	I9[illegible]
East Daggafontein	I973
S.A. Lands	I97[illegible]
Marievale	I[illegible]5

Source : Mining Journal, Quaterly Review of Gold Shares

/ From ....

I. 'cleaning-up' . A technical term referring to the removal of remaining pillars of gold-bearing ore.

From these figures, and the employment trends prior to closure, as seen earlier in the chapter, employment decline in gold mining in the three municipalities is estimated in Table 5.

TABLE 5

ESTIMATED EMPLOYMENT IN GOLD MINING IN THE MUNICIPALITIES IN THE EAST RAND I970-I976

	BRAKPAN		SPRINGS		NIGEL	
	white	non-white	white	non-white	white	non-white
I970	585	6398	I840	I7566	724	6422
I97I	585	6398	908	8782	724	6422
I972	585	6398	459	439I	724	6422
I973	497	5438	-	-	659	5940
I974	-	-	-	-	362	32II
I975	-	-	-	-	297	2729
I976	-	-	-	-	-	-

Source : Tables 2 and 4, and trends from Figure II.

The closing of Marievale will mark the end of an era, 90 years of dependency upon the extraction of a precious metal from the depths of the earth, an era which now leaves it's legacy in the economic development it created, and the landscape which it fashioned.

/ CHAPTER 3

CHAPTER 3

DEVELOPMENT OF THE SPACE ECONOMY IN THE EAST RAND

Within the relatively short period of eighty years the space economy of the East Rand has developed from a simple agricultural network, to a complex pattern, consisting of concentrated and fragmented development. Although the economic growth of the region, in absolute terms, has been largely a function of gold mining, earlier developments have played an important role in the shaping of the space economy, and continue to influence its development.

Economic Development Prior to the Gold Mining Phase

It is true to say that the East Rand has undergone two transitions of its economic base in its history. Apart from the present-day transition from gold mining to industry, at the beginning of the century there was a transition from one mineral base to another, namely coal to gold.

The Witwatersrand gold rush of 1886 had its unforseen rewards in the East Rand in the discovery of 'black gold'. The accidental intersection of a coal seam whilst prospecting near Boksburg led to an intensified search for coal in the neighbouring areas of the East Rand, and its discovery near present-day Brakpan in 1888, and at Springs in the following year. Despite the coal seams being of poor quality, the ease of mining (coal seams at depths between 80 and 200 feet), and the proximity to the expanding demand of the Witwatersrand goldfields led to the rapid exploitation of this resource. By the end of the century four mines had commenced operations in Brakpan, and five in Springs, being located in areas to the north-west of present-day Brakpan township, and south and south-east of

/ Springs ....

Springs (as seen in Figure I4 in the undeveloped areas between later residential area development).

Prior to the discovery of coal there was little economic development in the East Rand, the area being divided up into large farms with the only nucleated settlement being Die Springs, acting as a small agricultural centre for the area (Springs Town Council, I962). The exploitation of coal led to the creation of Brakpan and the development of Springs into colliery towns. It was however obvious to those at the time that coal was a rapidly wasting asset and hence the early economic development of Brakpan and Springs based on coal, as in Johannesburg at the time based on gold, was of a type which reflected the probable short-term nature of this development. The towns were built as probable 'ghost-towns' of the future. Springs at this time was largely comprised of wood and iron dwellings, a reminder of its temporary nature (Springs Town Council, I962). Indeed the coal mining phase in the East Rand was short lived. Only the Apex colliery near Brakpan, which closed in I947, continued operations beyond I9I0, as the other mines either became, worked out, unprofitable in comparison with Witbank coal, or were prematurely abandoned due to fire.

Coal mining therefore led to little permanent development of the local economy but did, in the associated early development of Brakpan and Springs, create locational factors in providing the base, and governing factors, for later residential and commercial expansions.

The Gold Mining Phase and Associated Development of the Local Economy

In the Nigel area, lacking economic coal deposits, the earlier gold mining activities led to residential development concurrent with that at Brakpan and Springs.

/ The ....

The establishment of Nigel Gold Mining Company Limited led to the development of Nigel Township, proclaimed in I890, two years after the opening of the mine. Hence by I900 the main nodes of later development were already established, Springs and Brakpan based on coal, and Nigel on gold.

It was not until the end of the first decade of the twentieth century that the prospect of the gold reef extending into the centre of the East Rand Basin was put forward by geologists. The penetration of this reef near Springs in I9II marked the birth of the space economy of the East Rand as a permanent economic feature of the South African landscape. The discovery of the gold reef and the technological advances facilitating deep mining led to the rapid development of gold mining in the centre of the East Rand between I9II and I925. Not only was there a spate of proclamations of residential townships following this new impetus, but it marked a new permanence of associated development reflected in the number of brick-lined buildings and modern business blocks in the towns. This permanency is also seen in the granting of municipal status to the three towns, Springs in I9I2, Brakpan, I9I9, and Nigel, I930 (Municipal Year Book, I960). From the I920's onwards the residential and commercial developments in the East Rand reflected the long-run aspirations of the towns, for although the eventual decline of the gold mines was an inescapable fact, this seemed many decades away at the time.

Growth and Spatial distribution of the Population

From I9I0 till I950 the history of economic development in the East Rand was intricately linked with the history of gold mining. The mines caused the flow of people and money into the local economy, leading to the expansion of residential and commercial development in the municipalities.

/ The ....

The periods of growth in gold mining (as seen in Chapter 2) are closely related to the periods of economic development in the region. Tables 6 and 7 show the growth in population in the three magisterial districts, separately, and grouped together as the East Rand, in comparison with the population growth of the Transvaal and Johannesburg. They show the very rapid growth in population between 1904 and 1960, and although it is misleading to compare the growth indices for Johannesburg and the East Rand over the whole period (because of the very small population of the East Rand in 1904), between 1921 and 1960 the East Rand's growth rate exceeded that of Johannesburg.

The Tables show the main period of population growth to be between 1911 and 1946, with an increase in population from 26,387 to 248,046. They also demonstrate a close correlation between the growth of white population and total population in the region, and within this close correlation two deviations, the index of total population increasing more than that of white population between 1904 and 1946, reflecting the influx of Bantu to work in the mines, whilst, post 1946, the index of white population has increased by a greater proportion, with the closure of the mines and the repatriation of migrant Bantu mine workers.

The gold mining base of the region has resulted in a peculiar spatial distribution of population. The gold mines as separate entities had to create facilities for housing their mine workers, both white and non-white. This usually resulted in two or three separate residential areas grouped around the main mine infrastructure, comprising a native compound, a white single and married quarters, and a managers residence. Grouped together the gold mines also created a demand for services in the locality and hence led to developments in the main towns and the expansion of the residential townships around the main nodes. In

/ addition ....

Table 6

TOTAL POPULATION OF THE EAST RAND

1904-1960

Index 1904 = 100

CENSUS YEARS

	1904		1911		1921		1936		1946		1950		1960	
	No.	Index	No.	Index	No.	Index	No.	Index	No.	Index	No.	Index	No.	Index
Transvaal	1,269,951	100	1,686,212	132	2087,636	164	3,341,470	263	4,283,038	337	4,812,838	378	6,273,477	493
Jo'burg	155,642	100	283,273	182	295,224	189	527,507	338	765,603	491	915,334	588	1,137,806	715
East Rand	11,329	100	26,387	232	58941	520	182353	1609	248,046	2189	258,102	2279	270,142	2384
Brakpan	1,048	100	3288	842	25,104	2395	56,749	5414	83828	7998	86,082	8213	78,625	7503
Nigel	3,420	100	8,734	255	10,600	309	34588	923	44,695	1306	46,780	1367	49,574	1449
Springs	6,861	100	8,825	128	23,237	328	94,016	1370	119,523	1631	125,340	1640	141,943	2068

N.B. Jo'burg, Brakpan, Nigel and Springs - statistics by magisterial district.

Source : Bureau of Census and Statistics - Urban & Rural Population 1904-1960

Table 7

WHITE POPULATION OF THE EAST RAND

1904-1960

Index 1904 = 100

CENSUS YEARS

	1904		1911		1921		1936		1946		1950		1960	
	No.	Index	No.	Index	No.	Index	No.	Index	No.	Index	No.	Index	No.	Index
Transvaal	297,717	100	420,570	141	544,973	183	820,576	275	1,063,121	357	1,204,712	404	1,468,305	493
Jo'burg	84,514	100	124,480	147	157,793	186	264,139	312	339,174	401	363,567	430	404,143	478
East Rand	3,168	100	5,936	187	15,168	479	44,332	1399	65,179	2057	73,622	2323	78,336	2472
Brakpan	388	100	1,776	457	7,317	1885	18,572	4786	27,498	7087	30,049	7744	29,340	7561
Nigel	1,225	100	2,320	189	2,701	220	6,248	510	9,494	775	10,560	862	10,779	879
Springs	1,555	100	1,840	118	5,150	331	19,512	1254	28,187	1812	33,013	2123	38,217	2457

N.B. Jo'burg, Brakpan, Nigel and Springs - statistics by magisterial district.

Source : Bureau of Census and Statistics - Urban & Rural Population 1904-1960

addition some of the mine employees would choose to live in the towns and travel out to the mines, further expanding the population of the townships.

Hence Figure I3 shows the development of two residential patterns, the mine townships, increasing with the number of operating mines and reaching a peak in I950, and the residential townships linked to the municipalities, continuing their expansion after I950 as industry began to replace gold mining. As will be seen some of the white mine townships have since the mine closure also been proclaimed municipal townships (e.g. Sub-Nigel and Modderfontein East), resulting in a very fragmented spatial pattern of residential development in the region.

TABLE 8

NUMBER OF RESIDENTIAL STANDS IN PROCLAIMED WHITE TOWNSHIPS IN THE DECADES BETWEEN I900 & I969

	Brakpan	Springs	Nigel	Total
I900-I909	-	-	I873	I873
I9I0-I9I9	32I3	22II	I46	5,570
I920-I929	-	980	-	980
I930-I939	I,935	I,550	2039	5,524
I940-I949	I58	3,I57	98I	4,296
I950-I959	682	I,82I	-	2503
I960-I969	I29	I50	8I7	I,096
	6,II7	9,869	5,856	2I,842

Source : Housing records of the Municipalities of Brakpan, Springs and Nigel.

Table 8 shows the number of residential stands created in proclaimed white townships in the decades between I900

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Figure 13 RESIDENTIAL & INDUSTRIAL TOWNSHIPS IN THE EAST RAND 1900 - 1970

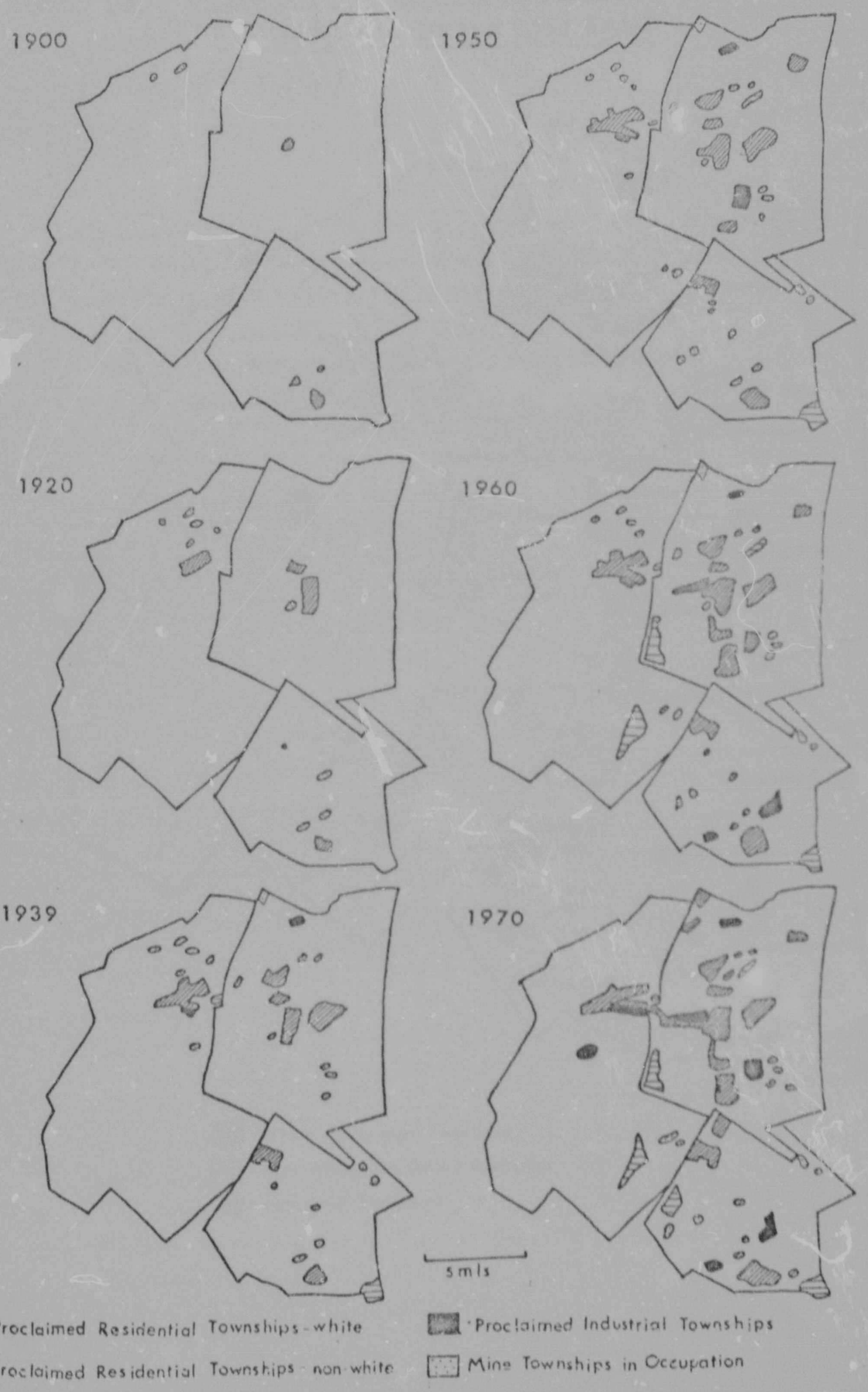
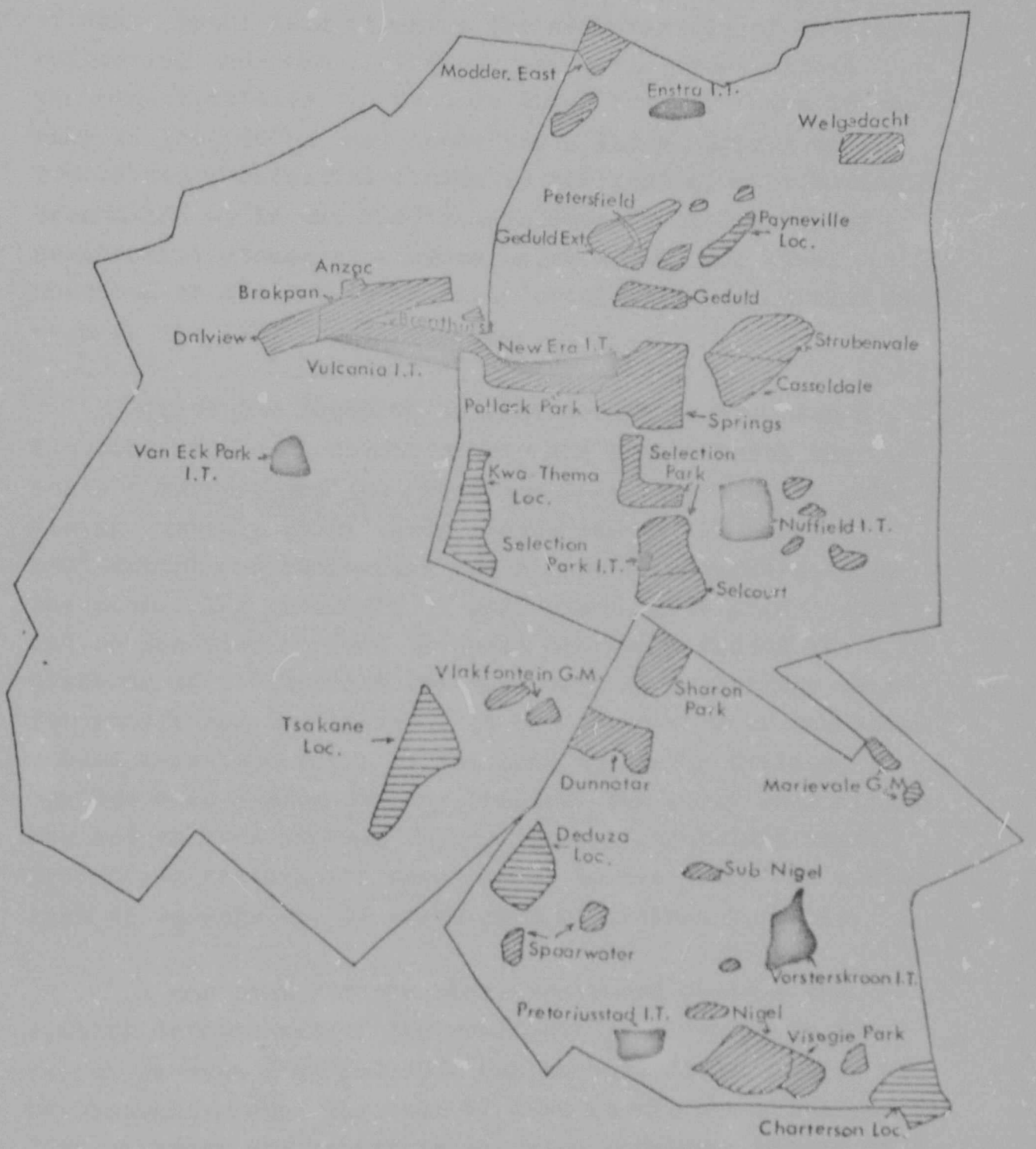


Figure 14 LOCALITY PLAN OF RESIDENTIAL & INDUSTRIAL TOWNSHIPS IN THE EAST RAND



Author Cockhead P J
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