

● user profile

of linbro business park – not to scale

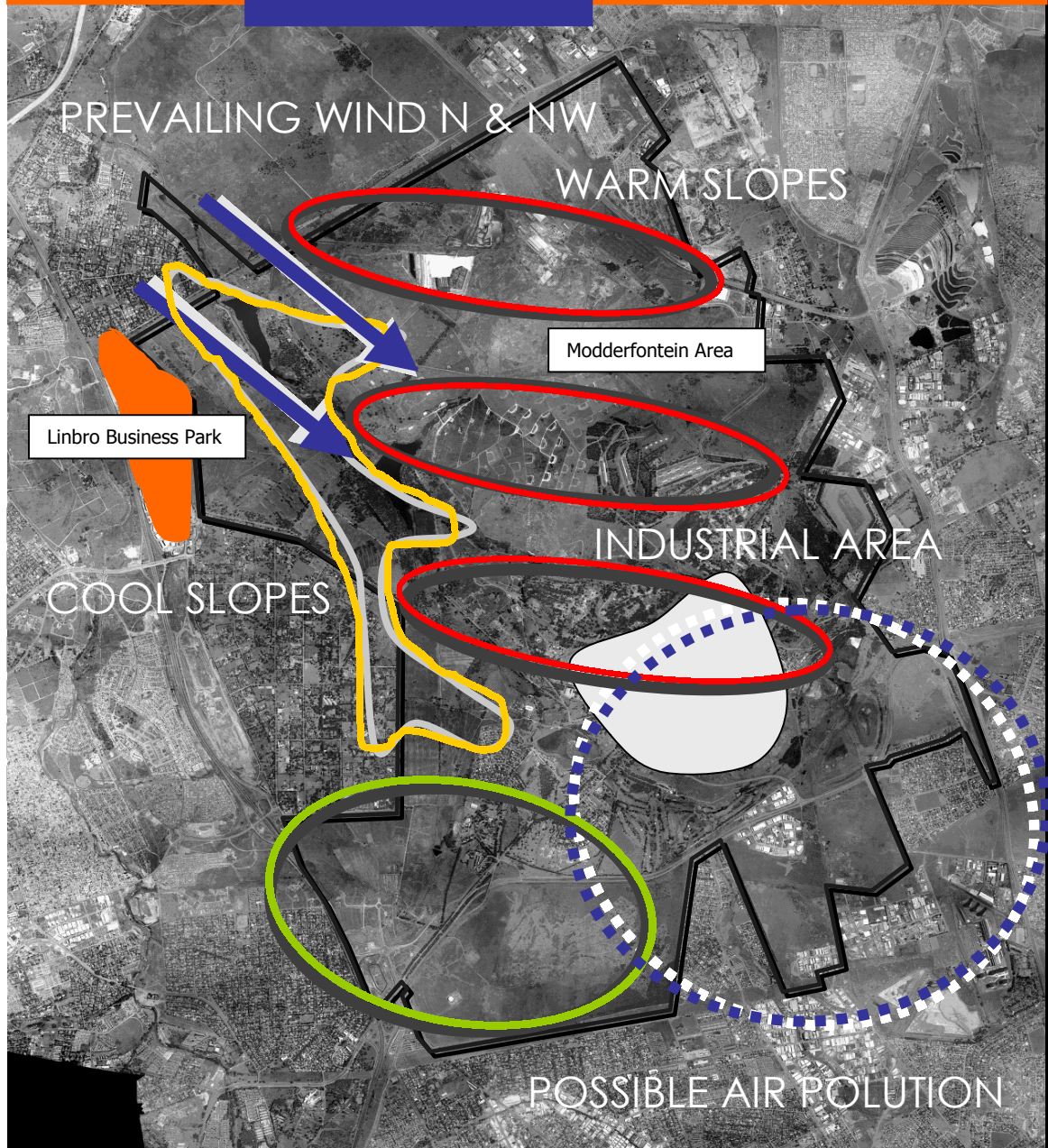


MACRO

CLIMATE

ANALYSIS

[MArch(Prof) I, 2003]



URBAN DESIGN PROPOSALS FOR LINBRO BUSINESS PARK:

- Focus on a secure environment
- Maintain the aesthetic and environmental tone of the business park to the benefit of all participants
- Develop various zones to create a broad range of industrial participants
- Provide mini-factories, small stand developments as well as sites for larger scale developments
- Improve circulation patterns for vehicles as well as pedestrians
- Provide urban design features and focal points through the main entrance
- Enhance street scapes by the provision of closely spaced street lighting and trees

[MArch(Prof) I, 2003]

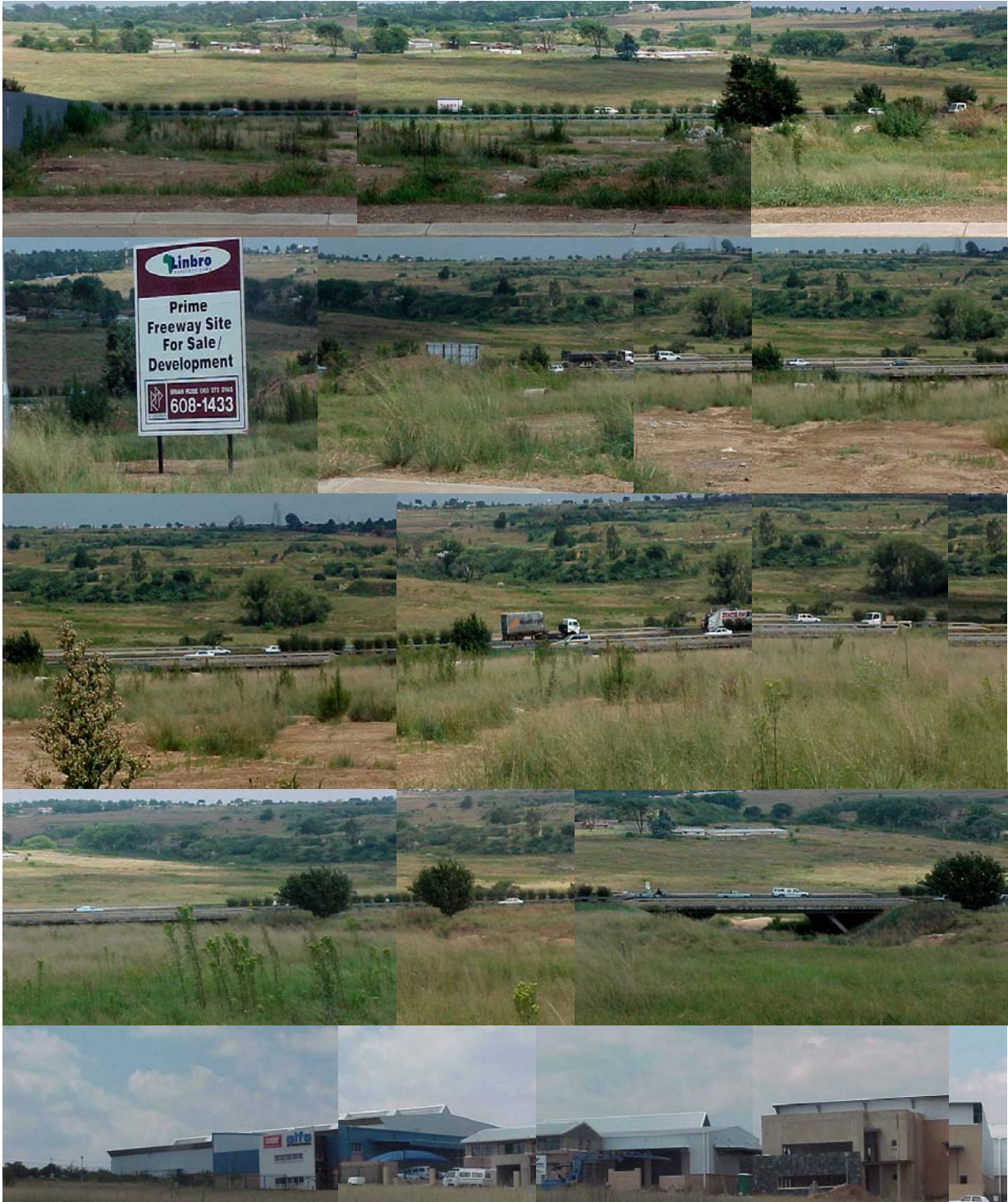


Fig. 7 - Linbro Business Park and (above) site for DID Warehouse



BUILDING COSTS AND ESCALATION FORECASTING

Second quarter 2002
Gauteng region (Overall rates per sqm incl preliminaries but excl VAT)

Retail Developments

Value centre type retail	R 1450-1700
Convenience strip shopping centre	R 1650-2100
Regional shopping centre with enclosed malls	R 1950-2750

Residential Developments

GASH housing by Contractor/Developer	R 1500-1850
Duplex houses/apartments	R 1750-2150
Luxury (cluster) houses	R 2750-4000

Leisure Developments

Thatched game lodge accommodation	per sqm	R 2050-2750
Budget type hostels	per room	R 175,000
Luxury hostels	per room	R 850,000

Industrial Developments

Warehousing with 6 m height (over 2000 sqm) including ablutions	R 800-1000
Medium duty factory building with 8 m height (over 2000 sqm)	R 1000-1250
Attached office buildings (no AC)	R 1600-1850
HiTech workshop and storage	R 1100-1300

Office Developments

Underground parking basements including foundations	R 900-1050
Commercial office park development on basement (with AC)	R 1900-2200
Prestigious office development on basements	R 2950-3750

Fig. 8 – Building costs and escalation forecasting.

JOHANNESBURG INDUSTRIAL RENTALS AND LANDVALUES

Selected Industrial Areas

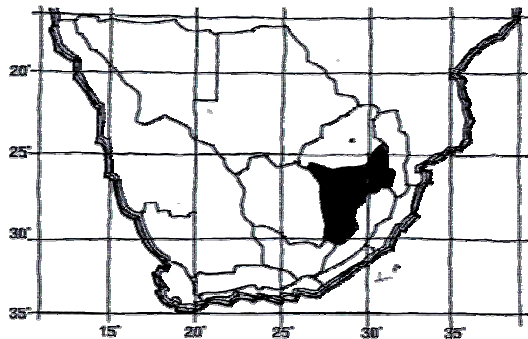
AREA	RENTAL LEVELS MINI UNITS R/m2 Gross*	RENTAL LEVELS MIDI UNITS R/m2 Gross*	RENTAL LEVELS LARGE UNITS R/m2 Gross*	LAND VALUES R/m2*
Honeydew, Laser Park	20.00	15.00	18.00	130.00
Industria North	11.50	9.50	7.50	80.00
Kramerville, Eastgate Extensions	24.00	21.00	18.00	180.00
Linbro Business Park	29.00	29.00	29.00	240.00
Meadowdale, Route 24	24.50	20.00	18.00	160.00
Midrand, Kyalami Business Park	22.00	20.00	18.00	220.00
Wadeville	12.00	8.50	6.00	40.00
Wilbart, Sunnyrock	24.50	18.00	16.00	120.00
Wynberg, Kew	12.50	10.00	8.00	120.00

Fig. 9 – Johannesburg Industrial Rentals and Landvalues.



CLIMATIC ZONE – HIGHVELD

[Holm, 1996:64]



LOCATION:

26,1 degrees to 31,2 degrees east and 30,8 degrees south.

ZONE CLIMATE DESCRIPTION:

Distinct rainy and dry seasons exist with a large daily temperature variation and strong solar radiation. Humidity levels are moderate.

TEMPERATURE:

The maximum temperature diurnal variation occurs in September. The average monthly diurnal variation is 11K.

HUMIDITY:

The average monthly relative humidity is 56%.

WIND:

Summer winds are predominantly north-easterly, and winter winds are predominantly north-westerly, but there is also a fair amount of south-westerly wind.

COMFORT ZONE:

The summer temperatures which exceed the comfort zone are insignificant. Winter temperatures are approximately 15K below the comfort zone. Humidity levels are low in the winter.

[Holm, 1996:64]

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
Max ave monthly temp (degrees)	25,6	25,1	14,7	21,2	18,9	16	16,6	19,3	22,8	23,7	24,1	25,2	21,10
Minim ave monthly temp (degrees)	14,7	14,2	13,2	10,4	7,3	4,2	4,3	6,3	9,5	11,3	12,7	13,9	10,17
Ave monthly amplitude (K)	10,9	10,9	1,5	10,8	11,6	11,8	12,3	13,0	13,3	12,4	11,4	11,3	10,93
Ave monthly relative Humidity (%)	64,0	65,0	64,0	61,5	53,3	51,5	48,5	46,0	46,0	52,5	59,5	60,5	56,04
Ave monthly rainfall (mm)	126	90	91	52	13	8	4	6	28	73	118	105	59,50
Rham	78	80	80	78	71	70	67	64	63	67	73	74	72,1
Rhpm	50	50	48	45	36	33	30	28	29	38	46	47	57,60

Fig. 10 – Climatic data for Johannesburg.

BUILDING ENVELOPE:

[Holm, 1996:64]

MASS:

Thermal mass is also advisable especially in inland areas when the daily temperature swing is larger than 13K. It can be provided by massive floors and internal partitions. It is effective for approximately half of the under heated period and for the entire overheated period.

INSULATION:

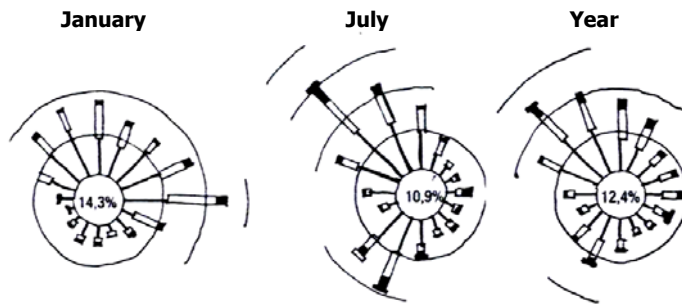
Lightweight insulated roofs are feasible in this region.

PROPERTIES OF MATERIALS:



All external surfaces should be light coloured or reflective (but not shiny metal) to minimize solar heat gain in the overheated period.

WIND ROSE FOR JOHANNESBURG



SOLAR CONTROL:

[Holm, 1996:66]

SUN ANGLES:

It is recommended that summer sun be screened and winter sun be allowed to penetrate.

EQUATORIAL WINDOW:

An equatorial window with an area equal to 19,2% of the floor area is effective for the entire overheated period. Openings for solar gain should be orientated towards the winter sun and screened in summer when solar control is necessary to prevent overheating.

VENTILATION:

Ventilation is effective for alleviating overheating, but may be unnecessary if thermal mass is exploited. Night ventilation can be implemented to compensate for insufficient mass.

SYSTEMS:

[Holm, 1996:67]

EVAPORATIVE COOLING:

Direct evaporative cooling is effective for controlling the entire overheated period, but is unnecessary if thermal mass is exploited.

ACTIVE:

Airconditioning is not necessary unless the building function demands it.

MECHANICAL:

Mechanical ventilation is not necessary unless the building function requires higher ventilation rates.

VERTICAL SUN ANGLE AT 12:00 SOLAR TIME

	Latitude (South)	Solstice (21 Mar/23 Sept)	Winter (22 June)
Johannesburg	26,13 degrees	63,87 degrees	40,37 degrees

Fig. 11 – Vertical sun angle at 12:00 solar time.

CLIMATE:

[Schulz, 1986:320]

The average annual precipitation in the highveld region varies from about 900mm on its eastern border to about 650mm in the west. The rainfall is almost exclusively due to showers and thunderstorms and falls mainly in summer, from October to March, the maximum fall occurring in January. The winter months are normally dry and about 85% of the annual rainfall falls in the summer months; heavy falls of 125 to 150mm occasionally fall in a single day.

The annual average number of thunderstorms varies from about 75 in Gauteng to 100 in the southern highlands. These storms are often violent with severe lightning and strong gusty south-westerly winds and are sometimes accompanied by hail.

This region has about the highest hail frequency in South Africa; about 4 to 7 occurrences (depending mainly on altitude) may be expected annually at any one spot, whilst occasionally hailstones grow to the size of hen's eggs or tennis balls and can cause tremendous damage. Snow may occur about once or twice a year. Very exceptionally, snow will fall further northwards and has been observed as far north as the Soutpansberg.





[Domus No 847, June 2002:]

Average daily maximum temperature is roughly 27 degrees in January and 17 degrees in July but in extreme cases these may rise to 38 degrees and 26 degrees respectively. Average daily minima range from about 13 degrees in January to 0 degrees in July, whereas extremes can sink to 1 degree and -13 degrees respectively.

The period during which frost is likely to form lasts on the average for about 120 days from May to September, though this period is longer in the southern highlands. On the whole winds are light except for short periods during thunderstorms. Very occasionally tornadoes do occur and cause tremendous damage if they happen to strike a populated area. Sunshine duration in summer is about 60% and in winter about 80% of the possible.

[Schulz, 1986:320]

Geology:

[March(Prof) I, 2003]

The underlying rock structure of Modderfontein comprises of two main rock types. Granite and Amphibolite.

Granite:

Granite is a very well known igneous rock, which forms some of the oldest rocks on Earth (3.5 billion years). Granite forms when magma intrudes into the Earth's crust to crystallize in an isolated environment, which causes the rock to be coarse-grained. This rock consists of minerals like quartz, plagioclase and alkali feldspar.

Soil Profile:

In humid areas silty sand or clayey silt forms, which is mica rich with quartz grains. These soils are dispersive (highly erodible) and have a high permeability. Core stone development and an uneven bedrock topography may occur. In some areas, e.g. Halfway House, a collapsible grain structure may develop.

Engineering Qualities:

Slope instability is frequent when it is saturated- which means that the ground can flow easily downhill. It is a high erodable soil. The core stones can cause problems in the placing of foundations such as piles. A collapsible grain structure may cause damage to structures if proper foundation measures are not implemented. Both the soils and the rock is widely used as aggregates for roads and concrete.

Unique Qualities:

Granite is regarded as a solid rock and is therefore widely used as construction material.

Aesthetic and Scenic Value:

The wide range of geomorphological features formed on granites make this a much written about and researched rock type. Some of the most scenic landscapes are associated with granite areas. Examples are the Klipkoppies in and around Nelspruit, south of Lebowakgomo, along the eastern Bushveld and the isolated tors in the northern and western parts of the Northern Province. In Swaziland and some parts of Kwazulu-Natal typical granitic landforms also occur.

Amphibolite:

A faintly foliated metamorphic rock developed during regional metamorphism of simatic rocks, composed mainly of hornblende and feldspars. The engineering qualities and uses of this rock are very similar to that of Granite as they are both igneous rocks.

An interesting characteristic of these two rock types, is that of the soil profiles formed by them and thus the agricultural potential of the area. The depicted view of the geology layers is identical to that of the agricultural potential - and therefore indicates those areas with the greatest potential(high, medium or low) for agricultural potential.

Ironically, the area's whose profiles have the highest potential are those which are most densely built and developed.

Habitat:

There are a number of elements other than say agricultural potential which determine the Ecological importance of the site, one of which is the Habitat and Habitat diversity - which includes both plant and animal life.

To briefly describe the fauna quality of the site(over and above the study conducted by Ryan Astrup) the area has patterns of indigenous trees, mostly Acacia and Rhus, as well as large clusters of Eucalyptus and Wattle.

[MArch(Prof) I, 2003]



Vegetation

IDENTIFIED INDIGENOUS GRASS SPECIES AT MODDERFONTEIN



- *Digitaria Erianthia*
- *Pennisetum Clandestinum* (left)
- *Eragrotis Curvula*

Dominant species to the Natural Environment:

- *Digitaria Erianthia* (Finger Grass)
- *Hyparrhenia Anamesa* (Bundle Thatching Grass)

Problem species to Natural Environment:

- *Hyparrhenia Hirta* (Common Thatching Grass)
- *Pennisetum Clandestinum* (Kikuyu)
- *Eragrotis Curvula* (Weeping Love Grass)

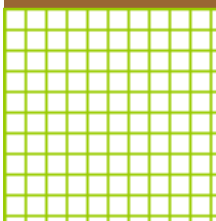
INDIGENOUS TREE SPECIES IDENTIFIED AT MODDERFONTEIN



ACACIA KAROO – Sweet Thorn
Shrub to medium sized deciduous tree; crown rounded, dark green. Spines paired, straight, white, usually more prominent on young plants. The inner bark can be used for rope. Excellent shade tree.



ALOE SPP.
Found throughout the Highveld. Thorny leaves used to thin animal skin for clothing. Important contemporary and traditional medicines.



CELTIS AFRICANA – White Stinkwood
Leaves eaten by cattle and other domestic animals. The wood has been used as a protective charm. Timber is tough and strong, used for furniture etc.



RHUS LANCEA – Karree
Wood is hard/tough.

GREWIA SPP. – Velvet rasin/cross-berry
Root extracts used to help in childbirth. Important contemporary and traditional medicine. Pounded bark – soap.



PORTULACARIA AFRA – Porkbush
Fresh leaves eaten raw. Valuable fodder plant in dry regions, but often unpalatable to livestock. Used as thatch.



SOCIO-ECONOMIC

COMMUNITY: MODDERFONTEIN AREA

[MArch(Prof) I, 2003]

THORNHILL ESTATES



The demand for housing establishments of this kind is in excessive demand in the Modderfontein area. Thornhill itself is constantly growing and people are willing to pay extreme prices to live in the Estate.

SPORT FACILITIES

Modderfontein has two sport clubs as well as a golf club. Other sport facilities are squash, tennis, soccer, rugby, cricket and bowls.



MODDERFONTEIN CENTENARY GOLF COURSE

Modderfontein Centenary is the only golf course in the area.

MODDERFONTEIN CONSERVATION SOCIETY

Environmental talks, walks through the park and many other activities are constantly organised and the public are encouraged to take part.

CHURCHES

The only church in Modderfontein is St. Francis In The Wood, an old Anglican chapel that served the community before the extensive expansion of Modderfontein. The chapel can only accommodate a community of around 50 people.

NOBEL PRIMARY SCHOOL

Nobel Primary currently has 735 pupils, of which 35 are pre-primary children. The school is totally full and no more additional pupils can be accommodated. This is due to the limits of the septic tank that they have.

The school attracts children not only from Modderfontein (Thornhill Estate and Lake Side) but also from all the surrounding areas including Eastleigh, Edenvale, Eden Glen, Illiandale, Kempton Park West, Estherpark, Rembrandpark and Tembisa.



HOSPITALS/MEDICAL CENTRE

There is a public hospital in Modderfontein although at present it is not in total functioning condition. The Modderfontein Medical Centre next door functions as a clinic for outpatients and sees most of the people in search of medical attention. The facility encompasses only two on-staff doctors and a pharmacy. It also runs a training facility. There are no private hospitals or private practices located in Modderfontein. The closest public hospital is Edenvale Hospital and is 15km away.



POLICE STATION

Modderfontein no longer has a police station of its own but falls under Sebenza Police Station.

FIRE DEPARTMENT

Johannesburg Fire Department.

Modderfontein boast its own fire department. The Modderfontein Fire Department falls under Johannesburg jurisdiction and can be dispatched through contacting the

INDUSTRIAL AREAS – SASOL POLYMERS

The industrial area of Modderfontein consists of mostly corporate and retail businesses. Most of the Sasol Polymers employees come from Kempton Park, Edenvale, Pretoria, Boksburg and Tembisa.



[MArch(Prof) I, 2003]