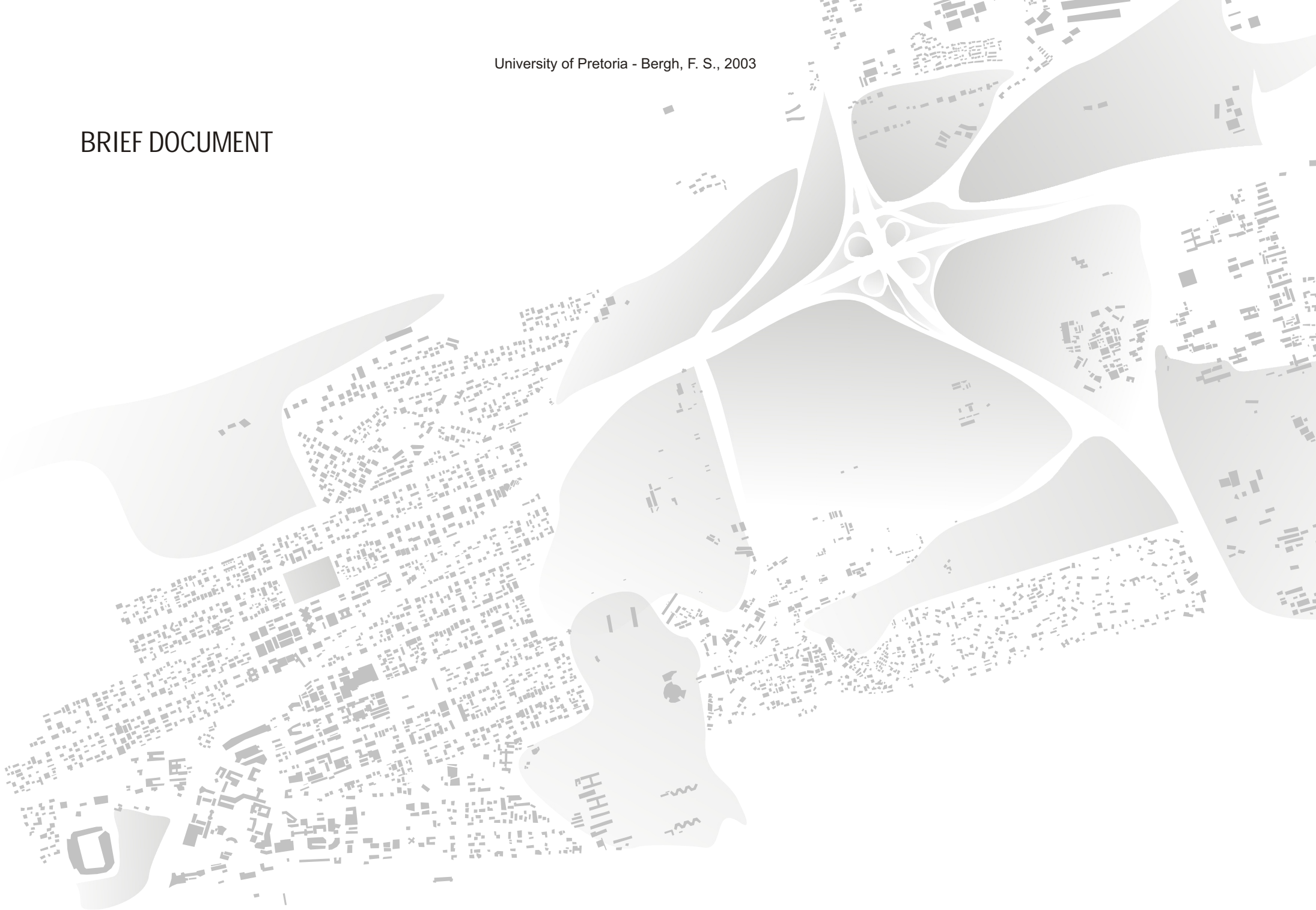


BRIEF DOCUMENT



Introduction:

Although Gauteng is South Africa's smallest province, it generates 38% of the country's economic activity and represents 70% of the nation's total formal employment. Industries in Gauteng currently employ over 80% of Gauteng's high-tech workers, creating the highest demand for IT and electronic expertise in Africa. The province has a well-developed tertiary education sector, with 40% of all university enrollments in the country, producing 40% of science graduates and 44% of engineering postgraduates. Gauteng also hosts the biggest concentration of research activities in the country, including science councils, industrial research and development facilities, and tertiary education.

The Innovation Hub will be established on a 60-hectare site in Gauteng, in an appealing setting which will harmoniously combine the natural environment and appropriate architecture into a synergy of place and function. Its location, a unique education/research axis between the University of Pretoria and the CSIR, and the close proximity to the corridor to Johannesburg and the Johannesburg International Airport, creates an ideal positioning for this initiative.

Hub tenants will have wide-ranging access to the substantial academic, technological and development expertise available at these and other institutions, as well as support from the numerous Government departments based in Pretoria. The city, and the active business corridor towards Johannesburg, also host many enterprises able to provide the business expertise required and the market exposure necessary to growing companies, particularly small, medium and micro enterprises.

[The Innovation Hub Management Company.2000. Information Release. TheInnovationHub.com]

The Client:

The profile for prospective Incubatees at the Innovation Hub development requires that technology intensive companies with unique proprietary technology or unique business models, that are product/service orientated, should be able to demonstrate high potential growth or are targeting high growth markets, export markets. Previously mentioned prerequisites are necessary to guarantee that the companies in question, have the ability to finance their exploits and the ability to pay for incubator services.

The entry criteria for these companies include:

- a viable business plan
- visionary entrepreneur with a demonstrated ability to network, motivate and has leadership attributes
- A committed team and evidence of technical expertise
- "Unique" product or service offering (product and business focused and consultant orientated)
- Export potential for the product or service in question
- Technology fit with Innovation Hub of knowledge and technology intensive industries

The Naledi 3D Factory
(www.naledi3d.co.za)

Focuses on the development of interactive 3D content in the form of virtual reality (VR) and visualization models, especially in areas that include community upliftment through education and training, heritage, culture and design.

The Naledi 3D Factory focuses on the development of interactive, visual CONTENT- another name for virtual reality. They provide cost-effective simulation and modeling solutions in the areas of :

- Interactive simulation for education
 - Interactive simulation content to support E-commerce
 - Specialist, tailor-made modeling and simulation
 - Interactive large-scale edutainment and entertainment

Partners of the Naledi3d Factory include:

- Tweensense (Delft, Holland)
- Eon Reality, Inc. (Irvine, California United States of America)
- UNESCO
- ESKOM

Tweensense is a young and innovative company in Delft. Tweensense produces 'virtual reality solutions' for desktop-level applications, by combining 3D models and interactivity. The advantages of this virtual environment demonstrates that new products or architectural-space projects can become both more efficient and effective.

Eon reality develops and manufactures PC-based 3D interactive simulation solutions for use within marketing, E-commerce, Architecture and training.

One recent project developed by the Naledi3D Factory in this area (in conjunction with UNESCO), is being tested in a multi-purpose community telecentre and teaches basic rural good hygiene practice. At Nakaseke (Uganda), 60% of the community are functionally illiterate and therefore traditionally barred from facilities such as computers. This (local content) VR model addresses basic issues that lead to water-borne disease such as typhoid, dysentery, and cholera as well as water based diseases such as malaria and bilharzia. Emphasis is on visual and audio cues to transfer the message, not the written word.

The introduction of an alternative education and training method, especially in the third world context, is of immense importance and could prove invaluable, not only in Africa, but in other regions of the world such as Asia and South America.

Source: www.Naledi3d.co.za



Fig. 1 : Virtual Education



Fig. 2 : Virtual Wind Turbines



Funding:

The University of Pretoria (UP), Council for Scientific and Industrial Research (CSIR) and the Gauteng Provincial Government (GPG) recently joined forces to promote the establishment of an Innovation Hub on a portion of the Pretoria University Experimental Farm.

The Innovation Hub is a strategic partnership between the Gauteng Provincial Government's Blue IQ initiative, and SERA, the Southern Education and Research Alliance, a partnership between the CSIR and the University of Pretoria.

The initiative resulted from:

- the Provincial government's drive to establish Gauteng as South Africa's "smart province"

- the UP and the CSIR alliance in the field of technology and research

- the need to establish a unique environment where high-technology business, education, research and venture capital could meet, network and prosper.

The Trade and Economic Strategy (1997) of the Gauteng Provincial Government defined 10 projects designed to propel Gauteng on a new growth trajectory to increase the province's international trading competitiveness, improve the comparative economic advantages of the province and boost its economic growth in the fields of high performance industries.

The Innovation Hub was identified as one of these projects and in this regard this development will be in accordance with the three strategic thrusts identified as the basis for achieving the desired growth trajectory for Gauteng Province, being:

- realignment of the manufacturing sector away from traditional heavy industry input markets and low value added production towards sophisticated, high value added production, as well as the development of high value added production activities in the agricultural and mining sectors

- Development of the province as the "smart" centre of the country, with specific emphasis on information technology, telecommunications equipment, research and development and bio-medical activities

- development of the finance and business service sectors with specific emphasis on financial services and technology, auxiliary business services and technology, corporate head office location and business tourism.

Although Gauteng is South Africa's smallest province, it generates 38% of the nation's economic activity and represents 70% of total formal employment in the country. Industries in Gauteng currently employ over 80% of South Africa's high-tech workers, creating the highest demand for IT and electronic expertise in Africa. The province has a well-developed tertiary education sector, with 40% of all university enrolments in the country, producing 40% of science graduates and 44% of engineering postgraduates. Gauteng also hosts the biggest concentration of research activities in the country, including science councils, industrial Research and Development facilities and tertiary education institutions.

The Gauteng Provincial Government's Blue IQ initiative and the commercialisation arm of SERA, SERA (Pty) Ltd, each hold an equal share in the Innovation Hub Management Company. The initial investment comprises a grant from the Province to the innovation Hub Management Company (Pty) Ltd of R258 million, while SERA has made 60 ha of land available for the development. Certain of the Provincial funds may be allocated to the Innovation Hub Incubator (Pty) Ltd, which is also an equal shareholding between the Province and SERA (Pty) Ltd.

[**STRATEGIC ENVIRONMENTAL FOCUS.** 2001. *The Construction of the Innovation Hub and Associated Infrastructure on the remainder of the farm Koedoespoort 456 JR, Pretoria.* Scoping Report. SEF] p. 3-4

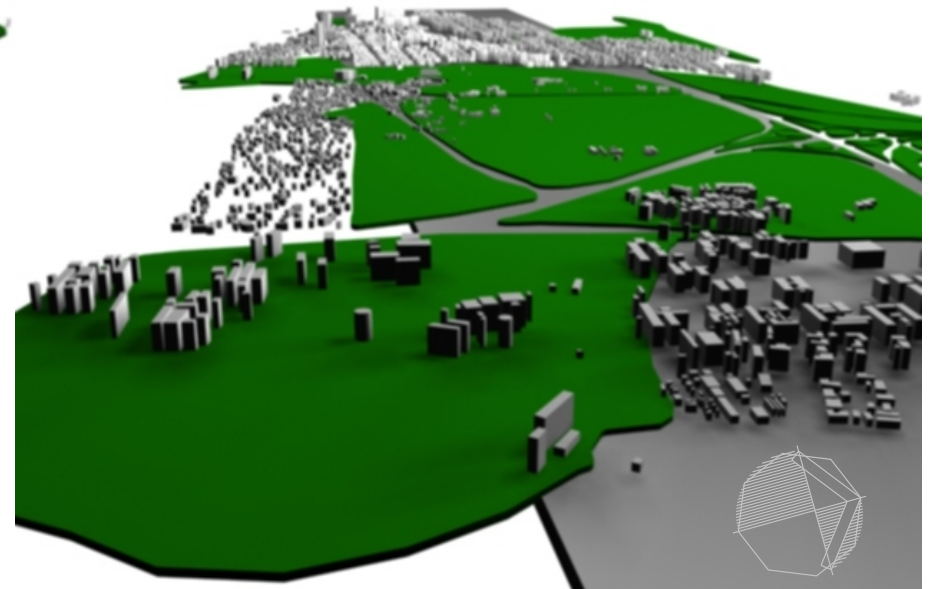
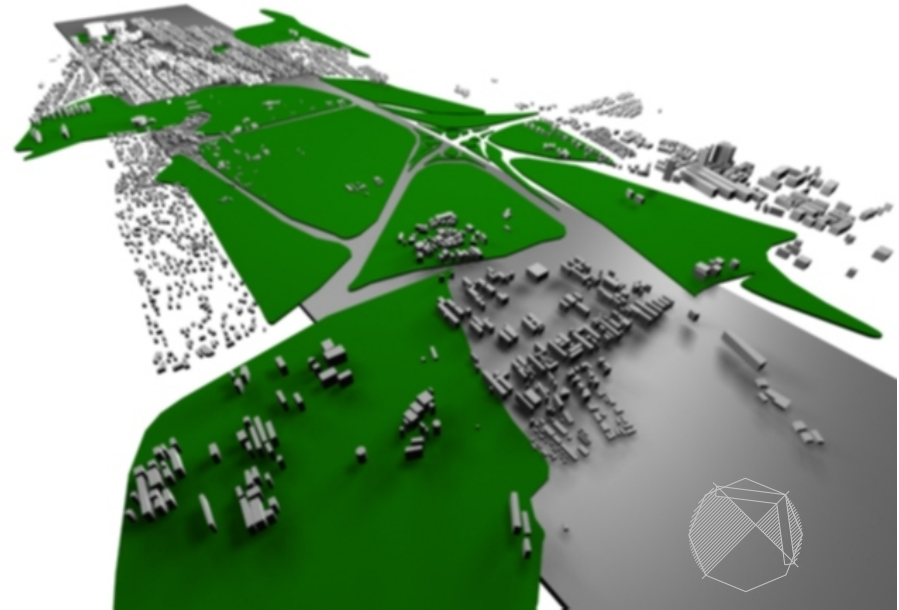
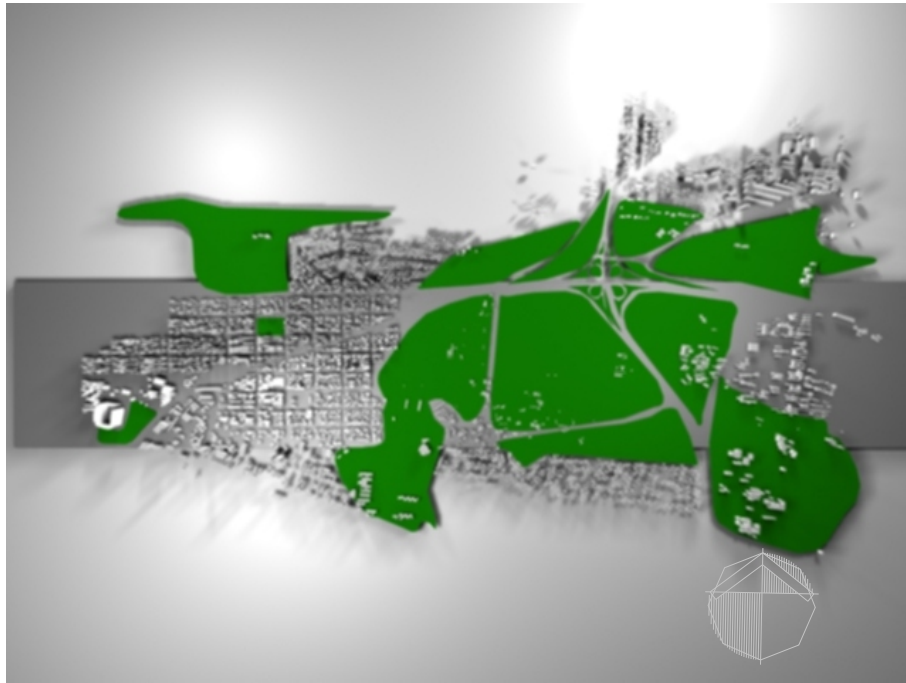


Fig.3: 3D Site Models by Author

SITE SELECTION

University of Pretoria - Bergh, F. S., 2003



Fig. 4: Map of Southern Africa [Encarta Encyclopedia 1997]

Site Selection

The Innovation Hub will be situated on a portion of the University of Pretoria experimental farm. The farm is located on the southwestern quadrant of the N1/N4 freeway interchange in Pretoria, and is bordered by the suburbs of Lynnwood and Menlo Park to the south. The Hatfield area is situated to its west, while Perseur Technopark and the CSIR are situated to its east, opposite the N1 national road.

The experimental farm is situated in what is now considered to be the "Old East" of Pretoria and this area was demarcated as part of Pretoria Planning Zone 9 during the IDP process as one of eleven planning zones in Pretoria.

The farm is situated approximately 15 kilometers to the east of the Pretoria central business area and approximately 70 kilometers north of Johannesburg.

The residential suburbs of Lynnwood and Menlo Park are situated south of the farm, while the university's sports centre, the Hatfield residential neighbourhood and business area, and the university's main campus are situated to its west.

N1 to Polokwane

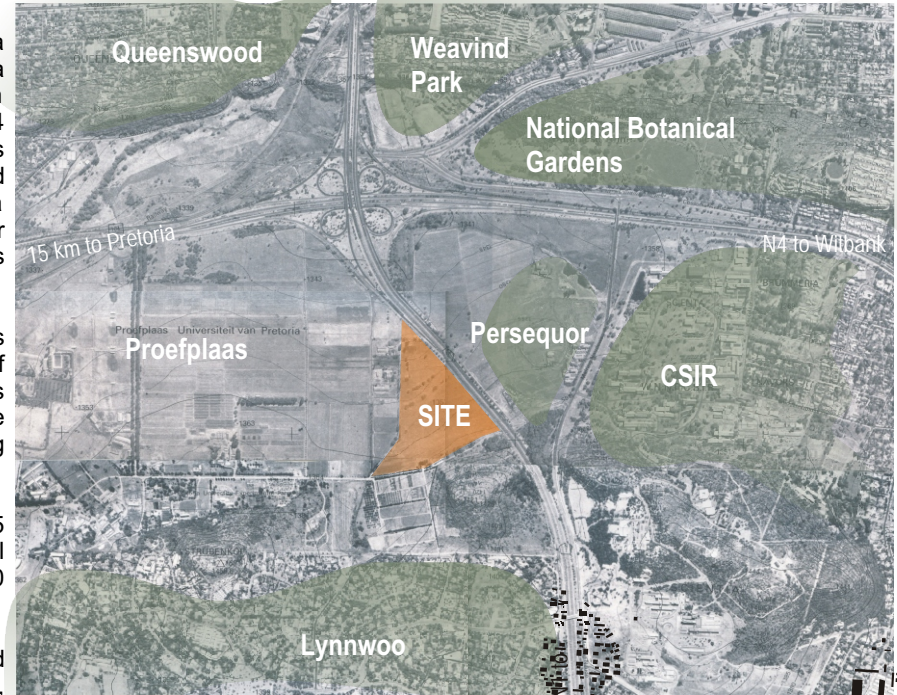


Fig. 6: Orthographic Photo Showing Context

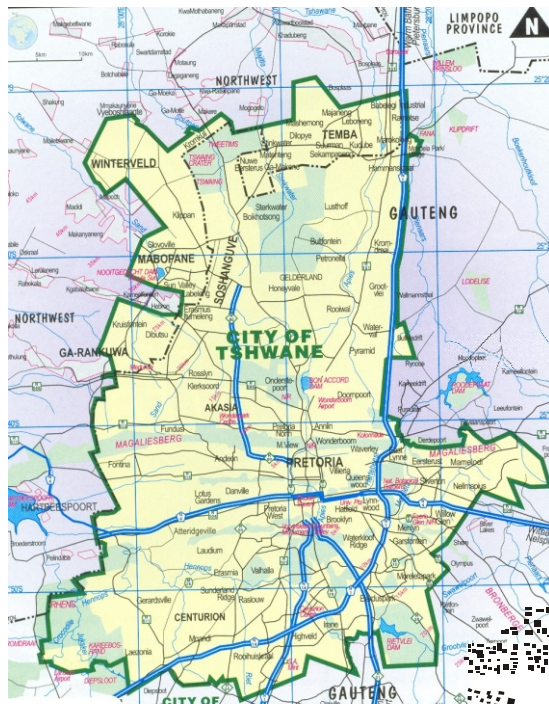
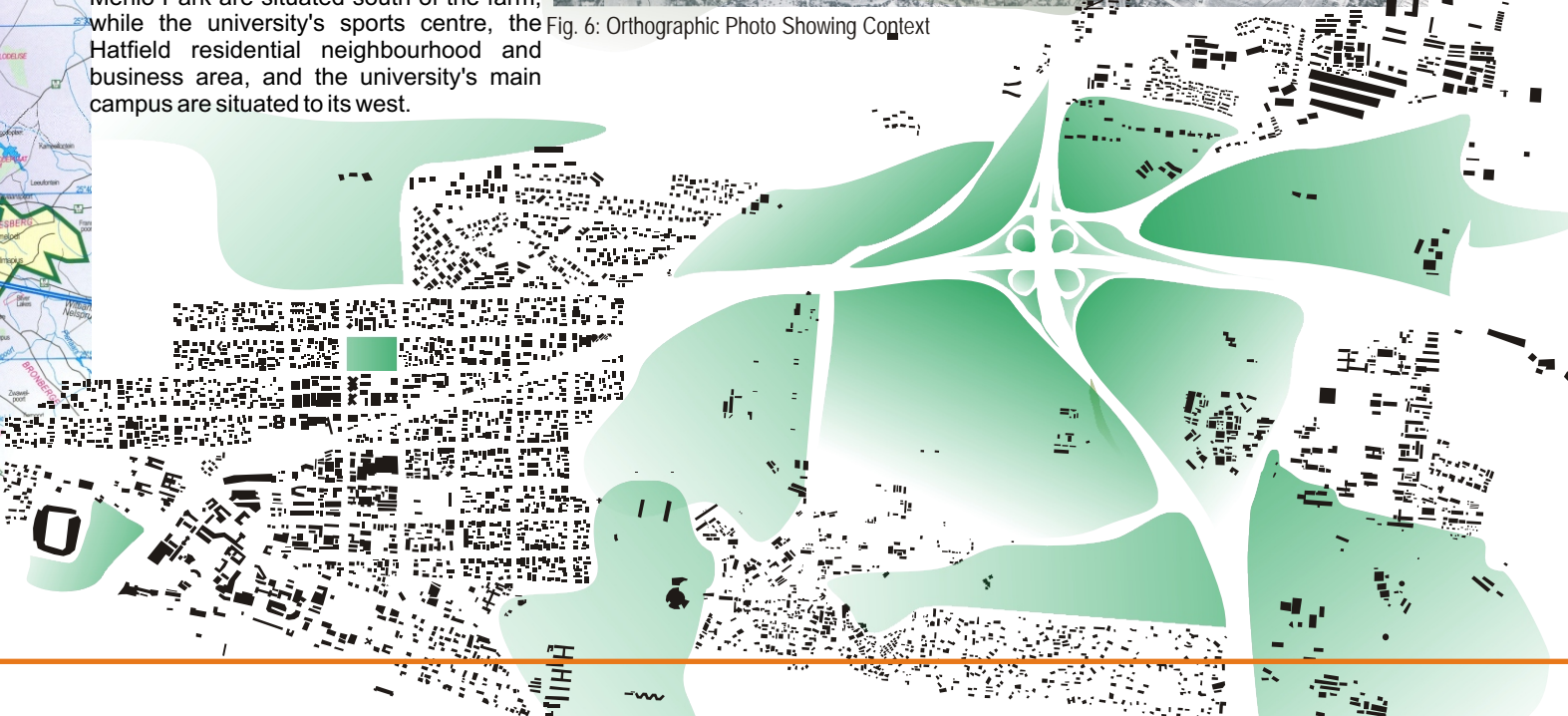


Fig. 5: Schematic Locality Map [Tshwane Visitors Guide. 2002-2003. P.16]



CONTEXT ANALYSIS

University of Pretoria - Bergh, F. S., 2003

The existing Pretoria parliamentary site, the Colbyn residential area and the Colbyn protected nature area are situated to the north and north-west of the subject property. The Silverton Secondary Metropolitan Activity Node (industrial, business and residential areas) is situated north-east of the subject property, with the Pretoria Botanical Gardens located directly north of Persequor Technopark and north-east of the proposed Innovation Hub.

Arterial routes connect the four quadrants formed by the N1/N4 interchange and interconnects several supplementary metropolitan activity nodes (supplementary business areas), as identified in the Greater Pretoria Metropolitan Council Integrated Development Planning (GMPC IDP) process. These city wide metropolitan activity nodes are the Hatfield, Brooklyn and Menlyn business areas. Smaller business and office centres are interspersed throughout the surrounding area.

[STRATEGIC ENVIRONMENTAL FOCUS.
 2001. *The Construction of the Innovation Hub and Associated Infrastructure on the remainder of the farm Koedoespoort 456 JR, Pretoria.*
 Scoping Report. SEF p.5]

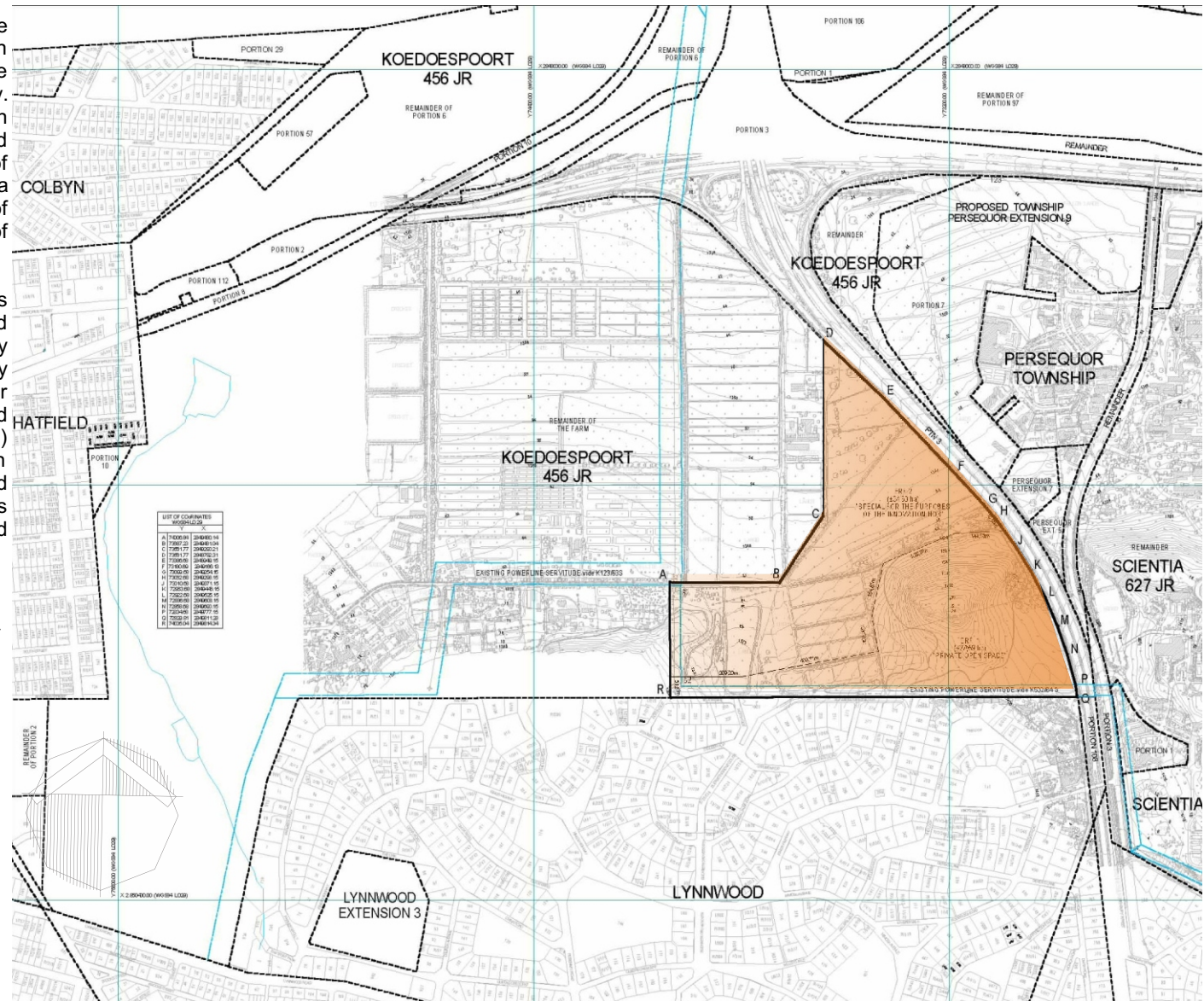


Fig.7: Cadastral Site Plan [Strategic Environmental Focus / Plan Practice. 2001. Appendix 8]



Fig. 8: Site Photo : To the Southeast



Fig. 9: Site Photo : To the South



Fig. 10: The Underway



Fig. 11: The Entrance



Fig. 12: Inside the Tunnel



Fig. 13: Exit towards Persequor



Fig. 14: Sheep on the Northern Apex



Fig. 15: Sheep Paddocks



Fig. 16 : Electricity Pylon



Fig.17 :Solar Generator

Cultural and Historical Overview:

An area of 128,475 hectares were donated by the City Council of Pretoria to the Government in 1911 to facilitate an Agricultural College (a portion of the farm Groenkloof east of the old filling station in the Fountains Valley). When the T.U.K. required an agricultural faculty of their own in 1916, the previous mentioned portion of land was not deemed appropriate. After years of scoping and ongoing negotiations, the transaction of buying the current land, which would serve as the University of Pretoria's Agricultural Research Farm (Proefplaas), was made in October 1919. Two portions were acquired: a portion of the farm Koedoespoort 299 (portion E) from the Wesleyan Methodist Missionary Trust and on the southwestern side, 39,4 ha from the farm Hartbeespoort 304. The Agricultural Research Farm was handed over to the T.U.K. in 1920.

In 1937 a small portion of land was occupied by the South African Broadcasting Corporation (SABC) next to Brummeria and Silverton

Where a radio tower was erected. In 1945 an area of 38,54 ha were given to the Botany Faculty of the Department of Agriculture to lie out a botanical garden. The site is currently still being used by this department and also received permission to construct a building in 1958.



Fig. 18: Entrance from South street, 1920. [Ad Destinatium. 1960. P. 151]

When the Council for Scientific and Industrial Research (CSIR) expanded its building complex in 1948, a committee was founded to negotiate the expansion onto a portion of the Proefplaas. The importance of the proposed research facilities to the University was evident when, at the end of 1948, 91,65 ha of the farm Koedoespoort 299 on the eastern portion of the Proefplaas was donated to the CSIR.

In 1954 negotiations started with the South African Bureau of Standards (SABS) who wanted to acquire 60 morg on the western side of the Proefplaas. Negotiations came to a dead end in 1958, but at the same time the committee, in 1954, proposed plans to develop the land in question into a vast sporting terrain with the L.C. de Villiers Stadium as the nucleus of the development. In 1959 the first of four proposed men's hostels was built in the southwestern corner of the Proefplaas.



Fig. 19: On the Agricultural Research Farm [Ad Destinatium. 1960. P. 152]

Since the Proefplaas came into being, the fast growing city and expanding residential areas (Lynnwood, Colbyn, Hatfield and the CSIR township Scientia) turned the Proefplaas into an isolated island over a period of 40 years.

The proposal of main routes crossing the Proefplaas was a point of debate as early as 1956. The province proposed roads crossing over the northwestern portion of the Proefplaas; between the end of Pretorius street which terminated in End street, and the extension of Church street to Silverton. The proposal was opposed by The University of Pretoria claiming that the development would interfere with the current workings of the Research Farm and future development and expansion of the University itself.

After years of planning and alternative proposals, and negotiations between the University, the City Council of Pretoria, the Provincial Road Department and the National Transport Commission, the planned highway to Witbank was accepted in 1964. The only condition being, its proximity to the existing railway line.

With the added land contractually given to the Christian Brothers College in the north eastern corner of the Proefplaas, only 245,8 hectares were left over from the original 342,6 hectares intended for the Faculty of Agriculture.

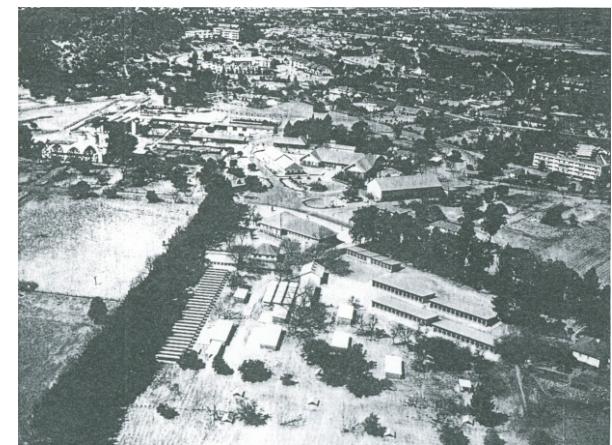


Fig. 20: The Agricultural Research Farm from the Southwest, 1972. [Ad Destinatium II. 1987. P. 245]

Sun Angles:
Winter

Climate:

Climatic data was provided by the Weather Bureau (Department of Environmental Affairs and Tourism) for the Pretoria University Experimental Farm measuring station. The study area falls within the summer rainfall area of South Africa. Most of the precipitation occurs in the form of thunderstorms.

Temperature (°C)

The average daily maximum temperatures for Pretoria are:

January	28.1°C
(max 37.0°C)	
July	19.5°C
(max 25.9°C)	

The average daily minimum temperature:

January	16°C(min 8.0°C)
July	3.6°C(min 7.0°C)

Precipitation (mm per year)

The mean annual precipitation Pretoria is:
494 mm per year (min)
686 mm per year (average)
1 069 mm per year (max)

The mean monthly precipitatic Pretoria is:

January	134 mm (max 492 mm)
July	3 mm(min 0 mm)

Wind

General prevailing wind direction is from east and a northwest direction in sum with the highest average preva velocities (7.3 m per sec. in December) from a south-eastern direction. Gene prevailing wind direction in winter is from south-east and north-west, with the high average velocities (6.2 m per sec. in and September) from a south-wes direction.

Mist

Ten days annually on average.

Lightning

Eighty-seven days annually on average.

Hail

Four days annually on average.

[STRATEGIC ENVIRONMENTAL FOCUS. 2001. *The Construction of the Innovation Hub and Associated Infrastructure on the remainder of the farm Koedoespoort 456 JR, Pretoria.* Scoping Report. SEF p. 15]

Summer

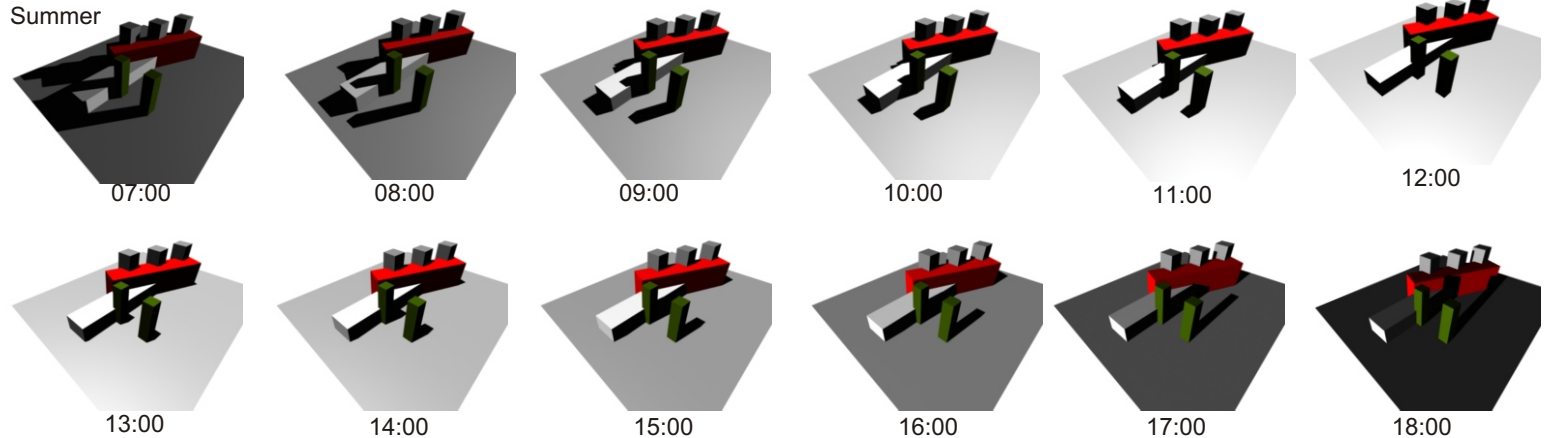


Fig. 21: Sun Angles for Winter and Summer

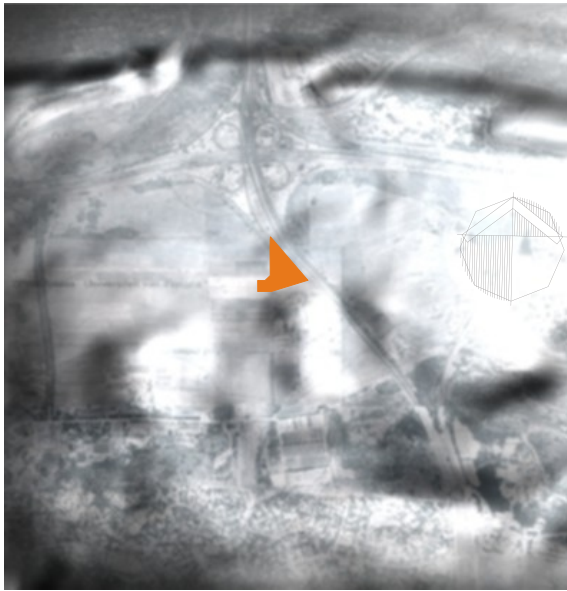


Fig. 22: 3D Model with Orthographic Footprint



Fig. 23: Eastern Elevation

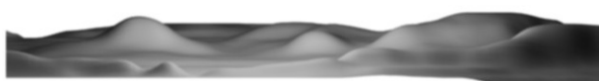


Fig. 24: Northern Elevation

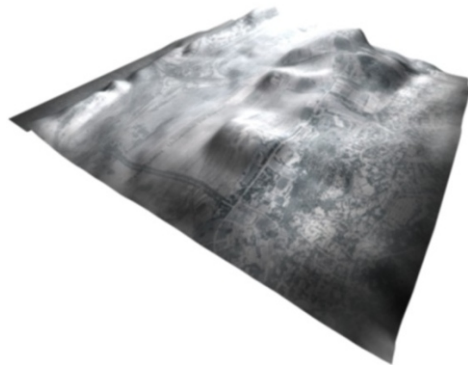


Fig. 25: 3D Site Model - Perspective

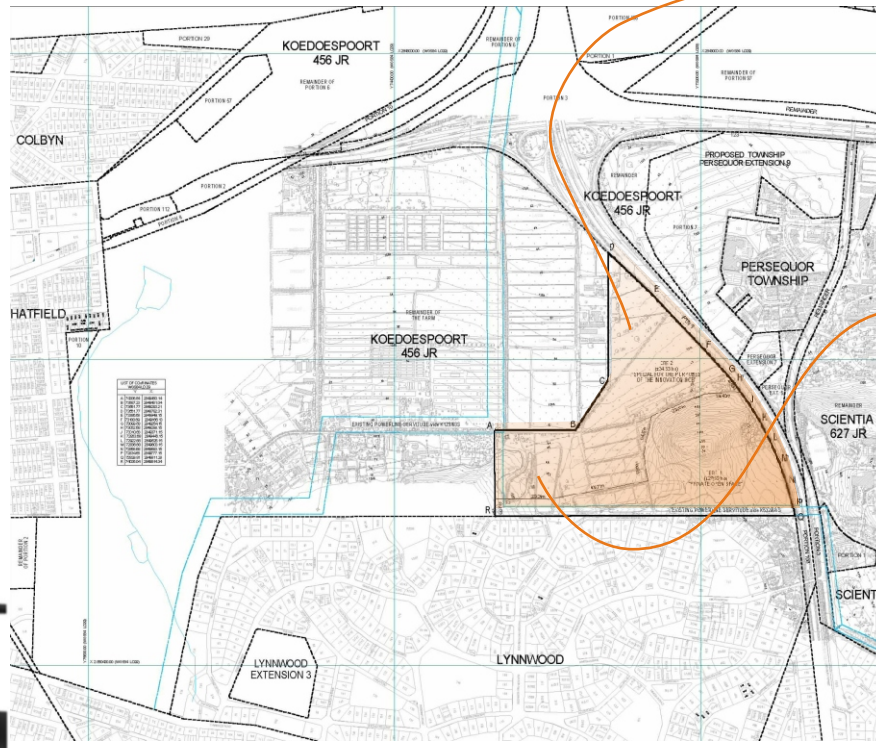


Fig. 26: Cadastral Site Plan showing Site Location [SEF. 2001. Appendix 8]

The topography is flat, with a gentle northwesterly slope. This part of the site consists mainly of previously ploughed land with an irrigated sheep paddock at the northern apex. There are a few scattered trees in this area and a single storey masonry building near the sheep camp.

This portion of the site consists of a partly rectangular area and an adjacent irregularly shaped area. The partly rectangular area is an experimental orchard and the ground surface here slopes moderately toward the northwest and is partly covered by grass. The southeastern corner extends part-way up a small koppie and is also grass covered. The irregularly shaped area, which forms the westernmost extension of this portion, has a large grass covered flatfill platform. The portion of the site at the northwestern corner of the fill platform lies on the toe slopes of a local quartzite koppie and has a moderately sloping grass covered surface.

[STRATEGIC ENVIRONMENTAL FOCUS. 2001. *The Construction of the Innovation Hub and Associated Infrastructure on the remainder of the farm Koedoespoort 456 JR, Pretoria.* Scoping Report. SEF p. 20]



Fig. 27: Western Elevation

Geo-technical Information:

Plan Practice Town Planners undertook a site investigation during September 2001, specifically to compile a geo-technical report in accordance with the requirements of the Development Facilitation Act, 1995 (Act 67 of 1995)

In general, rocks of the Pretoria Group of the Transvaal Super group underlie the farm, while the general geology of Pretoria is reflected by the topography of the experimental farm. The weather resistant quartzite beds of the ridges and the non-durable shale and andesite formations of the valleys characterize the general geology of Pretoria.

It appears that a diabase sill underlies the southern part of the experimental farm, while the ridges are part of the Daspoort Quartzite Formation. The Hekpoort Andesite Formation forms the gradual north falling slope of the site, with prominent north-south striking syenite intrusive dykes being present to the west of the site. Alluvium deposits underlie the northeastern part of the site.

Whilst this scenario was broadly confirmed during the site investigation, the site geology is more complex than suggested by the geology maps. In this regard the geological report confirms that Hekpoort Formation Andesitic lava, part of the Pretoria Group, forms the bedrock of the northern section of the site. The same bedrock is present on sections of the southern portion but geological faulting has placed Daspoort Formation quartzite in contact with the andesite in places.

The report concludes that no adverse conditions totally prohibiting the construction of structures for urban development were observed on the site. The site is developable provided that measures are taken to combat soil movements. In this regard six site classes were identified on the basis of geo-technical factors that affect soil conditions.

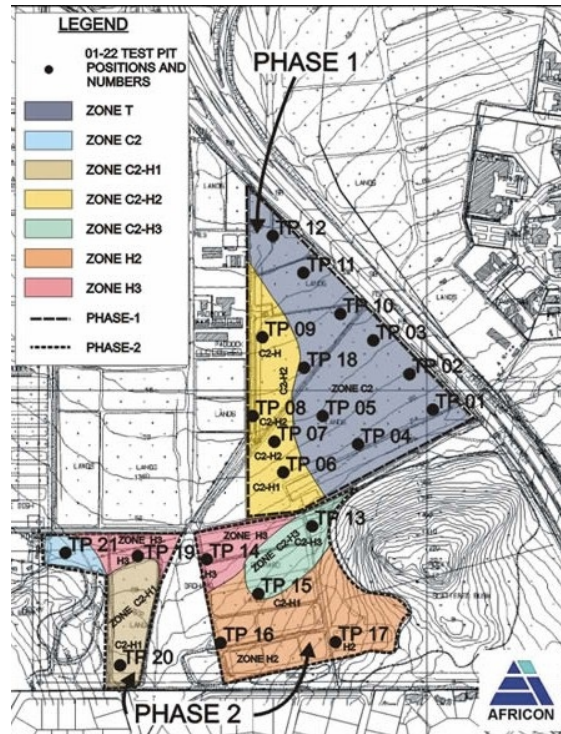


Fig. 28: Geo-Technical Map [SEF. 2001 .Appendix 5]

Hole no	Depth to residuum (m)	Total depth (m)	Remarks
TP 1	>3,2	3,2	Refusal on quartzite boulders
TP 2	>3,6	3,6	No refusal: hole stopped at end of reach of boom
TP 3	>3,4	3,4	No refusal: hole stopped at end of reach of boom
TP 4	>3,3	3,3	Refusal on quartzite boulders
TP 5	>3,3	3,3	Refusal on quartzite boulders
TP 6	2,0	3,5	No refusal: hole stopped at end of reach of boom
TP 7	2,7	3,3	No refusal: hole stopped at end of reach of boom
TP 8	2,35	3,4	No refusal: hole stopped at end of reach of boom
TP 9	2,0	2,9	No refusal: hole stopped due to very slow progress
TP 10	>3,0	3,0	No refusal: hole stopped at end of reach of boom
TP 11	>3,4	3,4	No refusal: hole stopped at end of reach of boom
TP 12	>3,3	3,3	No refusal: hole stopped at end of reach of boom
TP 13	1,7	3,1	No refusal: hole stopped at end of reach of boom
TP 14	1,6	3,2	No refusal: hole stopped at end of reach of boom
TP 15	2,1	3,3	No refusal: hole stopped at end of reach of boom
TP 16	0,8	1,4	Refusal on very soft rock quartzite
TP 17	1,3	3,0	No refusal: hole stopped at end of reach of boom
TP 18	>3,0	3,0	No refusal: hole stopped at end of reach of boom
TP 19	>2,8	2,8	No refusal: hole stopped due to very slow progress
TP 20	>3,1	3,1	No refusal: hole stopped at end of reach of boom
TP 21	1,9	2,9	Refusal on very soft rock quartzite
TP 22	2,5	3,1	No refusal: hole stopped at end of reach of boom

Site Class T

This zone is characterized by talus of quartzite boulders and gravel overlying stable sandy residual quartzite, the talus beginning at shallow depths of less than about 0,5 m. It is expected that shallow foundations for masonry structures will generally be placed on or near the talus and that some degree of compaction of loose areas between boulders in the foundation excavations will be required.

Site Class C2

In this zone compressible and potentially collapsible sandy hill wash extends from surface to depths of about 3 m. The expected total range of movements from the sandy soil profile is more than 10 mm.

Site Class C2-H1

This site class is restricted to the uncompacted fill platform in Phase II, where the low density of the generally silty fill material is expected to result in a significant degree of compressibility. The potentially expansive nature of the fill and the underlying silty soils is expected to add potential heave to the soil profile's characteristics. The expected range of total soil heave movement is greater than 30 mm. A dual classification is applied to this site class due to the fact that both compressibility and heave is expected here.

Site Class C2-H2

This site class has an upper sandy layer, both compressible and potentially collapsible, with an underlying thick potentially expansive silty to clayey zone. The total soil movements in the sandy material are expected to be greater than 30 mm and total heave from the clay is expected to be greater than 20 mm. This site class is given a dual classification due to the dual nature of the soil properties.

Site Class H2

The range of total soil heave expected from the silty to clayey transported soil and residual andesite present is up to 30 mm, hence the Site Class H2 designation.

Site Class H3

The area covered by this site class has a thick zone of potentially highly to very highly expansive clayey to silty hill wash and residual andesite. The total amount of heave movement expected could exceed 60 mm, hence the Site Class H3 designation.

Table 1: Results of the Test Hole Investigation Undertaken on Site [SEF. 2001. p. 7]

STRATEGIC ENVIRONMENTAL FOCUS. 2001. *The Construction of the Innovation Hub and Associated Infrastructure on the remainder of the farm Koedoespoort 456 JR, Pretoria.* Scoping Report. SEF

Water authority

Rand Water will be the water authority.

Ground water

During the geo-technical investigation, ground water seepage was only encountered in one of the 22 test pits excavated on the site. In TP12, which is located in the northern section, water was encountered at a depth of 0,4 m. This is considered to be a perched water table on top of transported very clayey sand. The latter material is possibly of alluvial origin and the source of the water is believed to be frequent irrigation of the sheep paddock in which the test pit was dug. Water ingress into excavations up to 3 m deep is not expected to occur except under exceptional circumstances, with the exception of the sheep paddock area.

Surface water

The site falls into the upper catchment area of the Hartbeesspruit, which is situated in quaternary catchment A23A. The Hartbeesspruit has a total catchment area of approximately 30.65 km² and drains into the Limpopo River via the Pienaars River and the Crocodile River.

Surface water quality

SEF was commissioned to conduct an investigation into the ecological integrity of two streams on the LC de Villiers sport complex of the University of Pretoria.

The study was conducted to establish base line data on the ecological integrity of two streams crossing the LC de Villiers Sport Complex and the UP Experimental Farm, on which The Innovation Hub site is located. The study was also to make recommendations with regard to storm water management of future development on the site. The study area is characterised by urban development, sport facilities and the University of Pretoria Experimental Farm.

Recommendation

It is recommended that a stormwater management plan be drafted before any development takes place to address the anticipated increase in stormwater run-off and associated pollution / nutrient loading of the streams. As part of site specific mitigating measures regarding nutrient / pollution loading of the streams, it is recommended that a wetland system be incorporated as part of the landscaping. A monitoring programme is recommended in view of the current condition of the two streams and the anticipated impacts associated with the development of The Innovation Hub.



Fig. 29: Harbeesspruit



Fig. 30: LC de Villiers Dam

[STRATEGIC ENVIRONMENTAL FOCUS. 2001. *The Construction of the Innovation Hub and Associated Infrastructure on the remainder of the farm Koedoespoort 456 JR, Pretoria.* Scoping Report. SEF p. 16]

In conjunction with the Urban Design framework proposed for the Innovation Hub, an ecological impact study was done. Areas that are conservation worthy were identified as well as developable areas. The study was undertaken by Strategic Environmental Focus during May 2001 which formed part of the scoping report which had to be submitted to the Innovation Hub Management.

All the relevant information gathered pertaining to the vegetation profile of the proposed site was translated into a site diagram showing the locations of the different vegetation types and plant communities. The developable area determined in the report, consists mainly of grassland and had previously been used as agricultural land where the University of Pretoria undertook research experiments.

The objectives of the study includes the following:

- To obtain and compile a comprehensive species list of the area (Previous studies of the area were available from the Pretoria University for this purpose).
- To identify sensitive areas, which will have bearing on future conservation and management of the area.
- The search for rare, threatened or

[**STRATEGIC ENVIRONMENTAL FOCUS**. 2001. *A Vegetation Assessment for the proposed Innovation Hub Development on the remainder of the farm Koedoespoort 456 JR, Pretoria. Gauteng.* SEF p. 23]



Fig. 31: Conservation/Development Plan [SEF. 2001. Appendix 4]

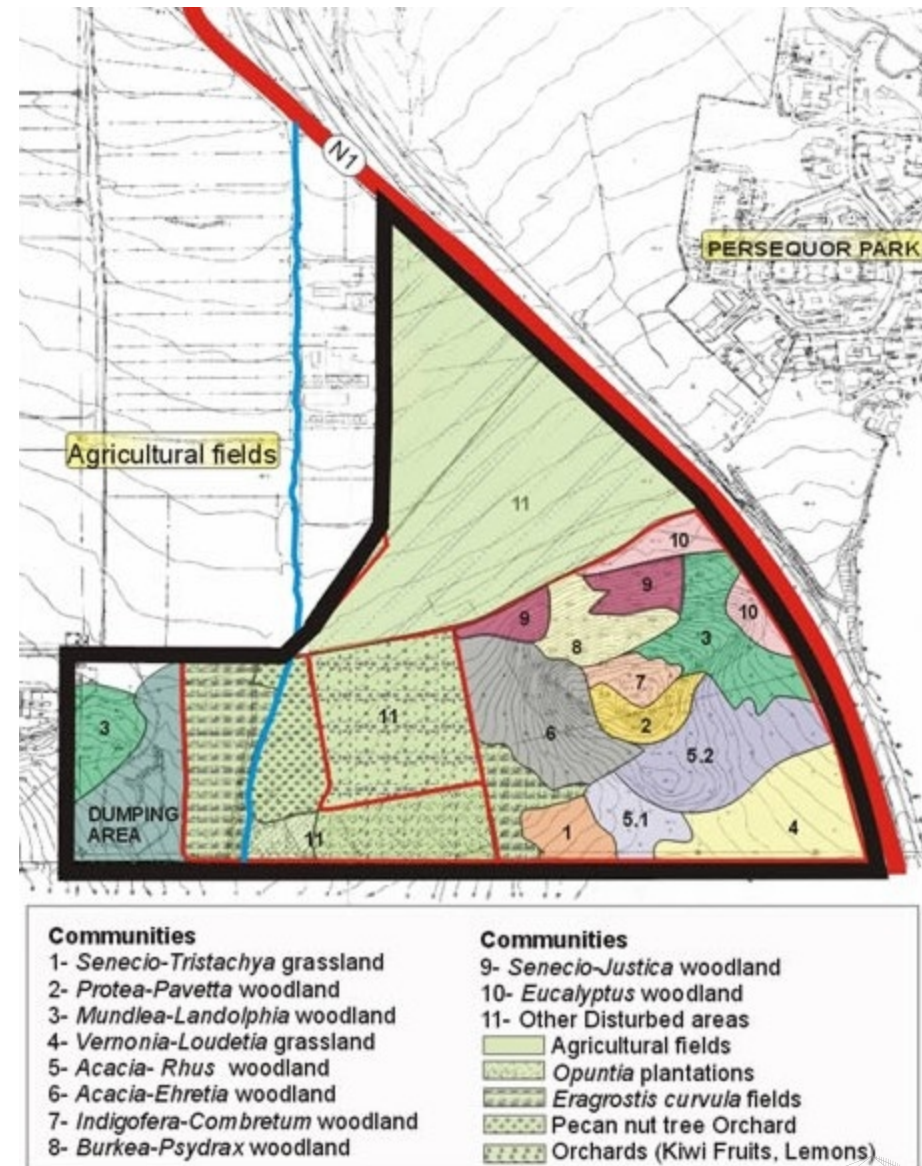


Fig. 32: Vegetation Map [SEF. 2001. Appendix 4]



Environmental Noise Impact

Due to the proximity of the N1 Freeway, which defines the northwestern boundary of the proposed Innovation Hub Development, the noise impact on the site had to be measured and the impact assessed in order to inform the design development and the urban design framework.

JH Consulting was commissioned by the Innovation Hub to assess the environmental noise impact on the site. Three locations were selected for testing, these locations represent the areas where the noise impact is at a maximum. The following readings were taken:

Location 1:

At a position at the site boundary with the Northbound N1 Highway, 40m south of sign 145 (500m exit to N4, Pretoria, Witbank). This position is approximately 30m from the centerline of the road system.

Day/Date	Time	L _{Aeq,l}	L _{Amin}
Mon 22/10/01	16:15 - 16:25	76.7	67.8
Mon 22/10/01	16:27 - 16:37	77.1	68.1

Calculated value: L_{Aeq,l} = 77.8 dB(A)

Observations:

These values are typical of a main highway with continuous noise from passing vehicles, which dominate the L_{Aeq,l} value. The L_{Amin} value represents the lowest value recorded during the measurement period.

Location 2:

At a position at the cul-de-sac end of Service Road at the boundary of the site. This site is approximately 100m from the centerline of the road system.

Day/Date	Time	L _{Aeq,l}	L _{Amin}
Thur 18/10/01	16:12 - 16:22	65.1	61.3

Calculated value: L_{Aeq,l} = 64.5 dB(A)

Location 3:

At a position at the site boundary on Elizabeth Grove North opposite the boundary between 451B and 453.

Day/Date	Time	L _{Aeq,l}	L _{Amin}
Mon 22/10/01	16:47 - 16:57	51.0	44.9

Calculated value: L_{Aeq,l} = 51.2 dB(A)

Observations:

These values are typical of a residential area distant from roads which are still the dominant noise source, with continuous traffic noise, which dominates the L_{Aeq,l} value. The L_{Amin} value represents the lowest value recorded during the measurement period. The above ambient noise measurement also agrees well with the values recommended as the highest acceptable for suburban districts in daytime, according to the relevant section (Table 2) of SABS 0103:1994 as follows:

INCREASE dB	RESPONSE INTENSITY	REMARKS	NOISE IMPACT
0	None	Change not discernible by a person	None
3	None to little	Change just discernible	Very low
3 ≤ 5	Little	Change easily discernible	Low
5 ≤ 7	Little	Sporadic complaints	Moderate
7	Little	Defined by National Noise Regulations as being 'disturbing'	Moderate
7 ≤ 10	Little to medium	Sporadic complaints	High
10 ≤ 15	Medium	Change of 10dB perceived as 'twice as loud' leading to widespread complaints	Very high
15 ≤ 20	Strong	Threats of community/group action	Very high

Table 2. SABS 0103 : 1994

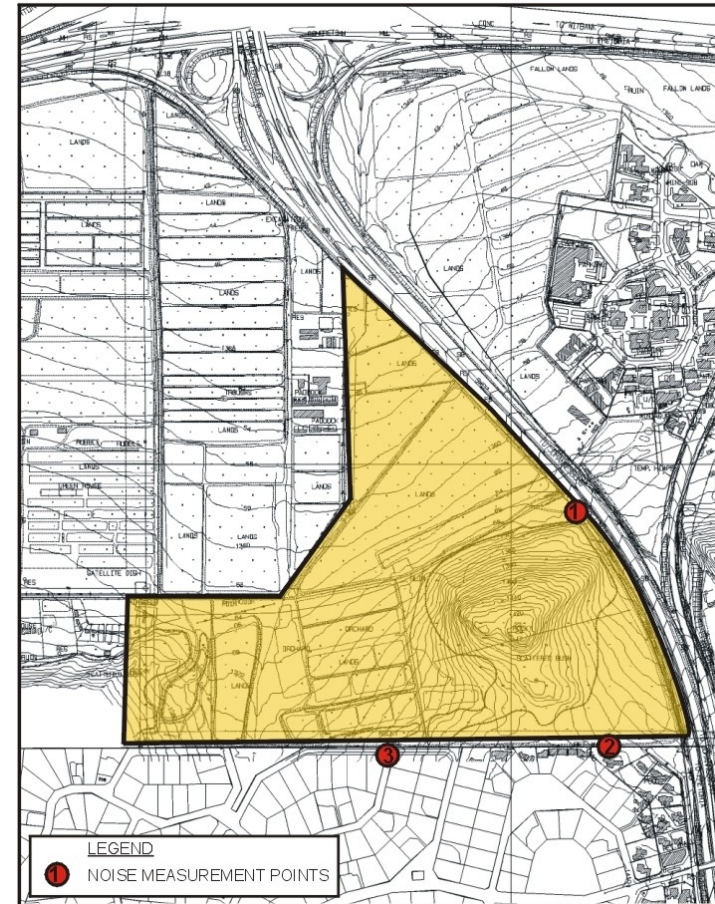


Fig. 33: Noise Measurement Points [JH Consulting. 2001. Appendix 7]

The provision of appropriate and sufficient access to the Innovation Hub is of utmost importance to ensure the success of the development. An overview of the roads and hierarchy system of roads within the area is provided to understand the problems associated with access to the Innovation Hub. In this regard reference is also made to the Traffic Impact Study and Fatal Flaw Report prepared by Africon which accompany the application and deals appropriately with traffic and traffic related issues such as access.

Meiring Naude Drive:

This road is similar to roads such as Lynnwood Road and Atterbury Drive, but not subject to the diversity of land uses along the latter roads. Meiring Naude Drive performs the function of a local distributor and its primary function is to connect Lynnwood Drive and Cussonia Avenue, both east-west bound routes, with each other. It also provides a good balance of access and mobility to its users. The road, however, does not provide access to the proposed Innovation Hub site at present as it is separated from this site by the N1 freeway. The construction of a bridge between Meiring Naude Drive and the proposed Innovation Hub will address several problematic aspects related to access, access control, and the use of land adjacent to a bridge.

The N1 national road:

The N1 is the most visible route in the vicinity of the proposed Innovation Hub. This is a national road under the jurisdiction of the South African National Roads Agency. The road divides the area into four distinct quadrants. It performs the hierarchical function of a regional distributor and provides a high-speed, high mobility means of travel to the motorist. Access to land adjacent to the freeway is highly limited. The only means of obtaining use of the freeway is limited to the existing interchanges. The construction of an interchange at the Hub will ensure direct freeway access, but will pose several problems. The problems relate directly to public access and public use of the internal Innovation Hub roads, national road standards and the restriction of development potential of land adjacent to the interchange for the purposes of development.

Kings Highway:

This route is strictly considered to be an urban collector street, providing a residential neighbourhood with access to higher mobility routes. It is not designed to perform the function of a local distributor as it provides direct access to residential properties. The sections of Kings Highway that intersect roads such as Meiring Naude Drive and Lynnwood Road do, however, provide access to regional functions within the larger area such as the business nodes.

South Street, Protea Street:

These roads are considered to perform the function of residential or neighbourhood roads, but each to a varying degree. Each of the roads has a fair degree of mobility but primarily performs the function of providing access to individual erven.

South Street is considered to be less of a neighbourhood access road and more of a communications route. It provides a direct link between the University of Pretoria campus and the LC de Villiers Sports Centre and experimental farm. South Street can, however, not perform the function of a high mobility east-west route, due to the high number of accesses to and from the street and should therefore not be considered as a primary access point to the Innovation Hub development.

Protea Street is considered to be a true neighbourhood access road, providing direct access to residential erven. The street is not designed to perform the function of a high mobility access route as it provides access to a number of residential erven. It furthermore is designed and constructed below the standards required for high mobility access routes in terms of visibility, speed and road reserve. Sappers Contour is considered to provide the least degree of mobility as it is a residential cul-de-sac. It does however, obtain access directly off Kings Highway with an office building situated at the said intersection. The cul-de-sac runs parallel to the N1 and only provides access to residential properties along one of its street fronts.

Existing Road Conditions

Access to the experimental farm is limited and the Innovation Hub area cannot be serviced with adequate roads, given the existing road infrastructure within the area. The only formal access to the experimental farm can be obtained via South Street in Hatfield and it provides access to both the LC de Villiers Sports Centre and the agricultural research farm.

The part of South Street extension providing access to the LC de Villiers Sports Centre is considered to be of fairly good quality but cannot be used as a primary access road to the Innovation Hub. The remaining extent of the South Street extension can be described as a tarred farm road. Although this road will not be the primary access to the Hub development, a servitude of right of way will be registered across the farm portion to ensure accessibility between the University of Pretoria, the Innovation Hub and the CSIR.

[STRATEGIC ENVIRONMENTAL FOCUS.
2001. *The Construction of the Innovation Hub and Associated Infrastructure on the remainder of the farm Koedoespoort 456 JR, Pretoria.* Scoping Report. SEF p. 9-11]

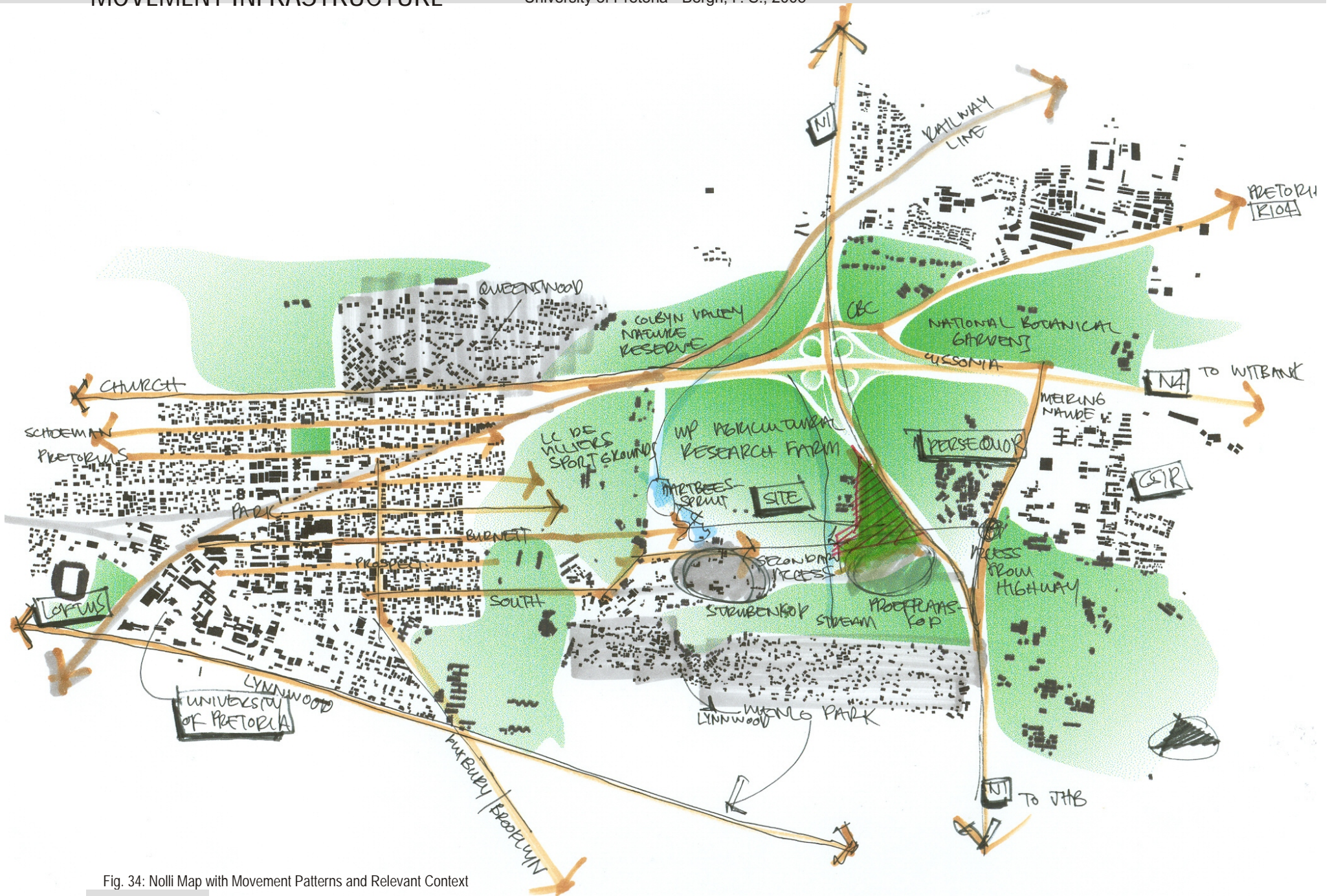


Fig. 34: Nollism Map with Movement Patterns and Relevant Context

Demographic and socio-economic characteristics

The zone in which the Innovation Hub is situated is home to approximately 85 258 persons, which represents approximately 7,5% of Pretoria city's population and approximately 4,6% of the Tshwane Metropolitan Municipality Area population.

The pre-school age group (ages 0 - 6) represents approximately 5,7% of the population within this zone, while the school going (ages 7 -18) population represents approximately 15,9% of the total population. The economically active population segment (ages 23-65 years) represents approximately 56,5% of the Zone's population and approximately 65,9% of the Zone's population earn an upper-middle to high income. The proportion of households with higher incomes is higher than the average for Pretoria, the metropolitan area and South Africa. The high levels of education, occupation and income among the residents ascribe a high socio-economic status to residents within this area.



Fig. 36: Second Church of Christ



Fig. 37: NG Universiteitsoord



Fig. 35: Entrance from South Street



Fig. 38: TUKS Sport Centre



Fig. 39: Afrikaans Hoer Meisies Skool



Fig. 40: NG Hartbeesspruit



Fig. 41: High Performance Centre



Fig. 42: NG Kerk Pretoria-Oos



Fig. 43: Securicor Loftus



Fig. 44: Hillcrest Municipal Swimming Pool



Fig. 45: High Performance Centre



Fig. 46: LC de Villiers Sport Complex



Fig. 47: Afrikaans Hoer Seunsskool



Fig. 48: German Church



Fig. 49: Brooklyn Police Station



Fig. 50: Pretoria Urology

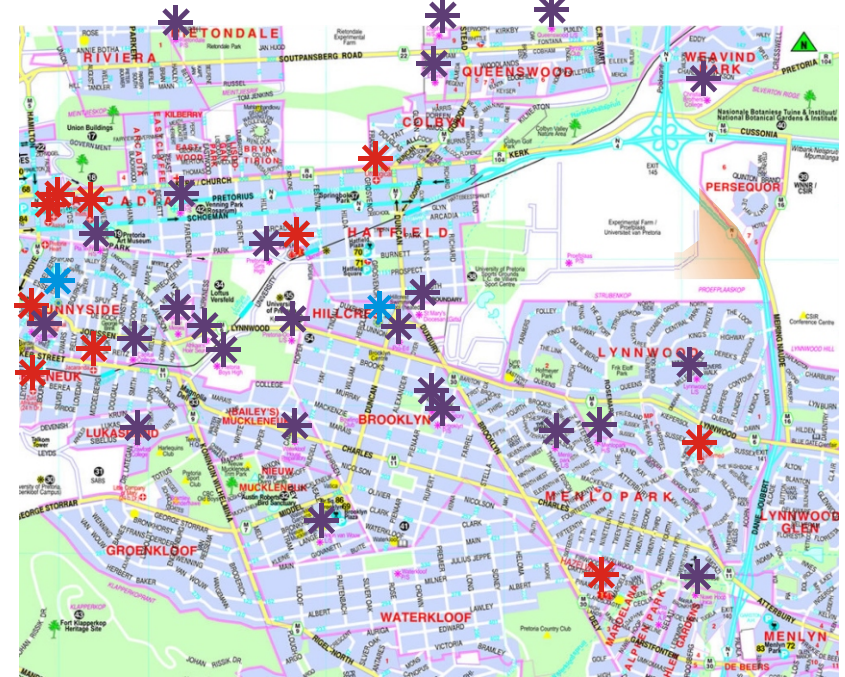


Fig. 51: Pretoria Map [Tshwane Visitor's Guide. 2002-2003.p. 33]

- * Hospitals & Clinics
- * Schools & Learning
- * Police

Economic Environment:

The economic base of this area relates to commercial and educational activities that provide both a high degree of white-collar employment and high levels of personal income. The commercial activities are primarily associated with the Menlyn area, Brooklyn Mall and Hatfield business area, each providing unique retail and office facilities.

The educational and research activities are mostly associated with the University of Pretoria, several schools, and to a certain degree, the CSIR. This area is not characterised by industrial or manufacturing activities and also not by extensive agricultural activities. Limited light service industries related to the motor trade are, however, present in the area. The only agricultural activities conducted within this area are that of the University of Pretoria, which are aimed at furthering agricultural research and education and not based on profitable farming activities.

[**STRATEGIC ENVIRONMENTAL FOCUS.** 2001. *The Construction of the Innovation Hub and Associated Infrastructure on the remainder of the farm Koedoespoort 456 JR, Pretoria.* Scoping Report. SEF p.12]



Fig. 52: Hatfield Business District - Burnett Street



Fig. 53: Menlyn Mall



Fig. 54: North Gate - CSIR



Fig. 55: CSIR Conference Centre



Fig. 57: Persequor Technopark



Fig. 56: Brooklyn Mall



2 REKORD OOS VRYDAG 10 JANUARIE 2003

Ontwikkeling raak paaië

Hettien Strauss

Die beoogde ontwikkeling van 'n hoë tegnologie park op die proefplaas van die Universiteit van Pretoria (UP) kan moontlik ook die natuurwêreld rondom die proefplaas, 'n bekende landmerk in Pretoria, betreek.

Volgens inligting wat voor 'n reghank van die Gautengse Ontwikkelingsburoal gegee het, beplan die universiteit 'n ontwerp vir die N1-deurpad wat teen 'n beraamde koste van meer as R10 miljoen arbuu aan saan word.

der inheerpark, Pretoria-park, geleë. Dit park se grond het ook voer aan die universiteit behoort.

Die oppervlakte van die geboue wat die UP wil bou op die deel wat nou in die aansoek voor die reghank is, is so groot soos sehoendert medium-groter huise.

Die ontwikkelingsfasilitering maak voorsiening dat inwoners beswaar kan aanteken teen aansoek soortgelyk aan dié van die UP. In dié geval is inwoners glo nie volledig ingelig nie en kan hulle nie die nodige beswaar maak nie.



'n Oorbrug word by die Pietersburg-Witbank-afrit oor die N1-deurpad deur die Universiteit van Pretoria (UP) beplan. Dit sal volgens inligtingstukkies teen 'n beraamde koste van meer as R10 miljoen, gebou word. 'n Af-en oprit word verder ook vir die suidelike baan van die N1 beplan.

Spil sal proefplaas nie vernietig nie, sê UP

Alet Rademeyer

Pretorianers se vrees dat 'n deel van die proefplaas van die Universiteit van Pretoria (UP) se natuur- en kultuurlandgoed vernietig sal word, is ongrondwettig, sê die universiteit se direkteur van natuurwêreld, Alet Rademeyer.

Prof. Niek Grové, registrateur van die UP, het gesê sowat die helfte van die 60 ha van die proefplaas wat vir natuurwêreld bestem is, sal as 'n natuurgebied behou word.

Dit sluit Strubenkop in waaroor sommige inwoners bekommerd was.

Inwoners het vandeeweek hul vrees uitgespreek dat hulle "in die toekoms oor 'n kloep fabriek op die proefplaas" sal moet uitkyk as die innovasie-spil werklikheid

word. Die spil is 'n projek van die UP, die WNNR en Gautengse regering waarin sowat R285 miljoen gepomp word.

Die UP het gister die versekeringspolis wat inwoners se besware teen 'n ag geneem is.

'n Deursigtige proses oor sowat twee jaar is gevelg.

Mnr. Sakkie Burger, voorsitter van die Strubenkop-inwonersvereniging, het gesê die inwoners is tevrede met die ooreenkomste tussen die betrokke partye.

Dit behels onder meer dat die geboue in die voorgestelde park 'n sekere hoogte sal wees en dat die omgewing beskerm sal word.

Daar sal ook voldoende veiligheidsmateriaal vir die inwoners wees, het hy gesê.

Die inwoners is dankbaar oor die "groen strook" wat behoue sal bly om die omgewing te bewaar. ■ arademey@beeld.com

GAUTENG-NUUS 3

Tuks kry 'ja' vir sy plan met proefplaas

Universiteit sê aansoek geld net 60 ha vir innovasiespil

HETER MALAN ohanesburg

Die Universiteit van Pretoria se aansoek om die hersenering van die rond waarop Gauteng se eie "silikonvallei" gebou gaan word, is die afgelope week goedgekeur.

Die sogenaamde innovasiespil, wat op 'n gedeelte van die universiteit se proefplaas aangrensend aan die WNNR en die N1 beplan word, is een van elf sogenaamde Blue IQ-projekte wat deur die Gautengse provinsiale regering begin is om ekonomiese ontwikkeling in die provinsie na te spoor.

Prof. Niek Grové, Tukkie se registrateur, het die afgelope week gesê die universiteit het die aansoek om hersenering goedgekeur, maar benadruk dat die universiteit se herseneringsaansoek net 60 ha van die proefplaas geld waarop die innovasiespil beoog word.

Hy sê ongelukkigheid oor die universiteit se beweerde onduidelikheid in Rapport 12, is gegrond op die misvatting dat die universiteit probeer het om die hele proefplaas van meer as 350 ha te hersener van plaasgrond tot dorpsgebied.

"Dit is beslis nie die geval nie. Ons het wel probeer om 'n beperkte verskeidenheid van die grond opgehef te kry. Die stadsraad het egter dié aansoek sterk teengestaan en ons het ons aansoek teruggetrek om die transportakte verander te kry."

Die transportakte hou verband met 'n voorwaarde wat tagtig jaar gelede deur die stadsraad van Pretoria gestel is toe die raad geld aan die universiteit geskenk het vir die aan-

koop van die plaas Koedoespoort. Die transportakte bepaal dat die grond uitsluitlik deur die universiteit se fakulteit landbou gebruik mag word vir "die bevordering van landboukundige opvoeding en navorsing".

Grové sê hulle wou hierdie voorwaarde opgehef kry omdat dit 'n bykomende finansiële las op die universiteit plaas, wat elke keer as hulle 'n deel van die grond wil ontwikkel of iets daarmee wil doen, moet hulle eers die stadsraad se instemming vir 'n verandering in die transportakte kry.

Die universiteitsowerheid meen die herseneringsproses verskaf in elk geval genoeg beskerming aan hul bure en dat dit onmoontlik sou wees om die grond ongemerk en in weerwil van die openbare mening te ontwikkel of te hersener — selfs al word die transportakte geskrap.

Uit dokumente in Rapport se besit blyk dit egter dat die universiteit nie inwoners van die gebied ingelig het oor sy voorneme om die transportakte te verander nie. In brieuwe wat in Januarie 2001 aan inwoners van Hatfield en Strubenkop gestuur is, het stadsplannekers wat die aansoek om hersenering namens die universiteit gehanteer het, net melding van sy voorneme om die grond uitgewys vir die innovasiespil te hersener.

Grové sê hulle het gemeen dit is 'n saak "tussen die universiteit en die stadsraad" en dat die universiteit se bure nie deur 'n wysiging in die transportakte geraak sou word nie. Hy het toegevoeg dat inwoners die transportakte sou kan beskous as 'n ekstra versekering teen die ontwikkeling van 'n belangrike groen gebied in hulle omgewing. Hy het egter verskerk dat die universiteit "hoegenaamd" geen ontwikkelingsplanne vir die proefplaas het nie.

6..

Pretoria-Beeld

Tegnologiepark goedgekeur

Planne om UP se proefplaas te ontwikkel kan voortgaan

Alet Rademeyer

Die Gautengse ontwikkelingsburoal het die aansoek van die Universiteit van Pretoria (UP) goedgekeur om 'n deel van die proefplaas as 'n wetenskapstechnologiepark te ontwikkel.

Dr. Neville Comins, uitvoerende hoof van die maatskappij The Innovation Hub wat aan die stuur van die ontwikkeling staan, het die besluit verwelkom. Die eerste uitdaging is die ontwikkeling van die infrastruktuur.

"Ons kan ook voortgaan met onderhandelings met buurders". Hy het gesê die innovasiespil sal help om talent in Suid-Afrika te hou deur die omgewing te versoen waarin vierdige mense sakondersaemings kan opbou.

Dit is 'n belangrike moment in die ontwikkeling van Gauteng as 'n uitstaande provinsie op Tshwane as die intellektuele hoofstad van die land.

Prof. Callye Pistorius, rektor van UP, het gesê die plaaslike gemeenskap en hulle land gaan by die ontwikkeling baat vind.

Op die proefplekure terrein van 60 ha, kan 31 nuwe ontwikkelingsprojekte met 'n totale vloeroppervlakte van 121 000 m² wat verhuur kan word.

Die gebied maak voorsiening vir 'n groenstrook en die beskerming van 'n koppie. Die terrein sal volgens 'n omgewingsbestuursplan bestuur word. Die ontwikkeling is 'n samewerking met die Tshwane-metro-raad gemaak.

Mnr. Wonder Nkomo, uitvoerende hoof van die raad se geteignesreerde ontwikkelingsplan en sal ekonomiese ontwikkeling bevorder.

Die ontwikkeling van die innovasiespil is een van 11 Blue IQ-projekte van die Gautengse regering in samewerking met die WNNR en die UP.

Mnr. Pradeep Maharaj, uitvoerende hoof van Blue IQ, meen die spil is ideaal om te help om buitelandse navorsers en ontwikkelingsmaatskappye te lok. Die planne om die proefplaas te ontwikkel is deur 'n rekrutering van inwoners in die oost van Pretoria betref. Prof. Thina de Wet, bestaande van die reghank antwoord nie omdat hulle se voorneme nie daaraan lyk.

RADEMEYER, A. 2003. *Tegnologiepark Goedgekeur*. Pretoria-Beeld, 21 Januarie, p. 6

Inwoners 'mislei'

Proefplaas verander

Hettien Strauss

Die beplande nuwe ontwikkeling van die Innovation Hub, 'n hoëtegnologiepark, op die proefplaas van die Universiteit van Pretoria (UP), kan glo binnekort in 'n koopakt omtand.

Die maatskappij se glo nie uitgesluit dat sake in die hoëtegnologiepark kan draai nie. Inwoners in die oost van Pretoria meen die ontwikkelde prentje waarop hulle volgens die Wet op die Bevordering van Inligting, Wet 2 van 2002, aandrif, is nooit aan hulle deungee nie.

Volgens inligtingstukkies uit skriftelike getuienis voor 'n reghank van die Gautengse Ontwikkelingsburoal vra die UP om fabriek op dié proefplaas, aangrensend aan Hatfield, Lintwood, Menkap, Brunneria en Isidiana, te bedryf.

Dit behels ook die verkoop van drank en die bedryf van winkels.

Die Innovation Hub is 'n onderneming wat hoëtegnologie ontwikkel. Dit word tans as 'n kantoor van die Wêreldkapiteel Navorsings- en Nywerheidsraad

(WNNR) bestuur. Volgens die huidige getuiskerpte kan die grond slegs vir opvoeding en navorsing in die landbou gebruik word.

Die universiteit domein eger aansoek om 'n deel van die proefplaas vir die innovasiespil te gebruik.

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Die universiteit domein eger aansoek om 'n deel van die proefplaas vir die innovasiespil te gebruik.

word nou eger lid verweg. Dit is uitdagingstukkies wat die reghank sal hulle hier 'n tegnologiepark vir innovasiespil te gebruik.

Die ligging van die spil, tussen die WNNR en die Tshwane-kampus, is kortliks vir die reghank.

Die geboue van die universiteit se proefplaas, wat aan die N1 grens, is tagtig jaar gelede gekoop met geld wat deur die stadsraad gegee is op voorwaarde dat die grond vir 'n proefplaas gebruik word.

Die stadsraad het intussen die voorwaarde verander en die universiteit, as eienaar van die grond, het aansoek gedoen om die hersenering van die deel wat vir die innovasiespil bestem is.

Prof. Thina de Wet, dosent in herenging en kommunikasiebestuur aan die UP en voorsitter van 'n groep wat behels Move the Hub (Moth) noem, sê

die universiteit het inwoners in die gebied aandag gegee op die hersenering van landbou gebruik.

Die universiteit se glo nie uitgesluit dat sake in die hoëtegnologiepark kan draai nie. Inwoners in die oost van Pretoria meen die ontwikkelde prentje waarop hulle volgens die Wet op die Bevordering van Inligting, Wet 2 van 2002, aandrif, is nooit aan hulle deungee nie.

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Dit behels ook die verkoop van drank en die bedryf van winkels.

Hersonering by Tuks in visier

Pieter Malan

Planne om 'n "silikonvallei" van gevorderde tegnologie maatskappye in Pretoria te ontwikkel, is deur die WNNR en die Tshwane-kampus, is kortliks vir die reghank.

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RAPPORT, 12 JANUARIE 2003

MALAN, P. 2003. *Hersonering by Tuks in Visier*. Rapport 12 Januarie, p. 4

STRAUSS, H. 2003. *Inwoners "Mislei"*. Rekord Oos, 3 Januarie p. 3

MALAN, P. 2003. *Tuks kry 'ja' vir sy plan met Proefplaas*. Rapport 28 Januarie, p. 3

PRECEDENT - IMMOS MICROPROCESSOR FACTORY

University of Pretoria - Bergh, F. S., 2003

Immos Microprocessor Factory

Location: Newport, South Wales
Architects: Richard Rogers Partnership

The programme for this project included office and ancillary space as well as facilities for microchip wafer production. Because of the technology involved and the sensitivity of the wafers to dust, an exceptionally high quality of environmental control was required. Air in the production area had to be absolutely clean to cut down the failure rate of wafer production. Additional requirements were added to the programme by the architects, these included that the design be able to respond to changes as it evolved during construction; that the building be both a high performance precision production machine and a friendly and stimulating environment for employees; and that the design allow for maximum potential growth and change in order to meet the needs of a new and fast-evolving industry. [DAVIES, 1988]

The building design evolved as a steel structure conceived as a kit of prefabricated parts to allow the building to be rapidly erected. The basic concept of phase one is a central circulation and service spine with internal wings for specialized activities. The spine is 7,2m wide and 106m long and acts as an internal street or informal promenade. Enough width is allowed to contain vending machines, public telephones, seating, meeting places, planted areas, and waiting areas for the offices. This system allows for passive surveillance

Service ducts are taken across the roof to the point of use, while the main air supply equipment is grouped in localized modules to minimize these ducts. Production wastes are collected in floor trenches and production supply services are distributed on service walls within the production zone.

The building can be extended along the spine where extra modules can be added on. The steel superstructure creates column-free interiors, which allow for maximum flexibility. The external walls are based on a system of standardized mullions that accept any type of infill. This allows the client to alter wall finishes and wall performances as wished.

The building has a sleek, industrial feel to it, and addresses the programme in an exciting and practical way. Even though the initial construction cost may be high, the long term running cost of the building will be much less comparatively to the same type of building designed on different principles.'



Fig. 59: Elevation of the Immos Microprocessor Factory [Davies,C. 1988.p. 29]

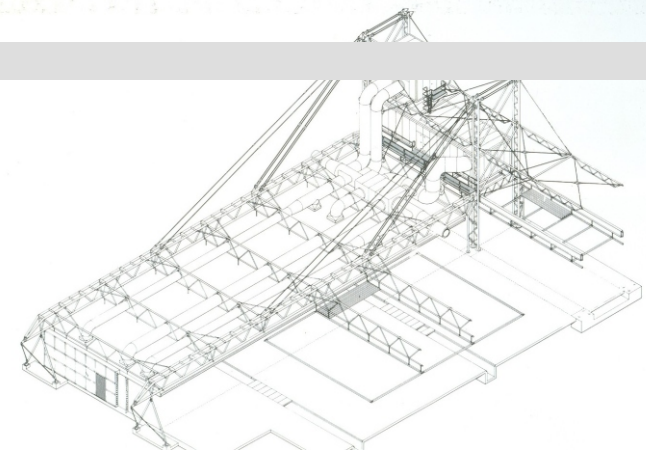


Fig. 58: The Roof Structure [Davies, C. 1988.p. 30]

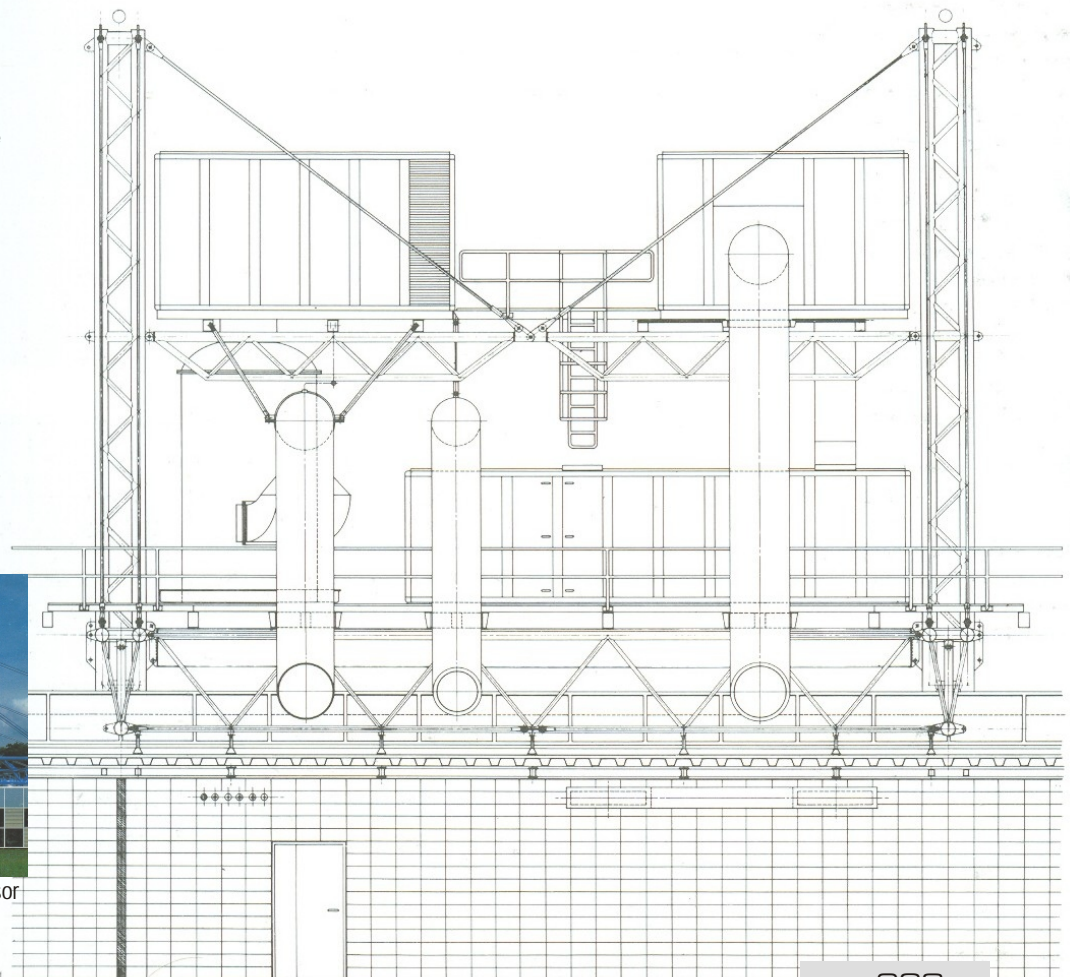


Fig. 60: Elevation Drawing of the Immos Microprocessor Factory [Davies, C. 1988.p. 27]

PRECEDENT - MEDIATHEQUE AT ALLIANCE FRANCAISE

Mediatheque at Alliance Francaise

University of Pretoria - Bergh, F. S., 2003

Architects: Architects Partnership
Location: Harare, Zimbabwe

This small facility was built to provide book, periodical and video libraries and Internet based research facilities for the French Cultural Organization. A decision was made by the organization to construct further accommodation on a site they had purchased, which at the time housed an original rendered and painted double storey house dating from the 1930's, and a lecture theatre and restaurant complex. The latter addition made no attempt to reconcile the new with the existing building, either physically or aesthetically.

Town-planning implications inhibited additional site coverage, and the dilapidated state of an existing single storey lean-to structure behind the double storey building, suggested the possibility of an alteration that could possibly meet the client's twin goals of providing additional accommodation and improving the relationship between the existing structures.

The forms and materials chosen in the addition, which was designed to act as a "hinge" between the two structures, creates a visual link and an accent, visible from the street, which clearly identifies the entrance to the Mediatheque.

Small, emergent contractors carried out the concrete-work, screeds and plastering on a labour only basis. The "hand made" qualities of both building renovations and the new addition, would be beyond the budget of all but the most expensive projects in the "developed" world where most buildings are based around mass produced, standardised materials and components. Yet, both these renovations and the construction of the new structure were achieved on very low budgets, and were also able to create employment opportunities outside the confines of the established construction industry.

The use of local materials and labour, gives prominence to this project as an example of what can be achieved in the African context, by innovative ideas and implementation.

DE BEER, P. 2000. *Out of Africa: New work in Zimbabwe.* S.A. Architect. P. 22-29.

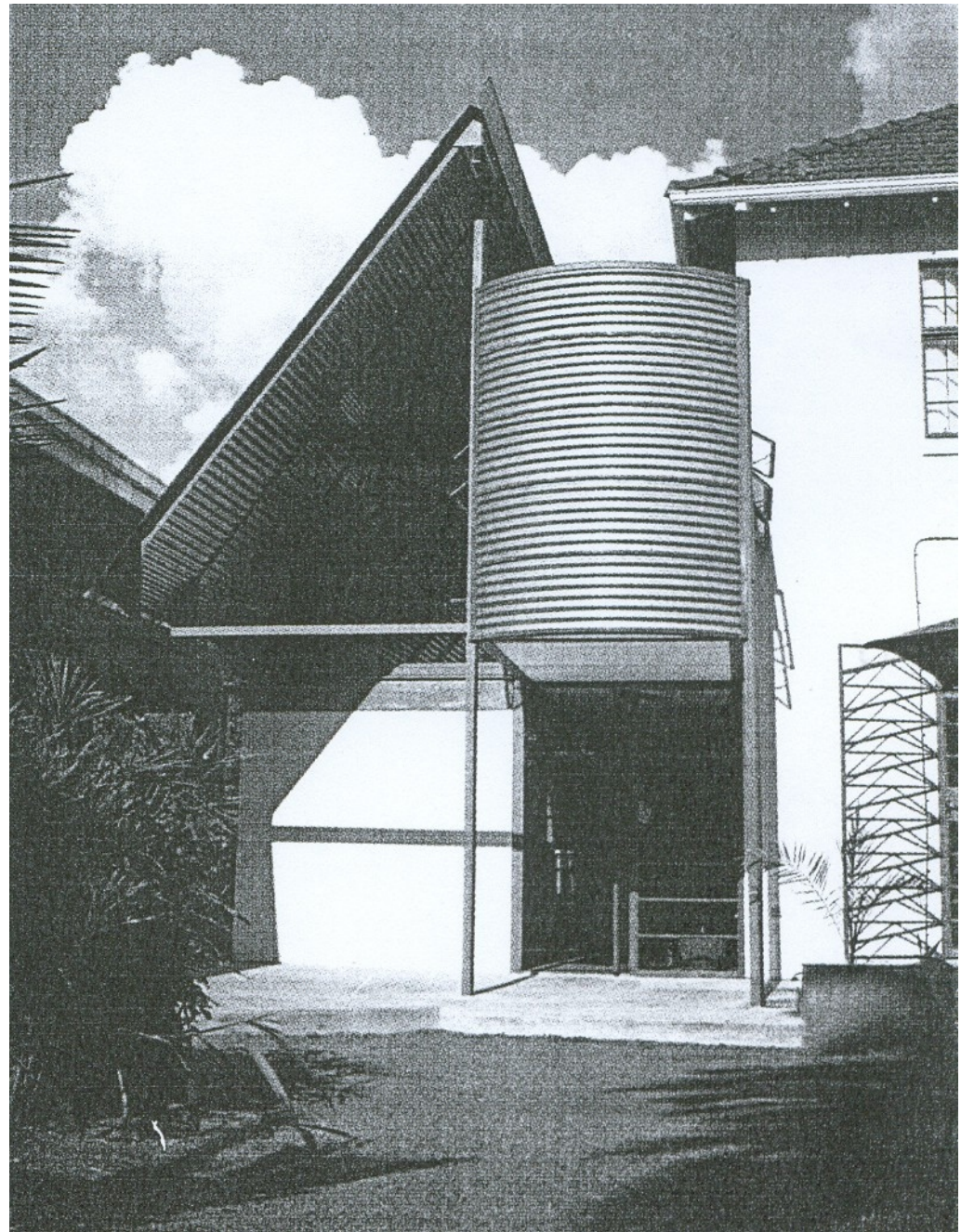


Fig. 61: Exterior View [DE BEER. 2000.p. 27]



Fig. 62: Interior View [DE BEER. 2000.p. 29]

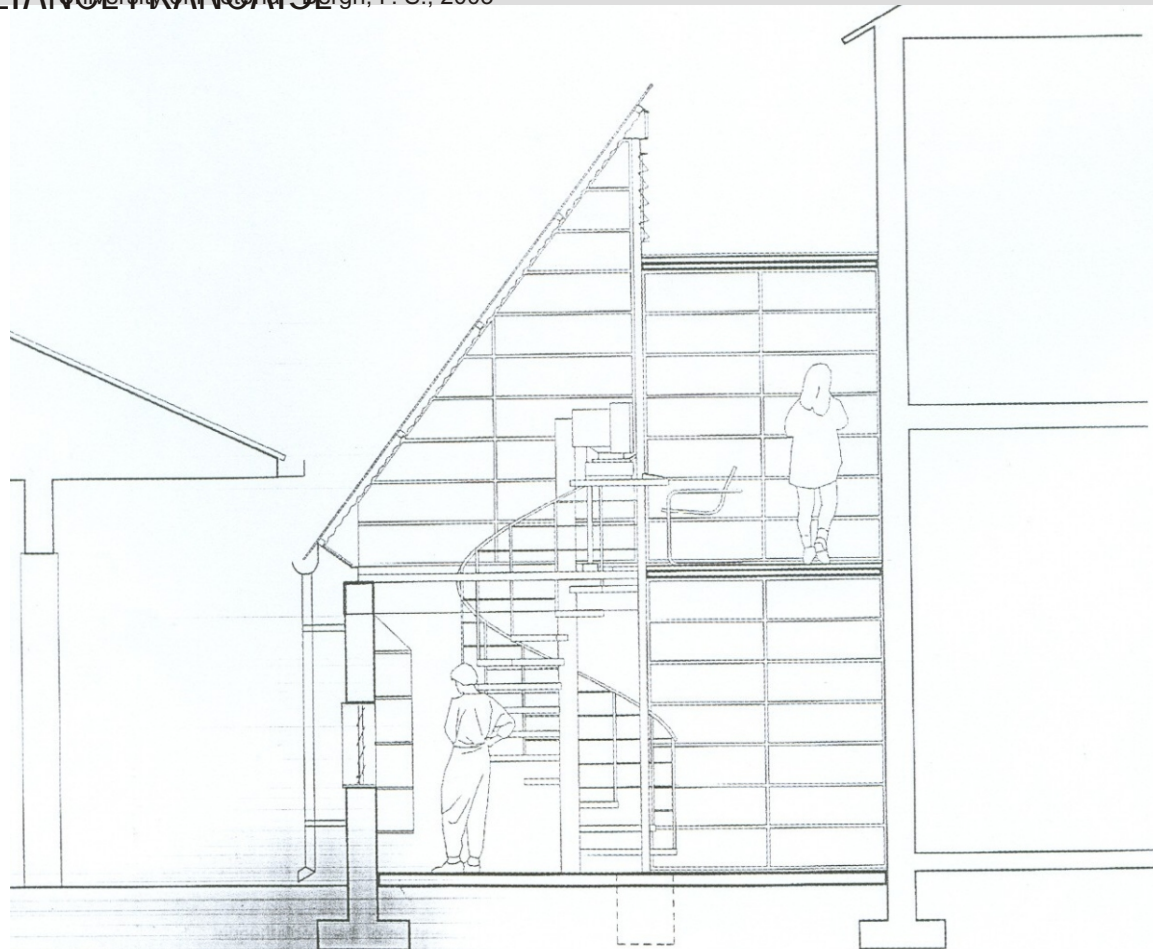


Fig. 63: Section [DE BEER. 2000.p. 28]

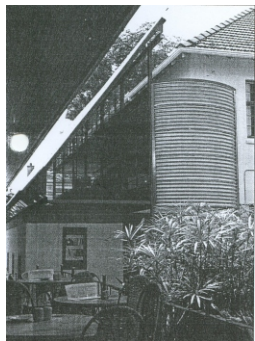


Fig. 64: Perspectives [DE BEER. 2000.p. 27]

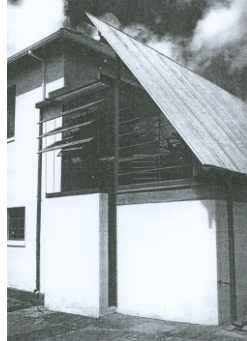


Fig. 65: Louvres [DE BEER. 2000.p. 29]



Fig. 66: Natural lighting [DE BEER. 2000.p. 29]



Fig. 67: Local Materials [DE BEER. 2000.p. 28]

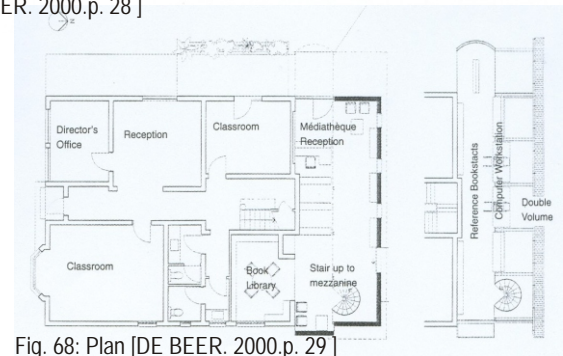


Fig. 68: Plan [DE BEER. 2000.p. 29]

PRECEDENT - SALTWATER PAVILION University of Pretoria - Bergh, F. S., 2003

Salt water/h2o pavilion
 architects: Oosterhuis associates & NOX
 location: Neeltje Jans, the Netherlands

The Salt Water/h2o pavilion is constructed on a man made island called Neeltje Jans in the Netherlands as part of a sustainability and technology expo. The building consists of two parts:

the Salt Water pavilion, by Oosterhuis Associates Architects

The Freshwater pavilion, by NOX architects

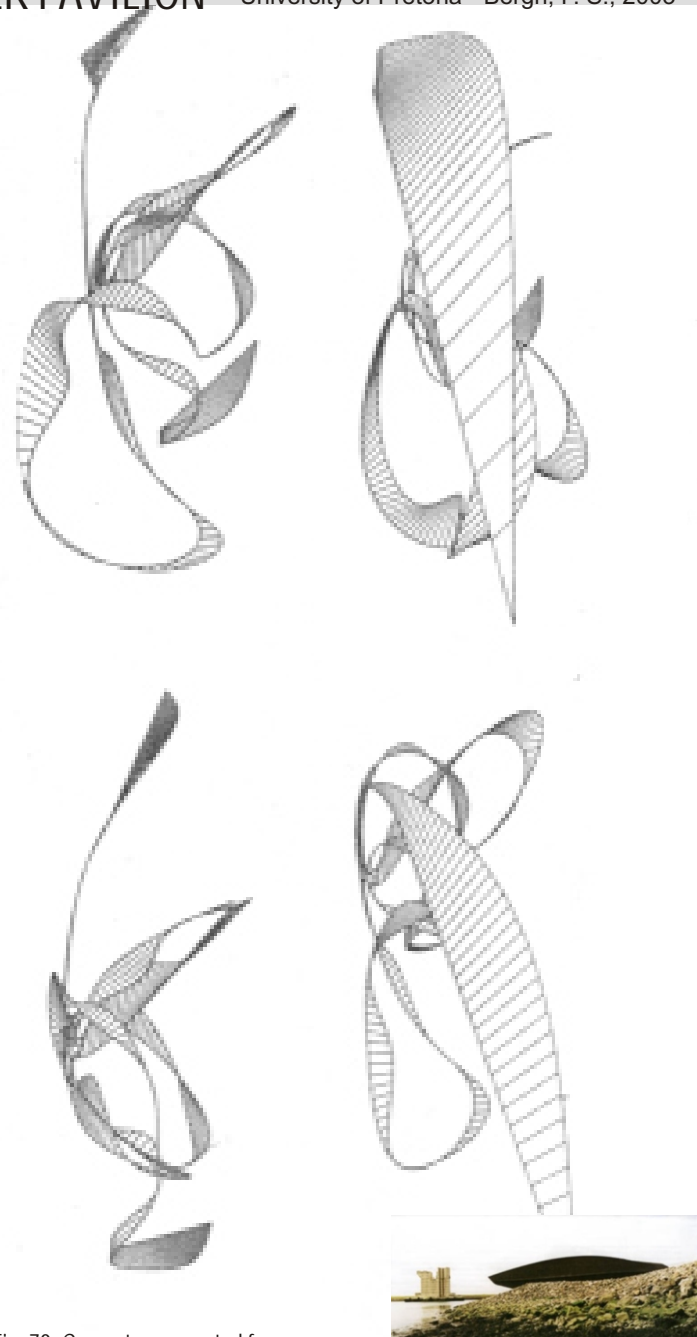


Fig. 70: Computer generated forms [www.greatbuildings.com]



Fig. 71: Elevation

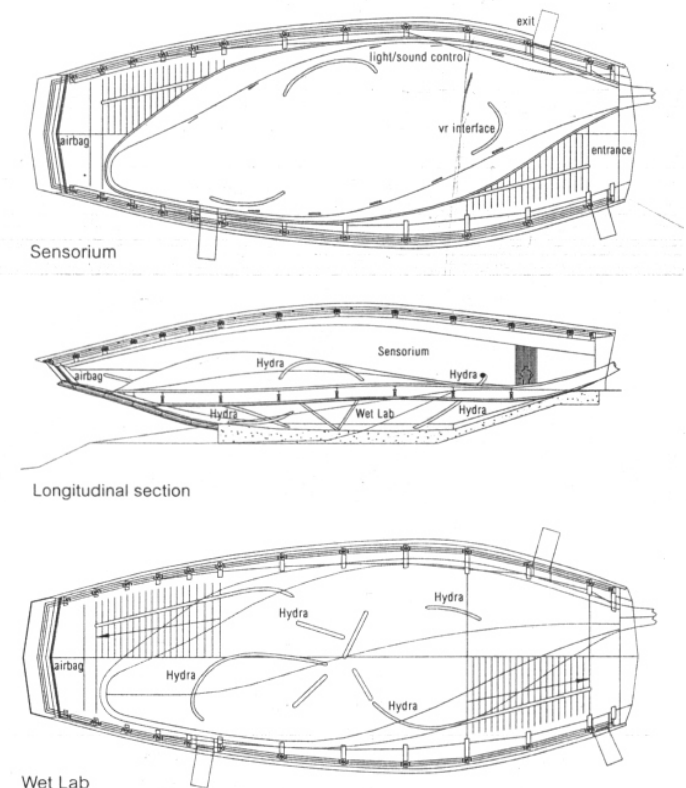


Fig. 69 : Plans and Sections



Fig. 72: The Saltwater pavilion Aerial View

The Freshwater Pavilion

The freshwater pavilion (FWP) is a silver, worm like form that extends from the back end of the Salt Water pavilion (SWP) and consists of a computer generated steel frame with titanium cladding on the exterior and a polycarbonate skin on the interior. The floor is designed to flow with the undulating form of the space while the whole space is also filled with changing projections, coloured lights and sounds.

The Behavioral System

Both pavilions were designed as virtual realities, with their own space, climate, sights and sounds. Interaction takes place between the controlling systems, the exterior and the interior while a small weather station in the SWP converts outside weather reports into computable information and changes the projections, colors and sounds on the inside. This system also controls the airbag that opens and closes the opening in the SWP (deflating with high tide to let natural light into the space).

At the same time, interaction takes place between the visitor and patrons can also change the system, lights and sounds by using a sensor board and a virtual reality (VR) interface. The VR projections also react to these internal and external inputs, and are controlled by two silicon graphics, os2 computers.

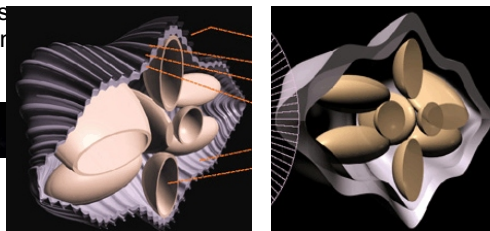
A lighting computer, the Avolite Rolacue Pearl, controls the intensity and length of the colour-changing spotlights whilst the only available program that is capable of real-time sound synthesis SuperCollider, controls the sound effects.



Fig. 73: The Freshwater Pavilion



Fig. 74: Computer Generated Forms



[www.GreatBuildings.com]

Conclusion

These two pavilions are perfect examples of highly immersive and technologically advanced environments that can be created by using form, space, sound, sight and touch.

It is a "virtual" world created within these two spaces, while still reacting to external conditions. Thus, it is not a total disconnection from reality but rather a virtual reality providing a new, fascinating perspective on our perception of reality.

Sunshine Coast University Library

Architect: Lawrence Nield and Partners in association with John Mainwaring and Associates
Location: Queensland, Australia

Glen Murcutt's tin houses have shown how the vernacular architecture of the nineteenth century can be a source of inspiration for contemporary Australian buildings of the highest quality. Notwithstanding his understanding of climatic conditions and ecological issues. Lawrence Nield's library for the Sunshine Coast University shows how some of Murcutt's ideas can be developed and extrapolated to make superior public buildings.

In this project, the Australian climate is accounted for and the emphasis is placed on interaction and the spaces involved, rather than the creation of a sterile learning environment. Murcutt's use of galvanized steel sheeting echoes in the design, especially in its application on the veranda structure. The pitch of the roof is also an indication that a pertinent amount of thought and planning went into the climatic considerations.

The entrance is defined by means of a prominent staircase, where the extremities of climate and glare on the veranda, are modulated by a series of overlapping sunscreens. Accommodation includes reference collection and reading areas, catalogue search spaces and organizational functions.

The application of Brise Soleil is admirable in this project, and the incorporation of passive design principles even more so. The product is a vibrant, interesting building, which creates a unique sense of place.

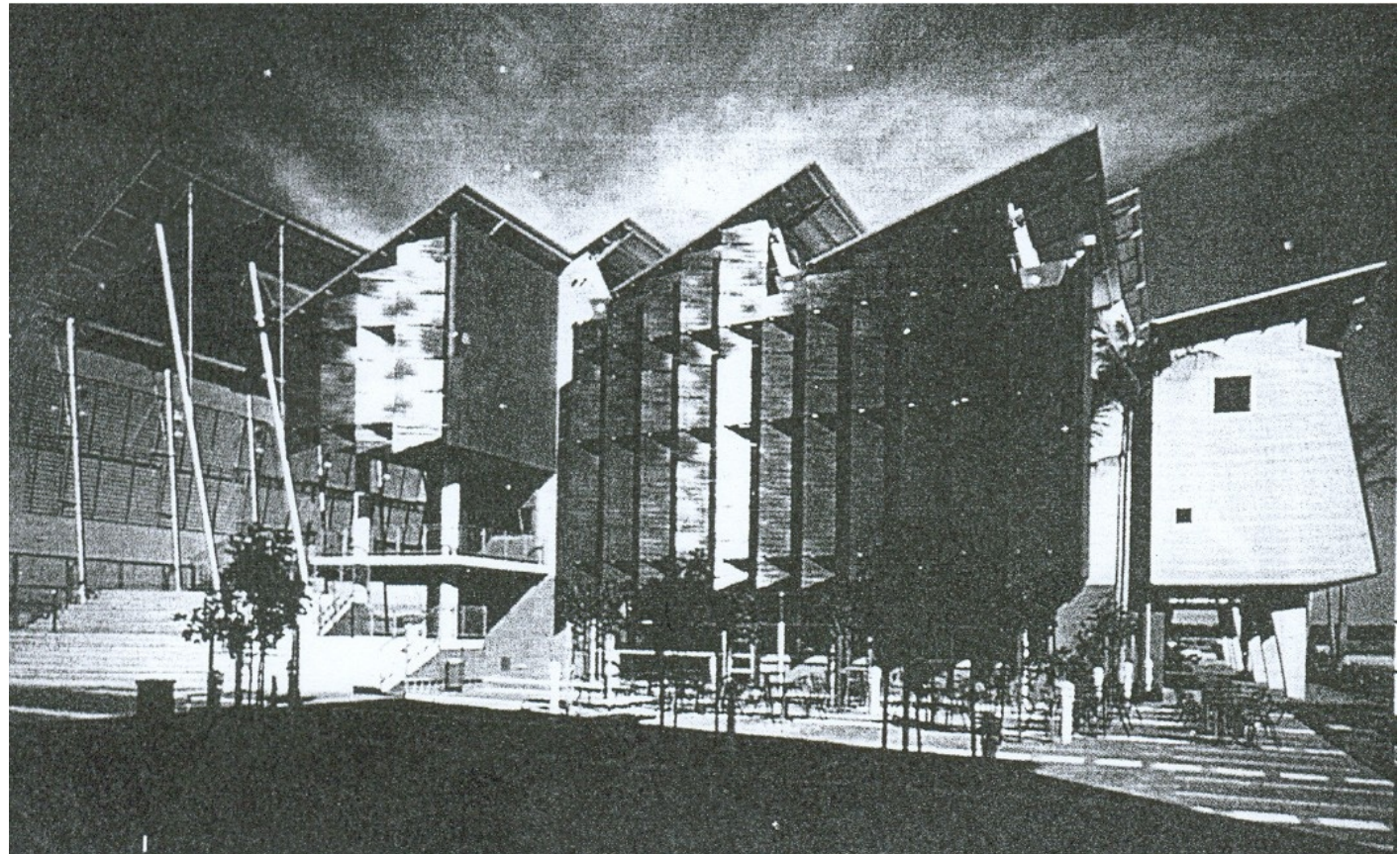


Fig. 75: The Sunshine Coast University Library [McINSTRY, M. 1999.p.62]

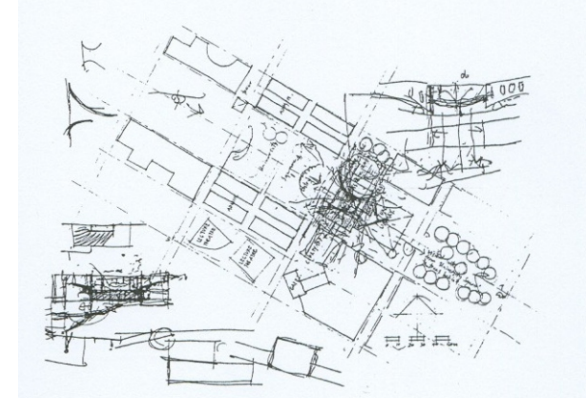


Fig. 76: Conceptual Development [McINSTRY, M. 1999.p.67]

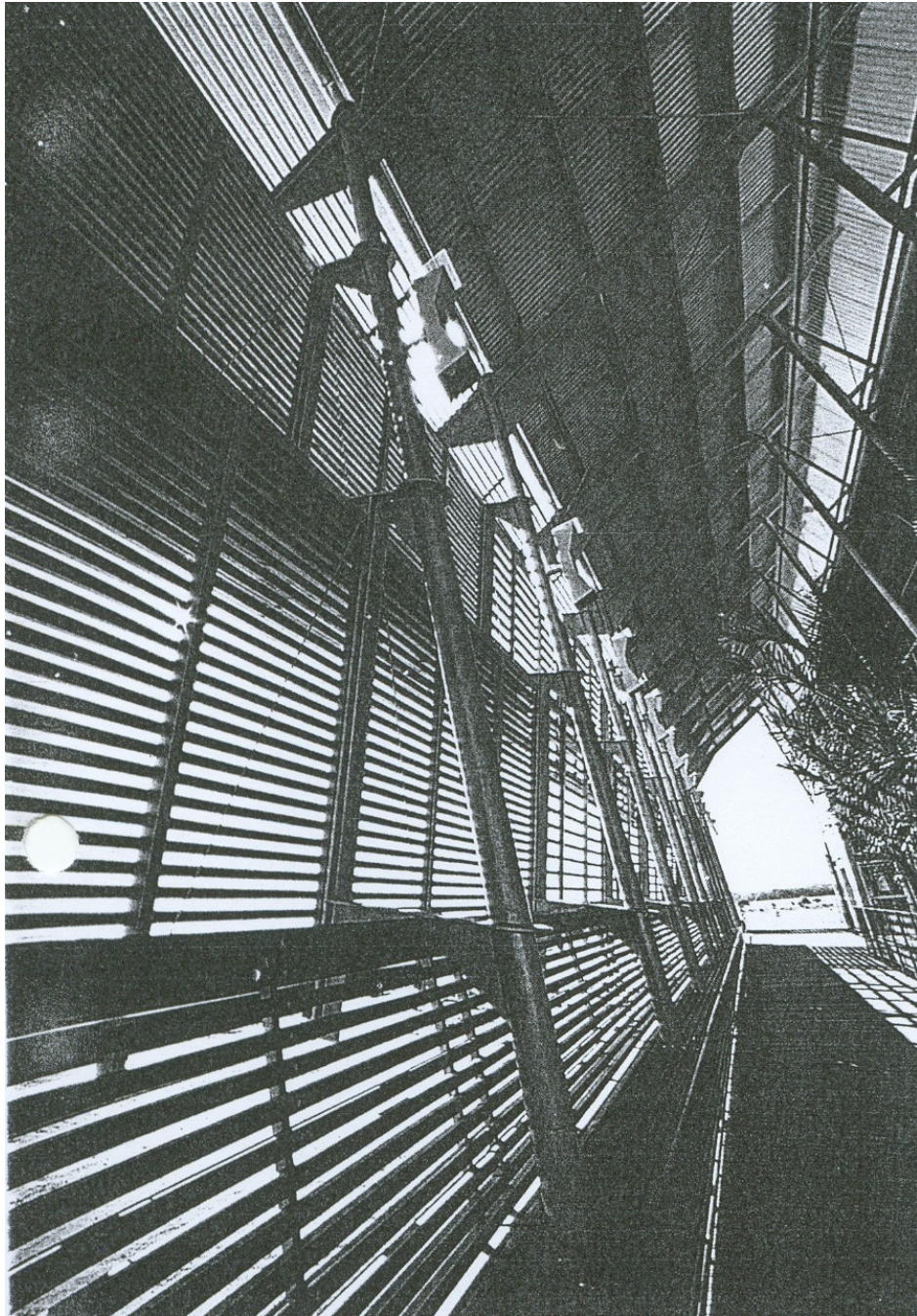
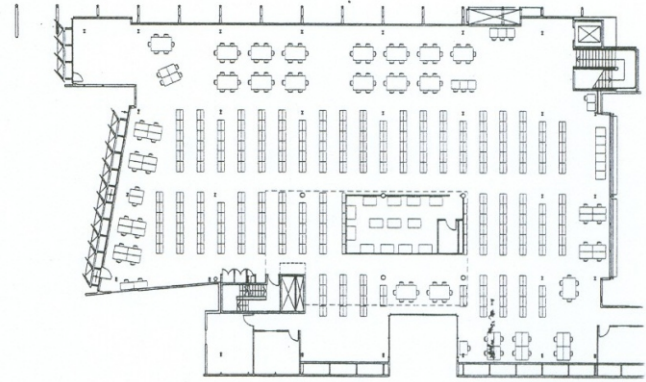
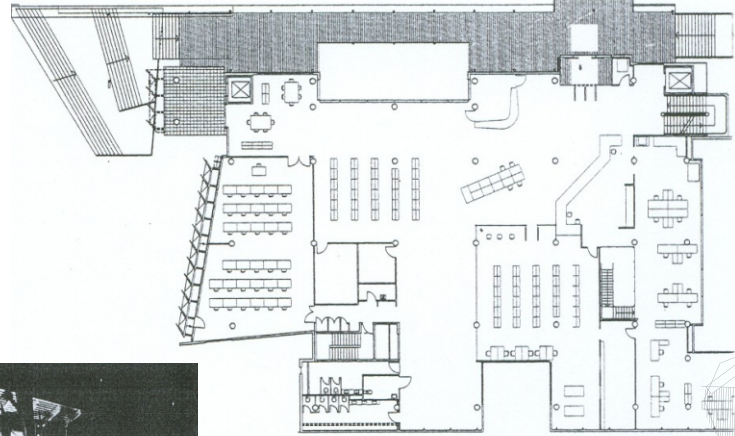


Fig. 79: Perspective
[McINSTRY, M. 1999.p.65]



second (reading and stack) floor

Fig. 77: Second Floor Plan [McINSTRY, M. 1999.p.66]



first (entrance) floor. Scale approx 1:650

Fig. 78: First Floor Plan [McINSTRY, M. 1999.p.66]

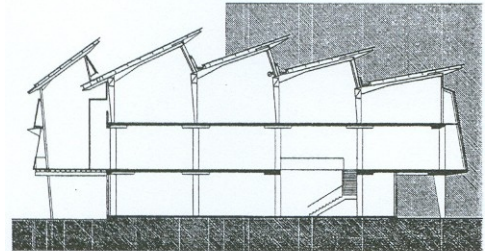


Fig. 80: Cross Section [McINSTRY, M. 1999.p.66]
cross section showing monitors

User Profile:

Because of the emphasis on interaction at the innovation hub development, a number of users will be present in the Naledi 3D Virtual Reality Factory. With the user in mind, a thorough schedule of accommodation would arise.

Technical Staff:

These include virtual reality experts and designers. IT personnel to ensure that the software and hardware of the equipment is in mint working condition to ensure smooth operations.

Managerial:

The company's Chief Executive Officer (CEO) and his higher ranked colleagues will be housed in the factory. Division heads and their staff, which includes the technical personnel would be housed in open plan offices, a space which requires freedom of interaction and "cross fertilization" of expertise between the designers, IT personnel and students.

Training:

The CSIR together with the University of Pretoria is renowned for their advances in the field of research, and as a proposal, Post Graduate students will be able to further their studies at the Factory by means of Practical experience. The main goal of this proposal is to ensure that new ideas and innovative people can intertwine producing cutting edge technology and design.

Security:

Security has become an important factor in South African buildings in recent times, and therefore an adequate security system should form part of the development. Issues include passive surveillance, CCTV, access points and card access, and to incorporate the technological aspects, methods such as voice recognition. Security personnel should form part of the user profile and should have access to ablution facilities, tea and coffee rooms as well as control rooms and access control facilities.

Janitorial Staff:

Personnel needed to ensure that the work environment remains immaculate, especially with the emphasis on interaction referring to international patrons who may visit the Factory on business or on an education basis.

Visitors:

The development of a new technology as is the case with the Naledi 3D Factory, will generate interest and therefore it is necessary to allow for visiting groups of people to be able to have guided tours to the facility. Auditoriums would be necessary, which could also be used for business meetings and presentations.

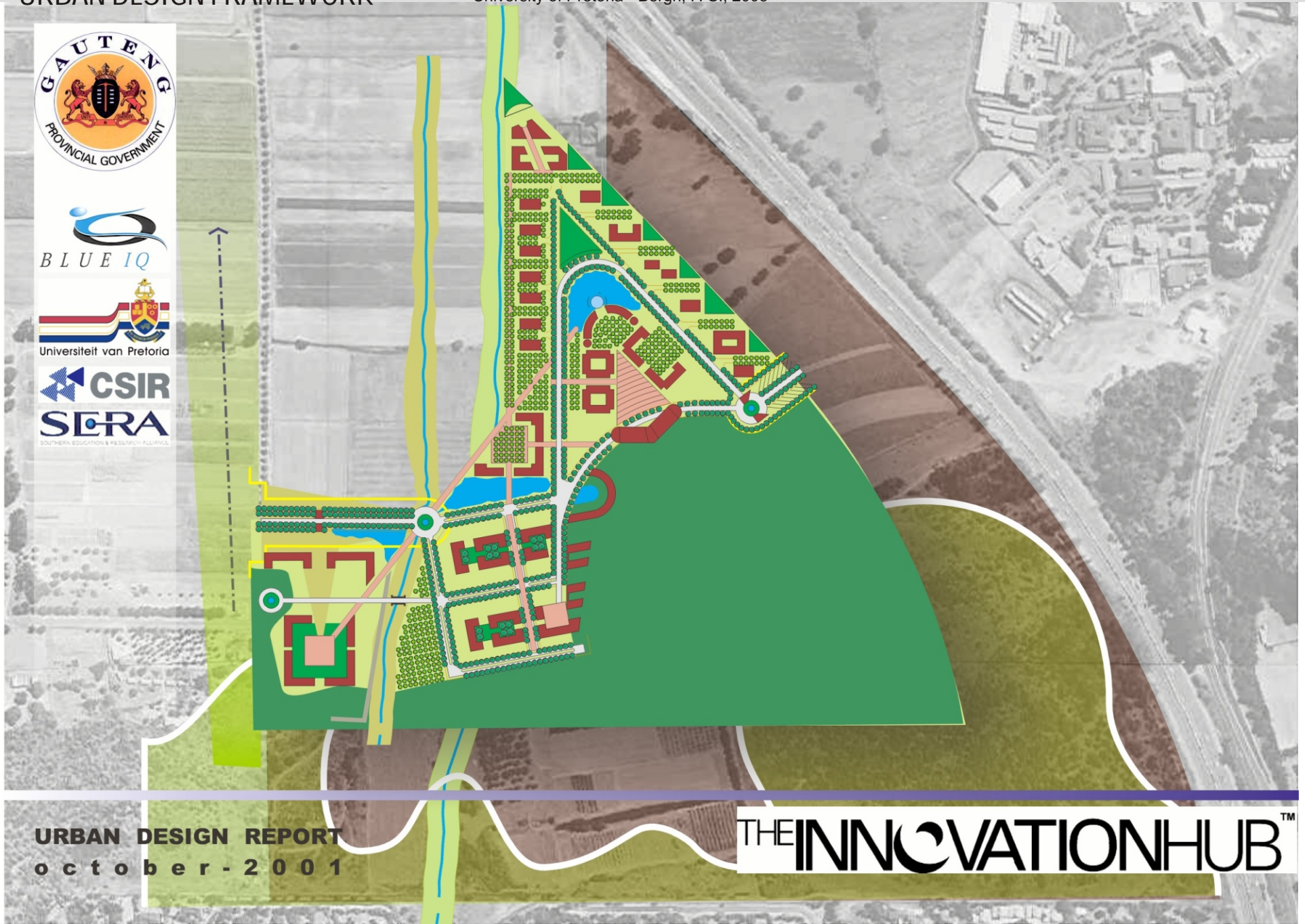
The user profile is rather dynamic and should allow room for change or improvement, with the building concept drawing on the flexibility and adaptability of the building. The user profile could also change with fluctuating industries, expansion of operations and the growth of the Factory.

ACCOMMODATION SCHEDULE

University of Pretoria - Bergh, F. S., 2003

USE	SPACE	SIZE REQUIRED	EQUIPMENT	FURNITURE	ACOUSTICS	ILLUMINATION
Entrance Foyer	Entrance	20m2	Signage	Waiting, Seats	General public space	50-200 lux
	Reception	20m2	Desk, PC, Telephony	Desk, Chairs	Applicable acoustic levels	300 lux
	Double Volume	10m2		Office Furniture		500-3000 lux
Open Office Area	Address Space	5m2	Workstations, Office	Desks, Partitioning	As per Office	500lux
	Outside Areas	20m2	Furniture, Telephony,	PC's, Servers, UPS	Application	500lux
	Circulation	20m2	Electrical, Water,	Armatures, Cabinets		500lux
	Workstations	200m2	Inter/Intranet access			500lux
Toilets/Ablution	Men	80m2	WC's, hwb's, Urinals			200lux
	Women	100m2	WC's, hwb's, Urinals			200lux
	Disabled	20m2	WC's, hwb's			200lux
Circulation	Movement	Pending	Lighting, Armatures	Vegetation		50-200lux
	Circulation		Info Terminals	Meeting, Waiting		50-200lux
				Seating		50-200lux
Auditoriums	Presentation	100 seats	Screening Facilities	Screening Facilities	Check SABS and	300lux
		50 seats	Seating and desks	Seating and desks	relevant references	
			Projection	Projection		
			Audio Equipment	Audio Equipment		
Screening Facilities	Testing Facilities	15 seats	Virtual reality Pods	Seats, Desks	As Auditorium	300lux
		30 seats	Screening facilities	Chalkboard		
			Projection Audio			
Services	Ducting, Ablution etc	30% of Building Area	Fibre Optics, Ducts			
Water Storage	Storage	Pending	Pumps Cooling/ Heating			
Exhibition	Exhibition	3 x 50m 2	Lighting	Movable Partitioning	As general Exhibition	300lux
			Screening	Screens	Space requires	
			Audio			
Lecture Halls/ Conference	Lectures, Meeting Conferencing	4 x 50m 2	As Auditorium	As Auditorium	As Auditorium	300lux
Social Meeting	Cafeteria, Coffee/Tea Rooms	100m2	Kitchen, Washing,	Seating, Tables,	General Meeting	50-200lux
		3 x 50m 2	Cooking, Cisterns	Refrigeration, desks,		
				Cooking facilities		
Outside Areas	Break Areas	Pending 5-10m2		Street Furniture		50-200lux
Shuttle Station	Transportation	50m2	Seating, Shading	Halt, Signage, Street		50-200lux
	Movement		Shuttle	Furniture, Shading		
				Devices		
Holography	Production/Factory	100m2/200m 2	Holography Related	As Office/Workshop	Workshop type	500lux
				Machinery	Noise Insulation	

QUALITY OF FINISHES	SERVICES	PARTICULARS	SABS REFERENCE	USE
Glass, Steel, Tiles	Electricity	Allow adequate light	Parts M, N, O, S, D	Entrance Foyer
Industrial Carpet	Telephony	for circulation and		
Cladding, W all finishes	Inter/Intranet	plant growth		
Industrial Carpets	Electrical, Telephony	Interactive Environ	Parts C, N, O, S, T	Open Office Area
W all Finishes	Inter/Intranet Access		V	
Ceilings, Armatures	Video Conferencing			
	Projection, UPS			
	Servers			
Ceramics, Stainless	Sewer, Electrical	Check SABS for	Parts P, Q, S	Toilets/Ablution
Steel Fittings		number of stalls etc.		
Acoustic Insulation	Electrical	Natural Ventilation	Parts M, N, O, S	Circulation
from Office Space	Ventilation	HVAC System		
Industrial Carpet	UPS, Fire Safety			
Carpet, Insulation	Ventilation	Availability of Public	Parts N, O, S, T, W	Auditoriums
W all Finishes	Electrical	Access		
	UPS			
As specified	Fibre Optics	Differential Life Span	Parts N, O, S, T, W	Screening Facilities
	Fire Protection	Easy Accessibility		
Pending	Piping, Pumps	Passive Cooling/	Parts P, Q, S, T, W	Services
	Heating/Cooling	Heating Possibilities		
	Ducts			
			Parts C, K, R	Water Storage
As Auditorium	Electrical, Ventilation	Natural Light	Parts N, O, S, T, W	Exhibition
As Auditorium	Electrical, Ventilation	Learning Environment	Parts N, O, S, T, W	Lecture Halls/
		Quite Space,		Conference
Vibrant, Functional	Sewer, Water	Accessible space		Social Meeting
	Electrical	Emphasis on	Parts C, D, J, K, L,	
	Refuse removal	Interaction	M, N, O, P, S, T, U,	
			V, W	
		Easy accessibility	Parts M, N, O, R, T,	Outside Areas
		to all users	U, W	
Part of Building Design		Informative/Interactive	Parts R, T, C, D, N, M,	Shuttle Station
		System		
Industrial Type Floors	Electrical	Industrial Type Space	Specialized	Holography
	Water	Technicians/		
	Ablution	Engineers		
	UPS			



URBAN DESIGN REPORT
o c t o b e r - 2 0 0 1

THE INNOVATION HUB™

INTRODUCTION

The Innovation Hub is one of ten mega-projects identified by the Gauteng Provincial Government through their Trade and Economic Strategy (1997) and the only project in the Technology sector (www.theinnovationhub.com).

The site covers some 60 hectares and is located on the east-west axis between the CSIR and University of Pretoria. The area set out for development is approximately 31 hectares, and predominantly to the north and west of the 'koppie'. The remaining portion of the 'koppie', some 30 ha is to be retained as open space.

Details of the useable area will be refined once the EIA and other studies are completed. The environmental Management Plan will define the standards for the maintenance of the park.

The site is currently zoned agricultural, and this Urban Design study is a supporting document to the DFA Application for land use rights.

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G.P. GREEFF & ASSOCIATES
Architects Urban Designers Environmental Planners

ArupStairway

PlanPractice
Townplanners



CSIR

SERA
SOUTHERN EDUCATION & RESEARCH ALLIANCE

THE **INNOVATIONHUB**™

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VIEW ALONG SOUTH STREET TOWARDS THE CSIR



VIEW OF THE SITE FROM THE CSIR ACROSS PERSQUOR PARK



VIEW ALONG THE SOUTHERN BOUNDARY OF THE SITE

THE SITE University of Pretoria - Bergh, F. S., 2003

The site has several important features, namely:

EASTERN BOUNDARY - This boundary is defined by the highway, which results in noise impact on the site.

WESTERN BOUNDARY - Consists of a row of existing poplar trees that visibly defines the area as well as several single storey agricultural research facilities.

NORTHERN BOUNDARY - Forms a sharp point between the highway and the agricultural farm.

SOUTHERN BOUNDARY - Consists of the "koppie" and some agricultural fields (fruit and nuts), while the southwestern corner is currently utilised as a dumping site. Some landfill also occur in this area.

From a development impact point of view, an important consideration would be the visual and functional impact on the adjoining residential area along the entire length of the southern boundary. Mid-way along this boundary is a small stream fed by storm water from the residential areas.

Existing dirt roads, the "koppie" and rows of trees (windbreakers) furthermore delineates the area.



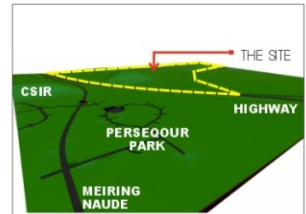
RELATIONSHIP TO UNIVERSITY OF PRETORIA AND THE CSIR



VIEW TO THE NORTH FROM THE RIDGE



AREA BETWEEN THE TWO KOPPIES SHOWING WINDBREAKERS



COMPUTER MODEL OF SITE PRIOR TO DEVELOPMENT - VIEW FROM THE EAST

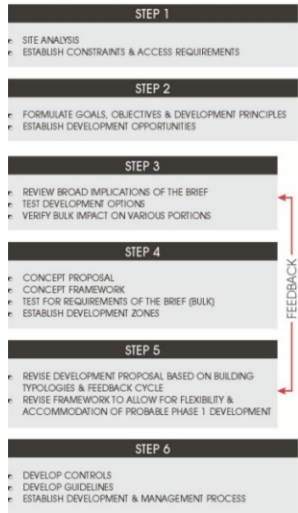


THE SITE
page 1

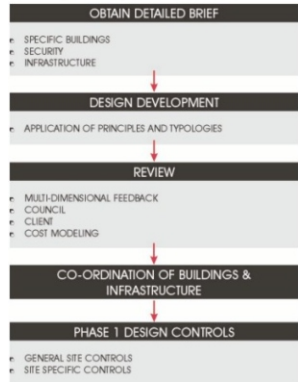


THE URBAN DESIGN PROCESS

PHASE 1: URBAN DESIGN FRAMEWORK



PHASE 2: DETAIL DESIGN



PHASE 3: IMPLEMENTATION



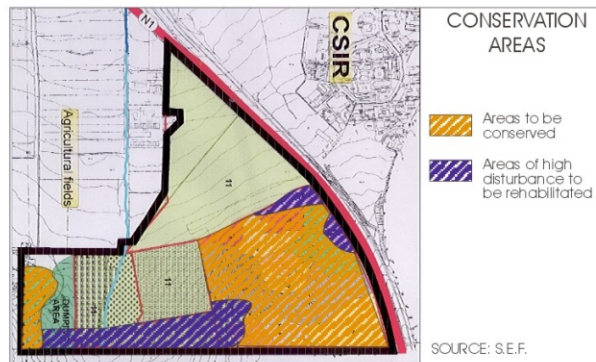
SITE ANALYSIS

In order to explore the implications of the site, the uniqueness of its setting and the inherent constraints, the following issues were identified:

1. Explore and enhance South Street as a soft access point and linkage to the UP Campus
2. Create a secondary access into the HUB that celebrates the threshold and creates specific identity
3. Acknowledge visual sight lines
4. Re-establish the green linkage between the natural areas of the two koppies
5. Establish a gateway or threshold space to support the sense of arrival into the HUB
6. Conserve existing watercourses and storm water runoffs through integration into detail site planning
7. Retain existing radial movement routes and site boundaries from the gateway to the site
8. Re-establish disturbed environment in natural setting
9. Establish a natural buffer zone between residential edge and study area to manage potential impact
10. Detail planning study to verify physical implications of a direct freeway access route
11. Protect and enhance the natural vegetation of the two koppies
12. Retain an open space buffer zone along the western edge
13. Provide a responsive edge along the freeway - enhance the view, vistas and edge interface



SITE ANALYSIS DIAGRAM



GOALS

The overall goal as set out in the Trade and Economic Strategy is to grow the knowledge intensive new economy business sector of Gauteng in a globally competitive way. For the scope and business purposes, and mission statement refer to the Outline Brief, Innovation Hub, Rev. 5, September 2001.

Based on the philosophy adopted for the development of the Innovation Hub the following more detailed goals were identified. To be relevant these goals must also find expression in the overall planning and physical development of the Hub.

- Promote a culture of research and innovation: The design and management of physical infrastructure should be developed to support a culture of innovation. This culture includes the cross fertilisation of ideas between different individuals, groups and organisations, the 'buzz' and excitement that comes with shared exploration of new ideas and easy social interaction both of a formal and informal nature.
- Establish new forms of business, education and incubation practice: new business, education and incubation practices must be developed to reflect the changing environment and needs.
- ICT: The use of ICT is likely to be pervasive in the Innovation Hub. It may be used in: communications, building and site management systems including environmental control, security, fire control and escape, access control.



PROPOSED DEVELOPMENT

1. DEVELOPMENT BRIEF

The following key business areas were identified for the Innovation Hub:

- Activities in Innovation Hub buildings
 - Business and Technology Incubation
 - CoachLab and other education-linked activities
 - Small and medium enterprise tenants in leased multi-tenant facilities
 - Enterprisesupports activities (business and social)
 - Networking organisation (including event activities and networked via IT)
 - Facilities management and operations (including IT, security, utilities, etc)
- Owner buildings (subscribing to tenant entry criteria)
 - Parcels of land long-term leased to Anchor Tenants for freestanding own buildings
- Customised buildings (based on business feasibility)
 - "Teleport" (and associated customers)
 - "Innovation Switch" (Showcase for innovative high tech products/services)

2. BUILDING TYPES

Based on the accommodation criteria the following building types have been identified. The specific character of the building types will be clarified during phase 2. These are:

- Anchor Tenants
- Hatchery
- Incubators
- Multi-Tenant buildings
- Club. The club is seen as a communal building, which will house a reception, waiting area, a small auditorium, conference rooms, a coffee shop, and possibly a small outlet to cover the short term needs in terms of stationery, refreshments, and a variety of small goods, that may be required by tenants on site.
- Centralised parking

In respect of Anchor Tenants, no specific brief has been issued and will in future develop to the allowable bulk on the zone identified, within the Urban Planning constraints.

3. FIRST PHASE DEVELOPMENT

The most likely buildings to develop initially are the club, an incubator, and 1 multi-tenant building, totaling some 1 6000m².

4. CONCLUSIONS

- TOWN PLANNING RIGHTS: A basket of land use rights will be procured and will be made applicable to the larger developable area of the site. SERA/ Hub Investments (Pty) Ltd, in collaboration with the Tshwane Metropolitan Municipality, will manage and control the incremental allocation of site specific land use rights to each identified phase prior to construction, on a basis agreed by the shareholders of The Innovation Hub Management Company (Pty) Ltd.

University of Pretoria - Bergh, F. S. 2003
It is clear from a preliminary analysis of the site that, if we are to retain a landscaped environment, that a proposal of basement parking will be required.

Pockets of parking will develop to minimise the impact of the surface parking area. Anchor tenants will have their own parking areas within their development.

- NATURAL OPEN SPACE: The existing "koppie" and the natural areas surrounding it will be appropriately zoned as a "Private Open Space" to achieve an appropriate level of protection and negate any development possibilities on the area. The private open space designation will preclude general public access as the "koppie" and surrounding natural area will form an integral part of the larger Innovation Hub Campus to which controlled access will be available.

- COVERAGE: Various coverage ratios were examined during the initial brief, and the final outcome was based on what the site could reasonably sustain, based on current good practice, and the accepted norms for the area. A bulk of 121,703m² was adopted on this basis.

The brief recommended that the coverage restriction be limited to a maximum of 40%, which would translate to a covered building area of some 120,000m². The coverage restriction only applies to the area of the developable site to be covered by the footprint of buildings and does not translate to "bulk or effective floor area".

BULK: Based on the above site definition and the proposed building uses, the bulk for Phase 1 and the remainder has been generated. See Schedules 1 and 4 of the brief.

As it is not possible to accurately predict the ratio of first storey to second storey coverage per building, it was suggested that the floor area ratio be limited to a maximum of 0,4 (or some 120 000m²) with a coverage restriction of not more than 30%. These requirements are to be tested in terms of the Urban Design Process and final recommendations will be made with regards to the brief and the development impact from and urban design point of view. Other considerations such as vehicular movement and environmental issues will be co-ordinated as part of the process.

Where peculiar circumstances dictate a deviation from this norm and where aesthetic considerations and functional linkages and the locational context favour the proposal, an individual end user may be granted the opportunity to develop an individual building or complex of buildings in excess of the norm. The result would merely be that this potential would be reduced elsewhere to retain the required balance.

PARKING: Based on the required bulk at a parking ratio of 5 bays per 100m² of rentable area, the development will require 3,159 bays. Based on two parking basements, the development will require 1,564 in basements and 1,595 on surface (at 30m²/car = approx. 4,7 ha).

No attempt, at this stage, has been made to analyse the impact of an integrated basement development approach.

The Urban Design Framework will investigate the tree planting in parking areas to provide shade during the summer months, as no shade netting will be permitted. A strategy towards distributing parking to cells of parking areas will

be investigated to reduce the negative impact of parking on the development.

- HEIGHT: Initial studies determined that the height of buildings be limited to a maximum of 3 storeys in a predetermined core area and gradually receding to a one storey restriction on the outskirts of the larger developable site. This approach will go some way in affording the urban designer an opportunity to affect some structured identity to the outer profile with a view to enhancing the visual appreciation of the Hub from surrounding freeways and higher advantage points.

The height restrictions will be modeled during the Urban Design Process to achieve the desired urban form.

- LAND PARCELS: Preliminary investigations indicated that the development must consist of a series of national land parcels fitting into the framework of the larger development plan for the developable area of the site.

However, the basket of rights attaching to the larger development site will afford a measure of flexibility and latitude as to the final definition of the outer boundaries of any individual development parcel before it is planned in detail and prior to construction.

In other words, although the framework will indicate a preferred or possible assembly of interrelated land parcels, the configuration may change according to end user requirements where site specific development controls (zoning, height restriction, coverage and bulk) will be made applicable.

Depending on the locational context of any individual land parcel, considerations such as height restriction, parking provisions and landscaping requirements and related controls will be imposed in the context of the larger development plan framework. Any future development will be approved by both the Innovation Hub Management Company and the local authority before construction commences.

- PEDESTRIANS AND BICYCLES: The design of the Park must make allowance for both pedestrians and bicycle users. The campus layout must accommodate routes for pedestrians and bicycles safely and comfortably.

- ROAD INFRASTRUCTURE: This will be designed to integrate the requirements of traffic and pedestrians, with durable finishes suitable to the intended traffic capacity and vehicle loading. Urban Design proposals must cover the design of:

- Road finishes;
- Stewalks;
- Traffic calming features;
- Lighting;
- Street furniture;
- Signage;
- Bus stops;
- Open Spaces

- SECURITY: All entrances to the site must be boom controlled with a guardhouse. Tenants must use a digital transponder system to gain access to the park. Perimeter fencing to the Park and a security monitoring system will be required, as well as digital CCTV monitoring of the full Park. The use of internal fences will be discouraged. Design of the perimeter fence is important and must not be determined by security requirements only.



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PROPOSED DEVELOPMENT

page 3



INITIAL DEVELOPMENT

The development must make provision for land parcels to contain the following facilities during phases one: (see section 5.1 of the brief):

1. The Club (2000m² plus undercover parking 1,692m²).

- Informal interaction and communication between tenants
- Specialist support spaces such as the knowledge centre
- Accommodation for the management company
- Facility control centre
- The building will house mentors for the incubator companies, as well as providing larger meeting spaces and offering catering facilities

2. Hatchery (2,000m² plus undercover parking 1,692m²)

3. TIH Incubator and GODISA Software Incubator (8,000m² plus undercover parking 6,293m²)

- Future accommodation of new businesses
- Shared receptions, meeting rooms and pause areas
- Short term lease
- Highly flexible environment (group rooms)

4. Multi-Tenancy

- Well-established companies
- Tenants will have clearly defined areas with their own receptions and meeting spaces
- Identity in terms of front doors and private toilets

5. Retail (2 categories will be required)

a) The Club

- Deli and banking facilities

b) The Community

- Not required in the initial phase
- Small retail facilities (extended hours)

6. Sports & Recreation (2 categories will be required)

a) Urban Facilities

- Runners, walkers, cyclists etc.

b) Specialist Gym facilities

7. Crèche - Child Care

- Freestanding unit on site
- Remote CCTV

8. Residential

- Not provided for on site, but in close proximity

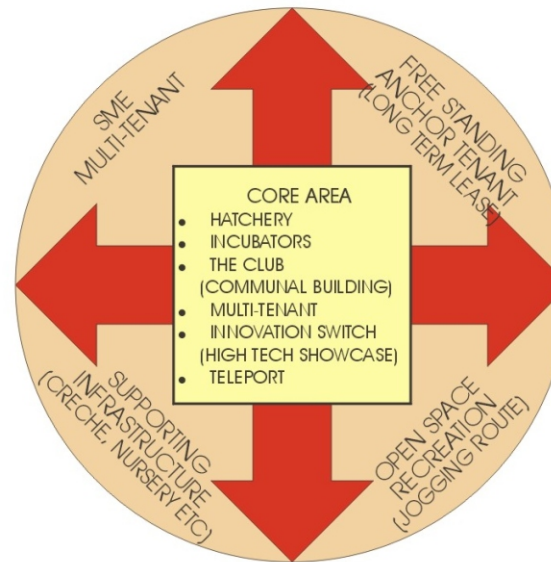
9. Hotel

- Adjacent on CSIR site

10. Data Centre & POP

- Service data centre

FUNCTIONAL DIAGRAM University of Pretoria - Bergh, F. S., 2003



DEVELOPMENT SUMMARY

SITE AREA:	± 60 ha
AREA TO BE DEVELOPED:	± 30 ha
CONSERVATION AREA:	± 30 ha
AVERAGE BULK:	0.4 (basket of rights)
TOTAL BULK:	± 120 000m ²
COVERAGE:	30%
HEIGHT:	Maximum 3 floors
PARKING:	5 cars/100m ²
BASEMENT PARKING:	2 Basements
PHASE 1:	± 16 000m ²
• CLUB	
• INCUBATOR	
• 1 MULTI-TENANT	

DESIGN OBJECTIVES

Based on the initial site analysis, environmental concerns, and the requirements of the brief, development proposals can now be formulated. It is however important to state the design objectives, which will underpin the development structure.

1. URBAN DESIGN OBJECTIVES

From an urban design point of view the layout of the proposed development must achieve the following:

- Balance between natural and hard open spaces
- Hierarchy of spaces and connections
- High legibility (connectivity)
- Sense of place
- Sense of arrival
- Cluster as opposed to dispersal
- Sense of identity/ different parcels
- Continuity in architecture, environment and use of materials i.e. roofs
- Roads and parking to be integrated as part of the open space system
- Enhance site features and opportunities
- Reduce negative impact
- Concentration of social activities
- Articulation of building mass in relation to the natural context
- Continuous fabric of buildings
- Diversity and consistency of character/ image

2. ENVIRONMENTAL OBJECTIVES

Due to the unique character of the site, the following important objectives must be considered:

- Plan for minimum impact
- Retain existing vegetation
- Enhance fauna and flora
- Adoption of sustainable principles:
 - Water harvesting
 - Indigenous planting material
 - Increase bird life

3. GENERAL OBJECTIVES

In addition some general objectives, which will assist in bringing about a unique identity and assist in the structuring of the development, must be considered:

- High-tech in a natural and relaxed setting. (technology and environmental quality)
- Proximity (ability to walk to facilities)
- Relaxed atmosphere
- Develop appropriate social space (space to gather, mix and congregate)
- Flexibility (cater for a variety of tenants)
- Promote an image of progress and innovation



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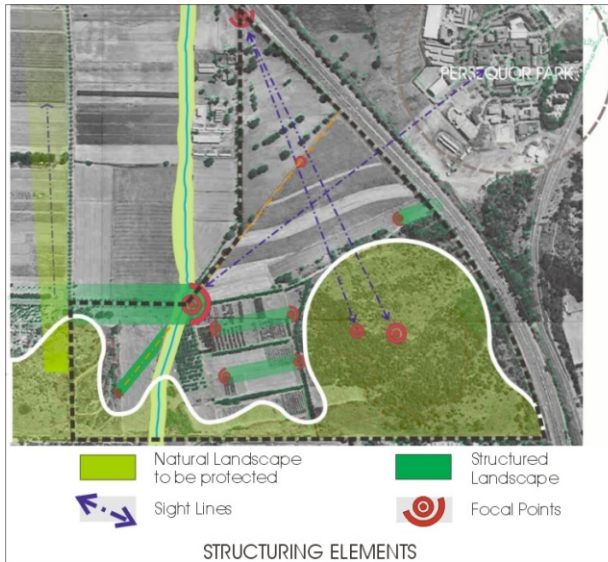
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INITIAL DEVELOPMENT & DESIGN OBJECTIVES

page 4

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DEVELOPMENT OF PRETORIA - Bergh, F. S., 2003

Based on the overall development criteria, an initial design concept was formulated and tested in terms of the stated objectives, bulk requirements, and environmental constraints.

The initial solution was driven by the requirements for a highly visible strip of land along the highway to cater for anchor tenants with a need for prominence. This strip of development is also to be utilised as a sound buffer to the internal development.

The need for proximity and walkability resulted in the concept of a core area (see functional diagram), which will form the main communication centre and focus of the HUB. Along the western edge a strip of land was identified for the accommodation of smaller tenants (see development zones).

The parcel of land to the west of the "koppie" contained by rows of trees (windbreakers) provided an opportunity for a cluster of buildings with a unique identity amongst the fruit trees (to be retained as long as possible). This area is earmarked for small-scale individual tenants/ innovators (consideration for possible impact on 2 adjoining residential areas).

Further west, it is proposed that the cluster of nut trees be retained for possible overflow parking, while fulfilling the need for open space. A vehicular link is proposed along an axis focusing on the "koppie" across the stream towards the isolated "dump site". This site is earmarked for low-key supporting facilities i.e. the crèche, storage and miscellaneous overflow requirements. A possible nursery to sustain the first phase development is being considered. The existing stream between these two land parcels is to be enhanced as a special feature of the development.

A buffer containing indigenous landscape is to be retained and developed between the two "koppies" to enhance migration of species and to assist in isolating the development from the adjoining landowners along the southern boundary.

1. LANDSCAPE AND CONSERVATION

The natural component of the site must be conserved and the natural character enhanced by additional open space areas and water features. The internal open space system must be interconnected and form part of the overall open space framework. It is furthermore recommended that the internal road system be designed to form an integral part of the open space system.

2. PEDESTRIAN SCALE

3 and 6 Minute walking distances were constructed to determine a potential core area and the relationship in terms of linkages to adjoining areas. The pedestrian system must be explored in the development proposals and contain a system of streets and squares to aid both in the legibility and the overall pedestrian accessibility of the HUB.

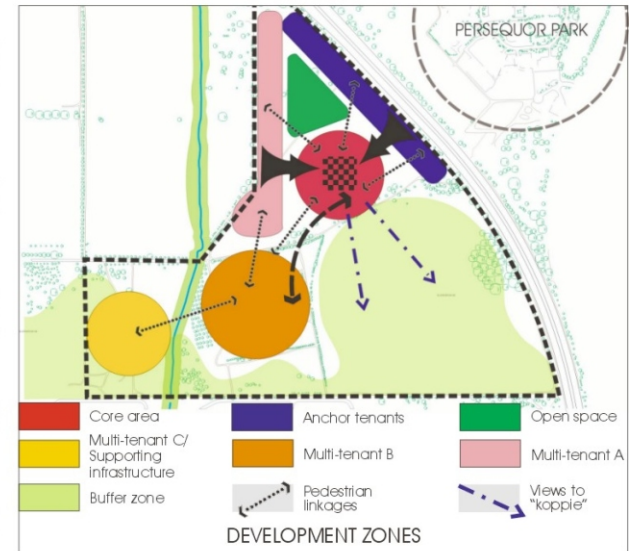
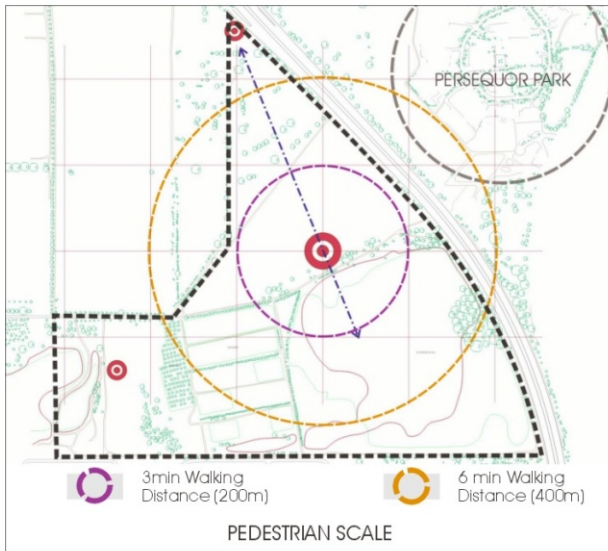
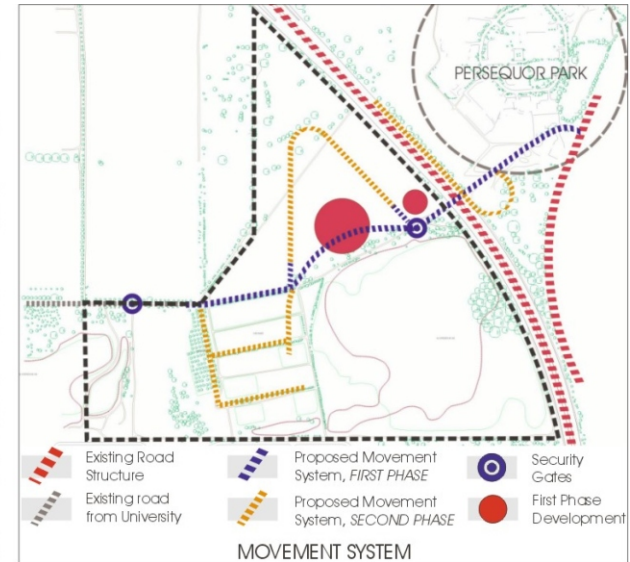
3. CIRCULATION AND MOVEMENT

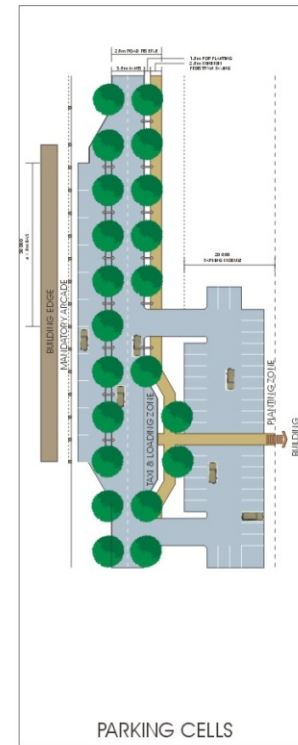
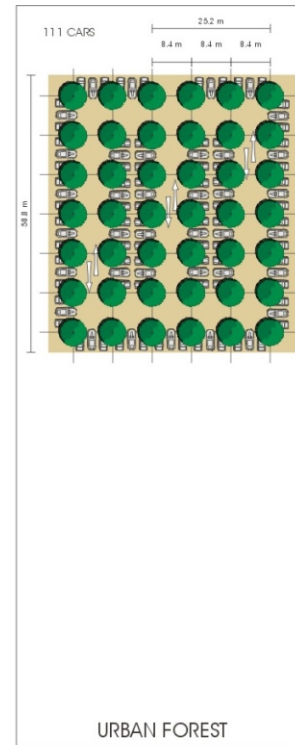
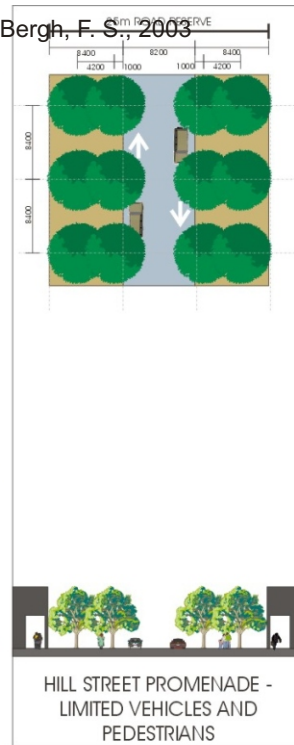
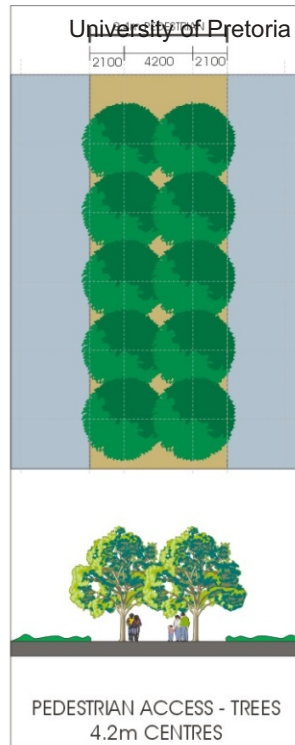
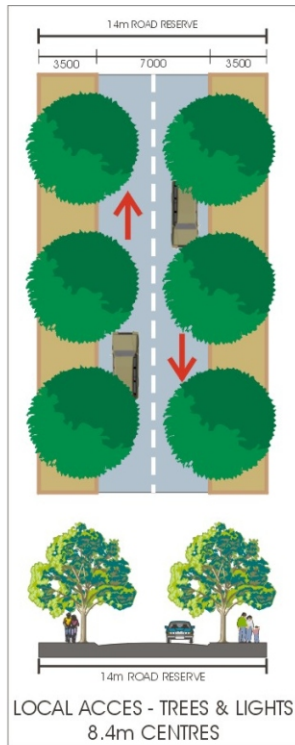
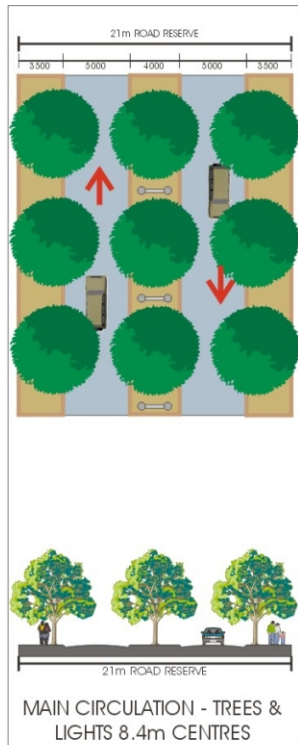
A basic loop road is proposed, providing access from the proposed new bridge and link to the CSR, as well as a future access road towards the University along South Avenue through the Research farm. The exact width of the land along the highway (anchor tenants) will be effected by access and stacking requirements from this new access point.

A promenade allowing some vehicular access is to be developed along the toe of the hill. This promenade will provide local access to specific buildings and facilitate pedestrian movement to the development along the western edge of the "koppie" (between the windbreakers). Limited road infrastructure is required for the initial phase (see movement system).

4. LAND USE

Basic land use parcels influenced by the geometry of the site and proposed circulation routes were established. These parcels will be subject to land use calculations contained in later sections of this report.





PLACEMAKING ELEMENTS

As the design approach is based on a philosophy of placemaking, it implies that buildings, circulation systems and public spaces be structured to form a coherent system with a hierarchy of spaces, streets and squares defined by adjoining structures. The components are outlined below:

1. DEVELOPMENT TYPOLOGIES AND BUILDINGS

Preliminary building typologies were developed and used to test the capacity of the site. These preliminary building types must however be defined by a specific brief in terms of the architecture and function of the building. (To be developed in phase 2) Most importantly, these typologies must be compatible with the overall philosophy of placemaking (buildings utilised to frame spaces).

2. STREETS

A preliminary range of streets were identified to inform the character of the overall circulation pattern. These range from pedestrian walkways to promenades and boulevards.

3. PARKING

The impact of surface parking to be provided (approx. 4.7 ha) resulted in a strategy to disperse and conceal parking in the following manner:

- URBAN FOREST - This concept is based on a grid of trees planted at 8,4m centres and a surface area in the form of a square. Parking areas are therefore disguised as squares or green pockets.
- STREETS - The utilisation of street parking or parking cells along the main roads to disperse visitor parking.
- COURTYARDS - The containment of parking cells internal to building courtyards designed as open space while buildings form street edges.

4. OPEN SPACE

Three types of open space must be provided. These are:

- HARD OPEN SPACE - To be developed in the core area and to function as the

focus for social interaction, spill out space for a food court/ coffee shop and pedestrian linkage to and from the core buildings.

- SOFT OPEN SPACE - Functional green areas dispersed throughout the development and linked to the pedestrian system.
- NATURAL OPEN SPACE - Interlinked with the system of hard and soft open space is the natural open space system characterised by informal indigenous vegetation. This quality forms the setting for the overall development (a development in nature).

5. STREET FURNITURE

An integrated family of street furniture must be developed during the second phase of the project to reinforce the image of the HUB. These include lights, bollards, seats, signage etc.,



TYPOLOGIES
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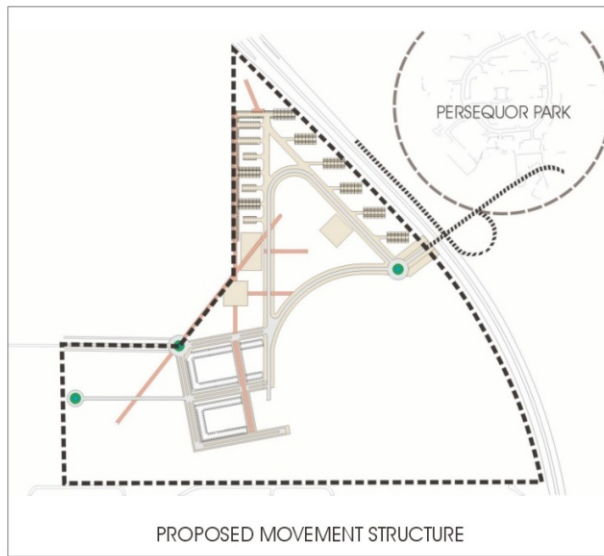
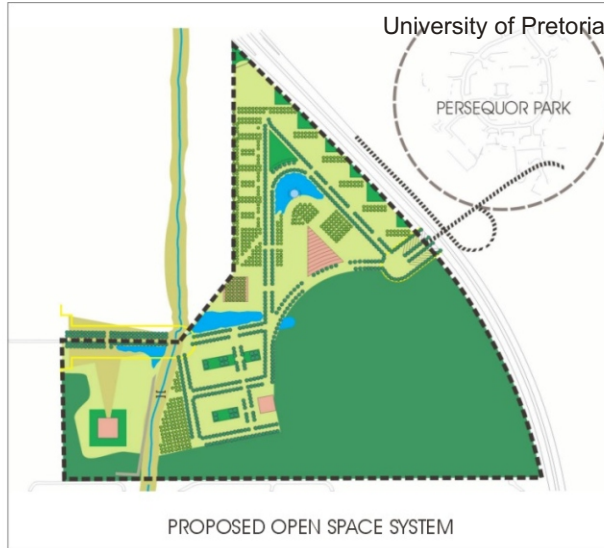
DEVELOPMENT VISION

During the design process several concepts were tested and are currently still in the review process. Included in this report is the initial development concept A and the subsequent revised concept B. Both of these concepts were used as a test for bulk calculations.

1. DEVELOPMENT CONCEPT A

Both concepts were based on the initial development scenario. The uniqueness of concept A is a central square in the core area of a rectangular nature, which could be used as a consolidated basement. The central axis from the northern point of the development towards the "koppie" forms an intersection with the central square and results in a complex geometry, which would have to be resolved if adopted.

Bulk calculations based on this scenario proved that the site can quite comfortably accommodate the required bulk and leaves some room for height manipulation.



2. DEVELOPMENT CONCEPT B

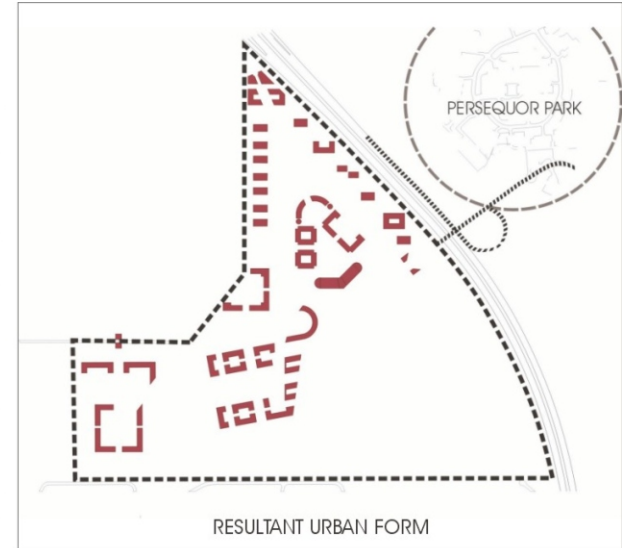
Development concept B evolved from concept A, but certain refinements were made, particularly with regard to the central square. Subsequent to this proposal, further feedback from the consulting team resulted in a more compact approach towards the core area as reflected in the development images shown.

Bulk calculations reflected similar bulk opportunities to those in development concept A, which resulted in a proposal to keep the developments to the west of the "koppie" as phase 2 with a maximum height of 2 storeys.

As the main purpose of this study was to develop a framework and not a master plan it is important to point out that the development vision shown in this document is purely a possible future vision and that the formal framework is capable of accommodating a variety of possibilities including a more condensed version.

DEVELOPMENT FRAMEWORK

Based on the initial development layouts, a framework outlining the minimum control for the site was developed. This Framework is currently being tested for flexibility and will be refined during phase 2 to ensure acceptability to relevant Authorities, the need for control and the promotion of a highly articulated and compact development.



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DEVELOPMENT VISION
page 7



DEVELOPMENT ZONES

Based on the two development scenarios, area calculations and subsequent footprint studies, certain zones were proposed. These zones are however indicative and represents future locational criteria for the basket of rights to be applied for. A review process must however verify the specific needs of site relationship for placing a building, and the process based on a set of principles.

According to the zoning diagram below preliminary area calculations were prepared to study the possible height and bulk implications. In all cases it was found that the principle of a 0.4 bulk, 30% coverage and maximum height of 3 floors were applicable.

1. BULK & DISTRIBUTION

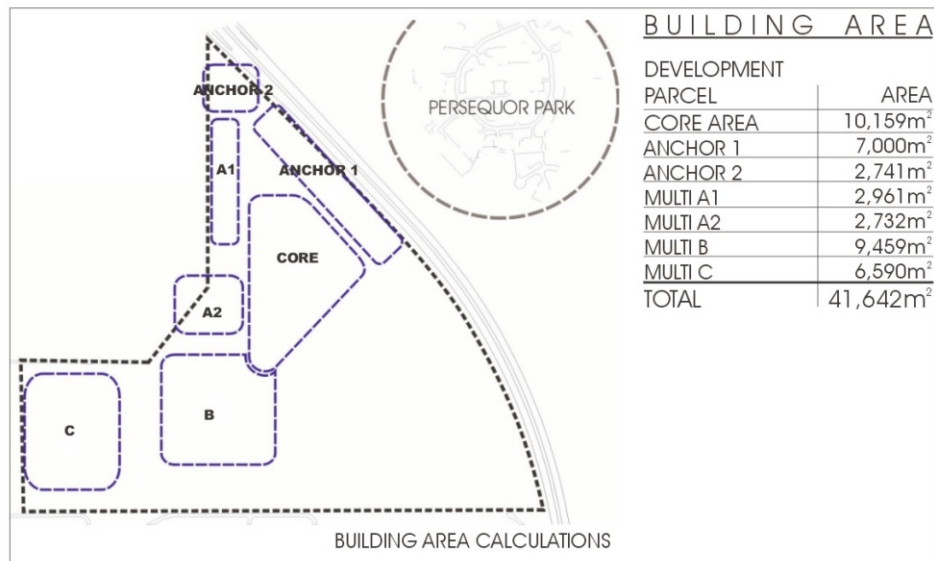
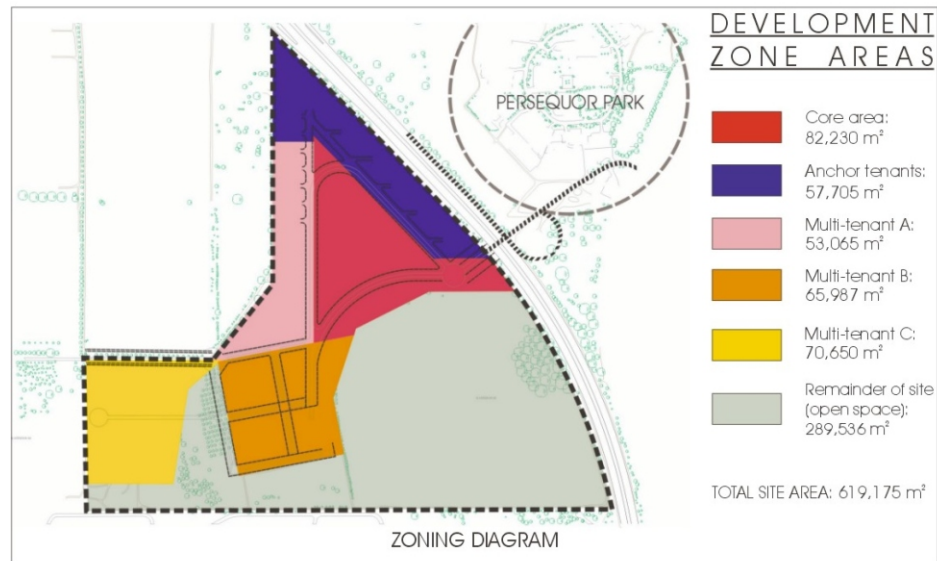
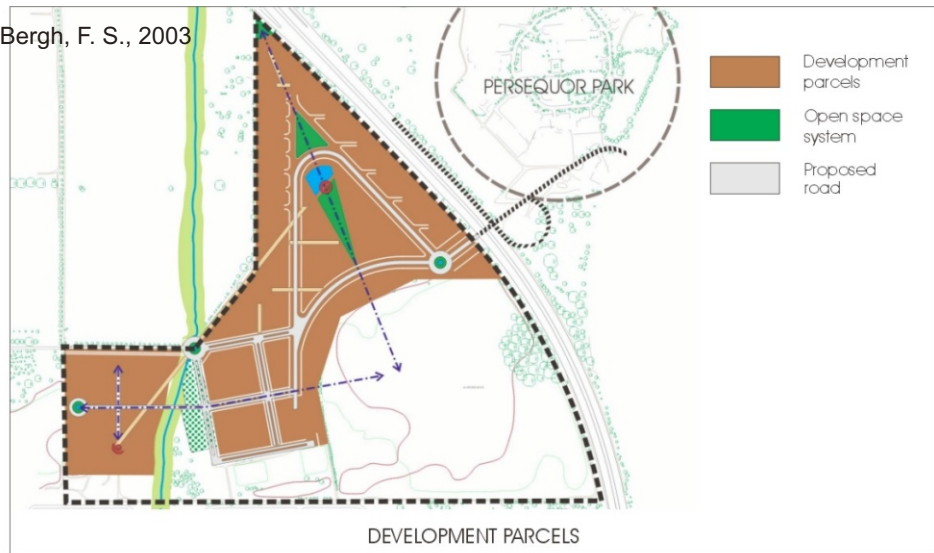
Anchor tenants will be required to develop their sites to full bulk. The Management Company has the delegated right to redistribute bulk over the site, but may not vary the total allowable bulk for any of the defined uses.

This will be achieved by individual site development plans for each identifiable land parcel (see Development Parcels) where the development plans will incorporate a chronological "bulk register" indicating an ever-reducing "balance of rights" available to the undeveloped portion of the site at any specified date. In other words, the site development plan of each individual land parcel will form an integral part of the zoning records of the local authority applicable to the relevant area of the site. A copy of the approved site development plan will be filed with the Innovation Hub Management Company for appropriate record keeping. Bulk & Distribution: the size of the sites must be flexible, but should accommodate min and max from a practical and management point of view.

2. BUILDING AREAS

A footprint study of the development vision previously shown indicated a total area of 42,000m². This implies a 3 floor development throughout, or alternatively an increase of density in the core area to reduce the height of peripheral buildings (see Building Area Calculations).

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DEVELOPMENT ZONES & AREAS
page 8





EXPLORE WETLAND OPPORTUNITIES



PROMOTE URBAN FORESTS



PROMOTE OUTDOOR COURTYARD SPACE

2. URBAN DESIGN GUIDELINES

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The Urban Design Guidelines consists of 5 basic components, namely street interface, natural interface, land use interface, building envelope and landscaping.

- Street interface: The street interface consists of the following components, namely position of entrances, built-to lines, set backs, colonnades and articulation of corners as well as the creation of gateways. Small scale retail activities should be provided in the core area to ensure a safe and vibrant street life.
- Natural interface: All buildings to be developed should have a strong relationship to the open spacesystem and natural setting.
- Building envelope: The building envelope (to be formulated in phase 2) is guided by articulation of significant corners, built-to lines, set backs, maximum height and the suggested position of entrances.

3. LANDSCAPE GUIDELINES

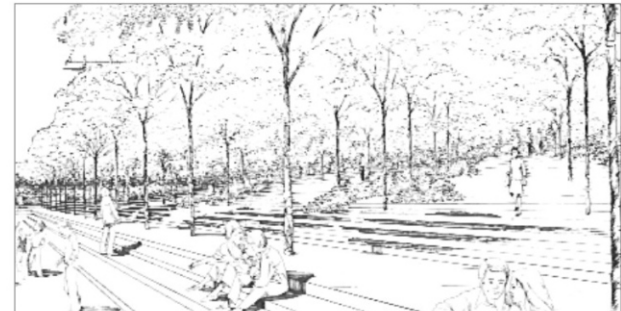
- The "koppie" must be retained as an area of protected flora and fauna, and can not be open to the public, access must be granted to identified tenants and their guests only. The "koppie" must be integrated into the recreation requirements of the Park's tenants.
- New planting will be required over the majority of the site and only indigenous species, as defined in the Landscape Policy, must be used.
- A Landscape Development Plan (LDP) must be submitted to the relevant authority for approval along with the Site Development Plan. All requirements of the local authority must be taken into account in the LDP.
- Trees must be planted in the parking areas to provide shade during the summer months. Noshade netting should be permitted.
- A buffer must be created between the development and the residential area to the north of the site. No permanent structures should be located within the 1 in 100 year flood line.
- Lighting on the site must be dealt with in a sensitive manner to minimise lighting pollution and impact on adjacent properties.
- Design landscape to promote water harvesting.
- Water features must be integrated with the architectural setting.



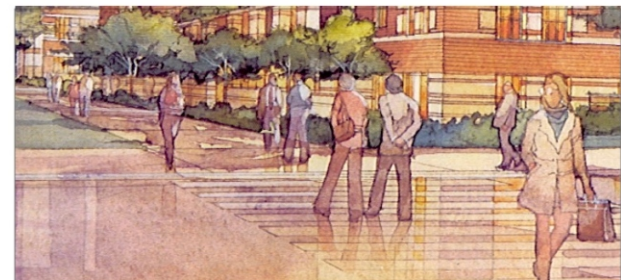
DEFINE PEDESTRIAN NETWORK



INTEGRATE WATER FEATURE INTO THE NATURAL SETTING



THE SLOPING TYPOGRAPHY IN THE CENTRAL SQUARE PROVIDES AN OPPORTUNITY FOR ARTICULATION



PROMOTE PEDESTRIAN QUALITY



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DESIGN PRINCIPLES
page 10



CONCLUSIONS

The development concept tested during the design process revealed the following:

- e The developable portion of the site as defined can accommodate the required bulk as outlined in the brief.
- e Concentration of the bulk to the north of the "koppie" is advisable as it will reduce the impact on the residential development on the southern boundary.
- e The site to the west of the "koppie" can accommodate future development needs, provided it does not exceed 2 floors, and that the open space parking is well landscaped.
- e The site at the western corner (dump site) must be rehabilitated and due to its remoteness reserved for future growth needs. It is therefore more ideal for services support, a possible crèche and an interim nursery.
- e Due to its location, the site has no physical connection to its surroundings, save for the linkages to the university and CSIR. It is a clustered and secure development in nature. This uniqueness must become part of its character and elements such as surface parking and movement systems must be accommodated as landscape solutions.

RECOMMENDATIONS

- e The "koppie" and its natural features must become a conserved central focus of the development.
- e A unique bridge should be developed to give access across the highway and give identity for the HUB.
- e The development must put conservation of the setting as high priority and endeavor to enhance that character by introducing indigenous vegetation.
- e The core of the development must be accessible by foot and function as the social focus of this development. This implies a degree of concentration to ensure integration.
- e A family of street furniture must be developed to compliment the development and assist in the formation of a strong identity.
- e Streets should preferably not be tarred. An earth colour paver should be used to blend with the natural setting.
- e Street lights must be of a human scale and prevent lighting pollution.
- e Flexible shells should be provided during the initial phase to ensure adaptability and robustness to accommodate a variety of uses.
- e Covered walkways should be investigated to link the core group of buildings.
- e The rehabilitated dump site could be utilised as a nursery during the initial phases as the costs of landscaping could be excessive.
- e Access from the University towards the HUB should be supported by a regular transport service to reduce the impact on South Street and the Research Farm.

The detail layout of the first phase and in particular the core area, should be tested by a space syntax model to ensure optimal location of ground floor activities (see Annexure for detail).

DEVELOPMENT MANAGEMENT

A Design Review Committee (DRC) must be established to process all new buildings on the site. The following process is proposed:

1. PROCESS

STEP 1: land use issues

- e Ensure and confirm that the land uses are in accordance with the proposed zoning as agreed upon by the Council.
- e Identify possible variations with regards to land use.
- e Ensure that the proposals adhere to the HUB Development Guidelines.
- e Confirm the process of consultation if required.
- e Verify conformance to the Site Development Plan.

STEP 2: preparation of plans

- e Prepare sketch plans for approval.
- e Accommodate feedback.
- e Hand in Site Development Plan and architectural concept.
- e Confirm style and finishing.
- e Accommodate feedback and hand in proposed Site Development Plan at Council for approval.
- e Develop working drawings and verify cost implications.
- e Obtain approval for implementation.

STEP 3: implementation

- e Monitor construction phase to ensure that any changes made during construction still adhere to the guidelines prescribed.

2. PHASING

According to the brief the Innovation Hub Campus will be developed in a series of phases. This pre-supposes that the relevant authorities will approve the principle of developing the Innovation Hub over the entire site in accordance with the larger development plan. At the same time, a pre-determined phasing program will be approved in principle enabling the Innovation Hub Management Company to incrementally proclaim each new phase when market demands motivate in favour thereof. The remaining unproclaimed phases of the larger development would essentially remain "Agricultural Land" until proclaimed. The initial phase will be approximately 15,000m². Traffic modeling indicated that a maximum of 20,000m² could be accommodated by building the bridge across the highway. Further road upgrades would be required to accommodate the remaining bulk (see Transport Report).

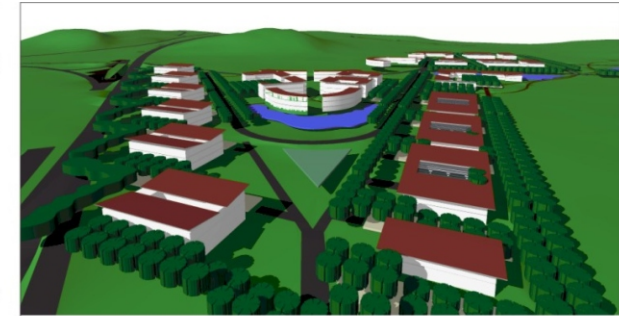
WAY FORWARD

Building typologies must be defined for the first phase building developments. This requirement together with the minimal infrastructure required for the first phase must be explored to promote a sense of place, the definition of the central area must provide for incremental development in the future while ensuring the integrity in terms of development principles of the core area.

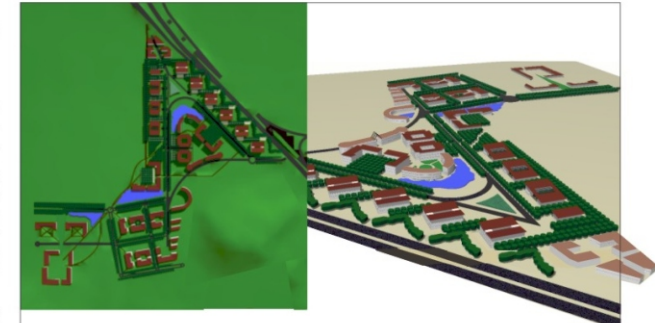
Prior to detail design, the access requirements from the future bridge and the detail requirements of the security gate must be finalised as it will have an impact on the width of the land parcel along the highway.

Specific design controls must also be developed to ensure a positive image along the highway, particularly with regard to possible short term anchor tenant development.

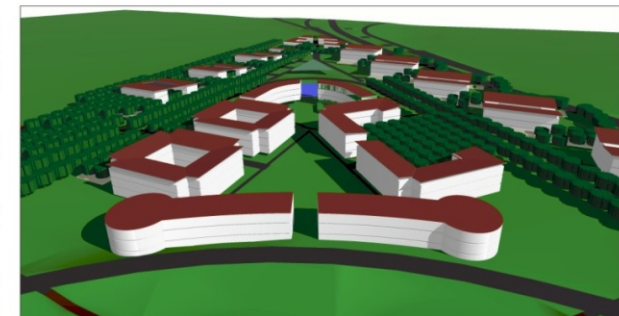
This document is but the first step towards a detailed development framework. The comments and feedback to be obtained from this document together with specific detail requirements of the HUB Management Company must inform the second phase detail design framework.



VIEW FROM THE NORTH TOWARDS THE "KOPPIE"



VIEW FROM ABOVE AND THE EAST



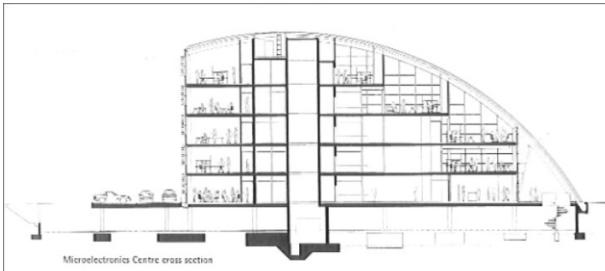
VIEW FROM THE "KOPPIE" LOOKING NORTH



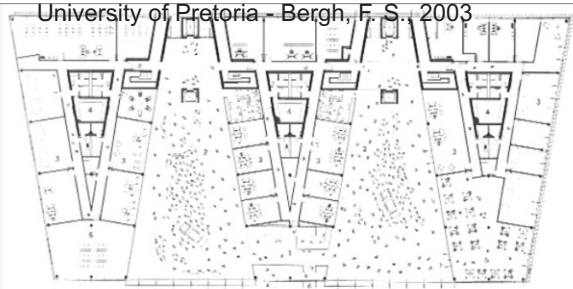
THE INNOVATION HUB™

CONCLUSIONS
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PROMOTE SOCIAL SPACE I.E. MICRO-ELECTRONICS PARK RESEARCH & DEVELOPMENT CENTRE - DUISBURG, GERMANY. INTEGRATION BETWEEN SOCIAL SPACE AND CELLULAR SPACE



CELEBRATE ENTRANCES, JUNCTIONS AND BASEMENT ACCESS WAYS

URBAN DESIGN GUIDELINES

Due to the "basket of rights" approach for the proposed development it is important that a set of guidelines be formulated to guide the quality of the development over time. These guidelines must form an integral part of the implementation process, which is to spell out the rules for the development.

The Urban Design Guidelines consists of two components, namely Urban Design Principles, which forms the basis for the guidelines, and the Urban Design Guidelines, which provide a clear indication of the development intentions and critical issues to be addressed.

1. URBAN DESIGN PRINCIPLES

Throughout the design of the Innovation Hub precinct the following urban design principles must be implemented as far as possible:

- Space defining streets: Streets should be designed to be on a human scale with a lively edge where possible to support and promote street activity.
- Management of cars: Create pedestrian friendly well-defined access routes and promote cyclic parking. Parking requirements should be balanced with the promotion of pedestrian movement and vehicular requirements.
- Strong structure and flexible guidelines: Ensure certainty, reduce risk and allow for variety within the urban environment. Where possible reinforce the existing natural structure and indigenous vegetation. The design should be robust enough to allow for detail change.

- Creation of unique places: Articulate entrances and gateways, significant urban spaces, visual and physical connections towards the surrounding natural context.
- Facades: Building facades are to be designed in accordance with the draft South African Energy and Demand Efficiency Guidelines.
- Roofs: Flat roofs must be minimised and a consistent roofscape promoted.
- Refuse: A screen must apply to all aspects of refuse management.



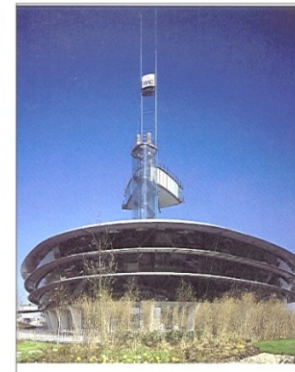
DEFINITION OF SPACE AND PEDESTRIAN SHELTER TO BE PROMOTED



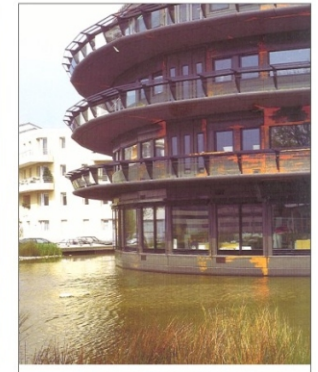
CONSIDER WEATHER PROTECTED STREETS



HIGH TECH BUILDINGS CAN ALSO BE LOW KEY



TECHNICAL FEATURES MUST BE INTEGRATED TO FORM STRONG FOCAL POINTS



PROMOTE INTEGRATION OF LANDSCAPE AND ARCHITECTURE



G.P. GREEFF & ASSOCIATES
ARCHITECTS URBAN DESIGNERS ENVIRONMENTAL PLANNERS

ArupStairway



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DESIGN PRINCIPLES
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BASELINE DOCUMENT AND TECHNICAL REPORT

