

A developmental framework proposal for the University of Pretoria's Groenkloof campus

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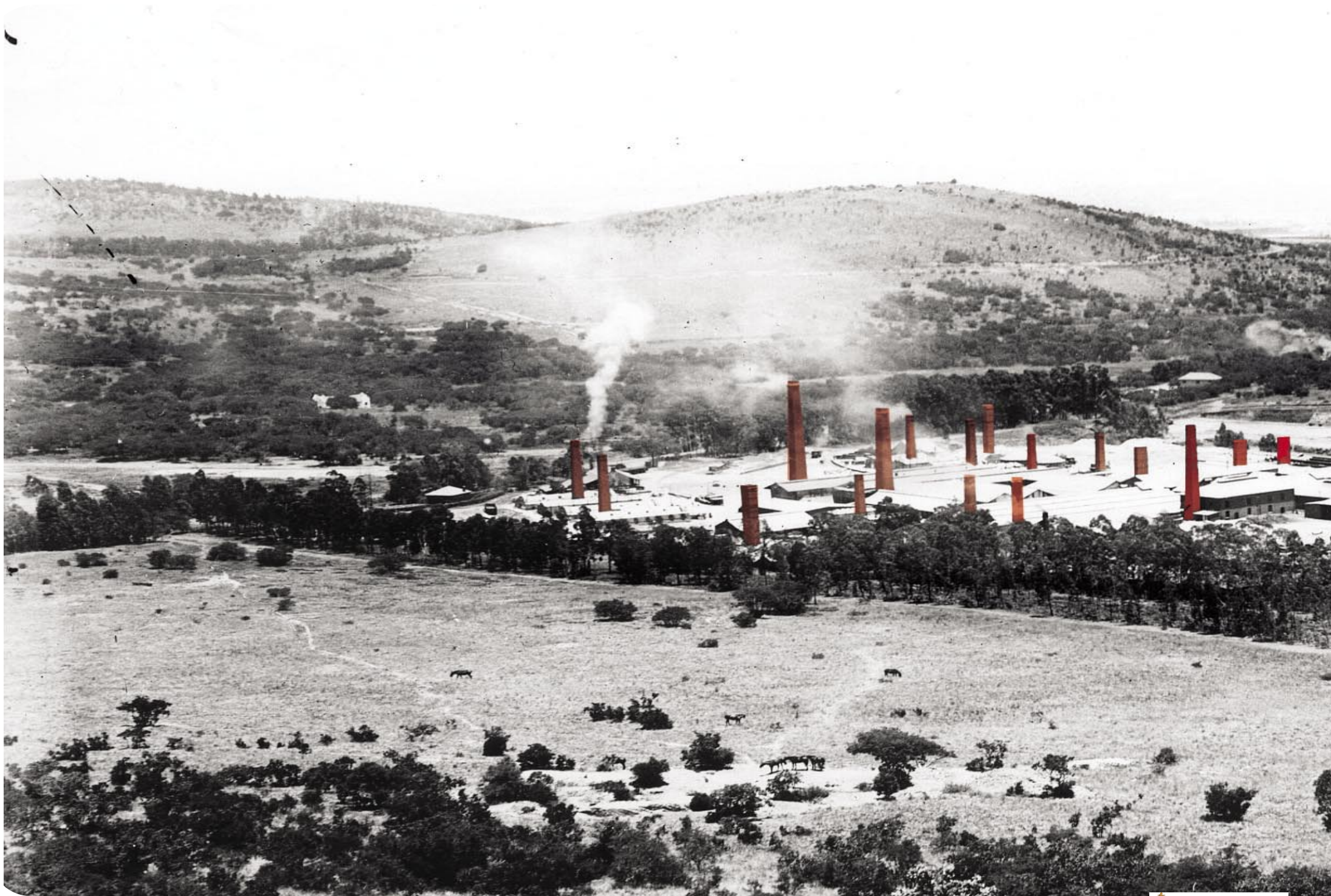




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Chapter 1

1.1 Background

2008 is the University of Pretoria's centenary year. In celebrating this event, master students had to choose a campus of the University of Pretoria for their thesis study area. The location, history and size of Groenkloof campus made it a good choice for a landscape intervention project.

Landscape Architecture brings together multiple disciplines and it was the dynamics of this field that made it become an absolute passion. Like the French landscape architect Bernard Lassus (1998) something other than the plain schemes we hurry through and past is sought after, a layered landscape in which imagination, heritage and experience are brought into play.

1.2 Problem setting

WHAT

L.C de Villiers is the official sports-grounds of the University of Pretoria and hosts the High Performance Centre (HPC). This world class sports clinic was designed as a rugby training facility, but is currently used as a training and accommodation centre catering for various sport codes. The HPC has enjoyed great success; to such an extent that the facility is overcrowded and expansion plans are in the pipeline.

WHY

A twin HPC facility is planned on the Groenkloof campus. This campus has developed sportsfields, existing infrastructure, ample space for development, cultural significance and forms part of the southern gateway of Pretoria.

HOW

This study investigates how a HPC integrates with Groenkloof campus. Furthermore, stormwater management will be investigated. Lastly a material selection referenced from relevant history will be put together for detail design.

1.3 Sub-problems

Sub - problem 1:

How does a HPC integrate with a campus facility?

Sub - problem 2:

How can stormwater management be applied to enhance HPC activities and maintain the scheme?

Sub - problem 3:

Can history/memory of a place be restored through structures and material choice?

1.4 Hypothesis

The hypothesis is made that Groenkloof campus would be better utilized when a HPC is introduced.

It is hypothesized that stormwater can be used in recreation and to maintain and satisfy the proposed scheme.

It is hypothesized that a material selection inspired by relevant history could commemorate cultural significance.

1.5 Research methodology

The grounded research method will be used to determine the opportunities and constraints of Groenkloof campus.

Groenkloof campus will be analysed as follows (Figure 4):

Contextual analysis will identify the land use and river systems around Groenkloof campus.

The **history** of Groenkloof campus and surrounding area will be documented.

The local investigation will be an analysis of the Groenkloof campus site.

Existing facilities, hydrology, circulation, vegetation, geo-technical, heritage, slope, visual impact and interviews will be used to better understand the site.

The **“genius loci”** of Groenkloof campus will be described.

Legal analysis will indicate some limitations regarding the site and proposal.

The National Water Act and National Environmental Management Act will be studied to identify relevant legal implications regarding the proposed design.

The Landscape Development Program of the site will be based on the outcomes of the analysis.

1.6 Delimitations

-For the purpose of this study the confines of the study area will be; Unisa to the north, George Storrar Drive to the south and west and Leyds Street to the east.

-The quality of the water in the stormwater management plan will not be addressed.

-All stormwater calculations are basic and should be confirmed by hydrological engineers.

1.7 Assumptions

It is assumed that:

1. The development plan for the University of Pretoria proposed by Holm Jordaan is accepted as the preferred policy.

2. The HPC on L.C de Villiers is overcrowded and a twin facility will be developed on Groenkloof campus.

3. No access roads will be allowed along George Storrar Drive due to the speed of vehicles on that road.

4. The compaction of the fill in the landfilled cavities is not optimal for building construction.

5. The buried landfill has not polluted the groundwater or leached into the drainage system that leads to the Apies River.

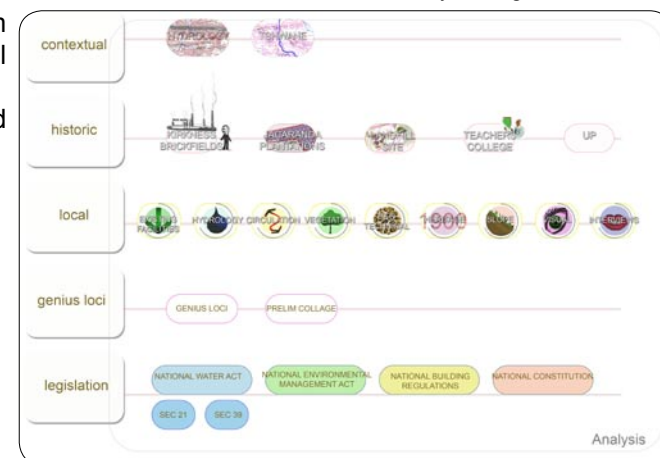
6. The volume of stormwater run-off could increase when the Tshwane ridge policy is implemented to rehabilitate the Klapperkop Hill from plantations to grasslands.

7. Permission has been granted to reroute stormwater from the existing channel onto the campus.

8. After the installation of the new water pipe system along George Storrar Road environmental rehabilitation will take place and the stormwater run-off will contain less silt.

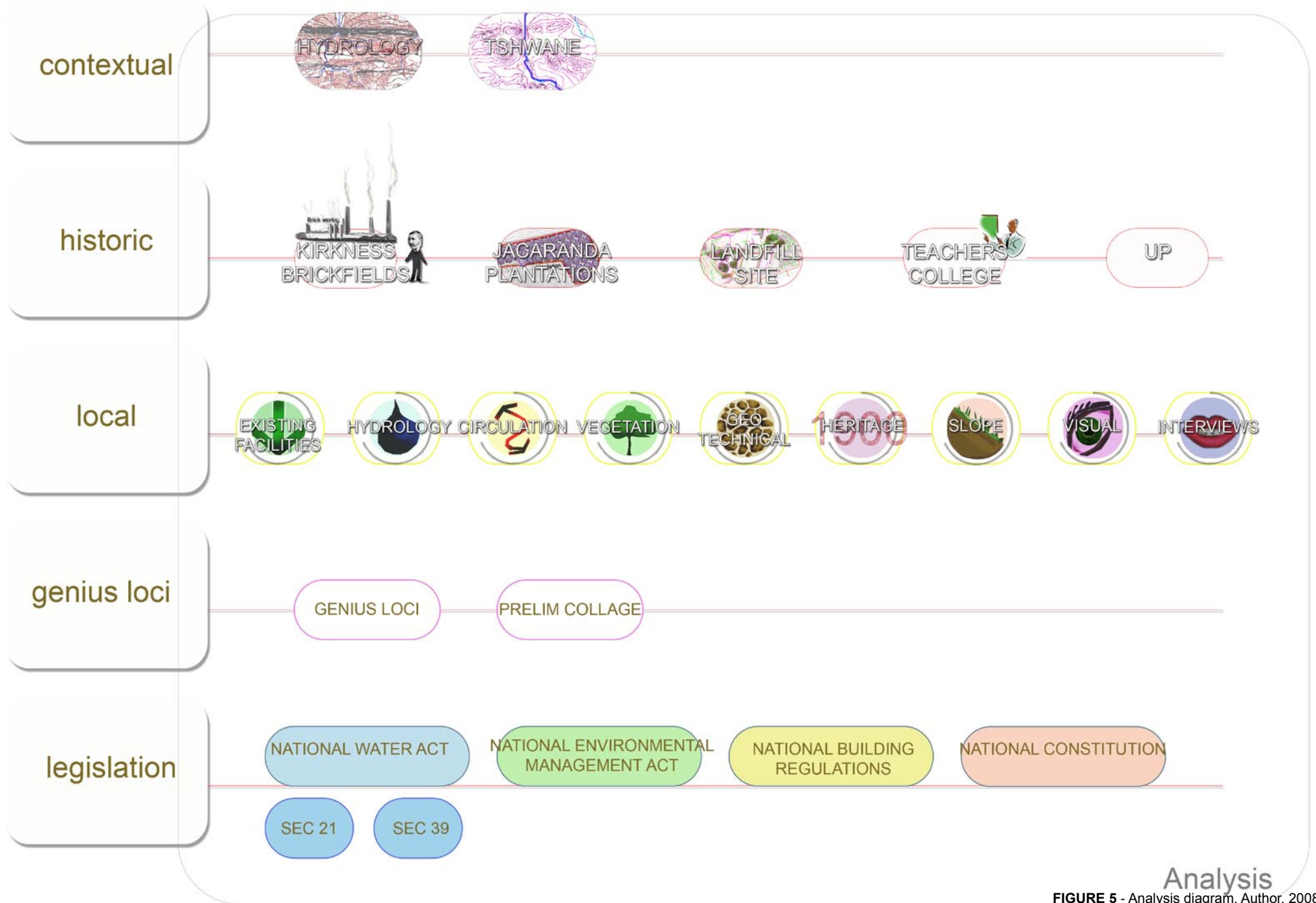
9. All studies and applications needed for the proposed development will be done and approved.

FIGURE 4 - Analysis diagram, Author, 2008





Chapter 2



Analysis
FIGURE 5 - Analysis diagram, Author, 2008

2 CONTEXT STUDY

2.1 Analysis

2.1.1 Contextual

Background

The Apies River was named after the many vervet monkeys that inhabited the white stinkwood (*Celtis africana*) forest along its banks. Chief Mzilikaze (a Nguni chief that lived in the area in the 1800's) called the river *Zubuhlungu* ("that which hurts"), referring to the sharp stones found at the two springs that in part feed the river. Sothos call this river Tshwane, after a historical chief. Tshwane is currently used as the name for the metropolitan area which includes Pretoria (Van der Waal & Associates, 1999).

Urban context

Pretoria is situated between ridges and valleys with three main catchments, namely the Apies River, Moreletta Spruit and the Pienaars River. The Apies River catchment area with its main tributaries from the west is the largest. The Apies River draws together many natural and urban elements of importance on metropolitan scale. Major natural elements of importance along its way include the following: Fountains Valley (Groenkloof campus), Bon Accord Dam, three ridges that are crossed, namely Time Ball Hill at Unisa, the Witwater Mountain range at Daspoort and the Magalies Mountain Range at Wonderboom airport.

Urban nodes and original farm portions in Groenkloof linked to the Apies River are: Unisa, *Groenkloof 358-JR* (*Groenkloof campus*), Berea Park and Muckleneuk to name a few.

In the Apies River Urban Design Framework (1998), 14 precincts were identified by evaluating the character of the river. The first two precincts (Precinct A: Fountains Valley, Precinct B: Unisa Poort) fall in the Groenkloof study area and further enhance the importance of Groenkloof campus (Figure 12).

River water

The two springs at Fountains Valley are the sources of the Apies River. Other streams and tributaries into the Apies River include:

- Eufees Spruit (Precinct A: Fountains Valley),
- Bergklapper Loop (Precinct B: Unisa Poort),**
- Kerameikos Loop (Precinct B: Unisa Poort),** (both these tributaries are located in the Groenkloof study area)
- Timeball Creek (Precinct C: Berea),
- Walker Spruit (Precinct H: Daspoort),
- Steenoven Spruit (Precinct G: Marabastad),
- Skinner Spruit (Precinct H: Daspoort),
- Modder Spruit (Precinct J: Mountain View)
- De Moot Spruit (Precinct K: Wonderboompoort), and
- Wonderboom Spruit (Precinct M: Onderstepoort).

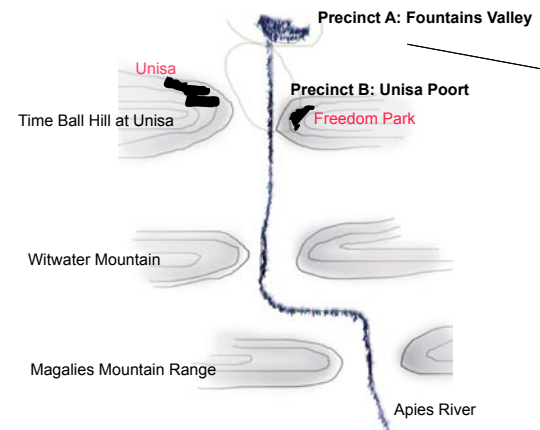
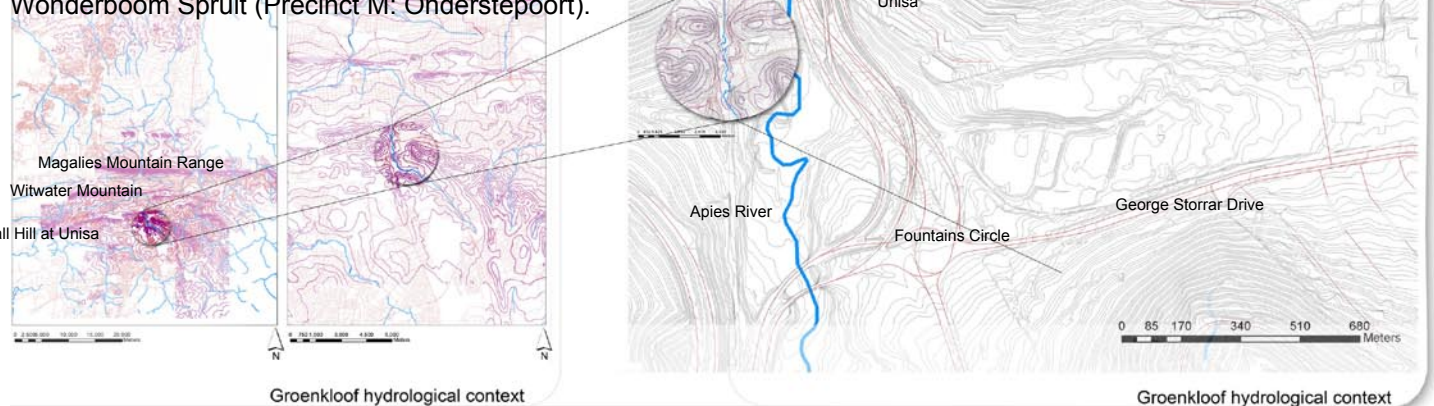


FIGURE 12 - Precincts of the Apies River, Pretoria City Council and the Action Apies River Working Committee, 1999, reworked by author, 2008

FIGURE 7 - Hydrological diagrams, University of Pretoria Geography Department, assembled by Author, 2008

FIGURE 6 - Contextual diagram, Author, 2008

Precincts A & B

Precinct A: Fountains Valley (Figure 12)

Precinct B: Unisa Poort (Figure 12)

City context

-Site Location

The site is located in the south-westerly portion of Pretoria. This is a dynamic cultural and ecological precinct with monuments and nature reserves (Figure 11). In Figure 11 Groenkloof campus is rendered yellow and the location of the mayor monuments (Unisa, Klapperkop, Voortrekker Monument, and Freedom Park) are clearly indicated.

As shown in Figure 9, the R21 highway borders Groenkloof campus towards the west. George Storrar Drive forms the southern boundary, Leyds Street the eastern boundary and Unisa acts as the boundary towards the north. The Apies River is situated towards the west of the site (Figure 7), and Fountains Circle towards the south-west. Figure 10 shows the land use of Groenkloof campus and surrounding area.

FIGURE 8 - Apies River relative to site, University of Pretoria Geography department, assembled by Author, 2008

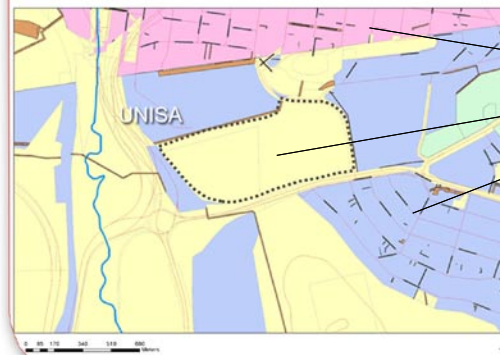


FIGURE 9 - Roads relative to site, University of Pretoria Geography Department, assembled by Author, 2008

FIGURE 10 - Land use, University of Pretoria Geography Department, assembled by Author, 2008

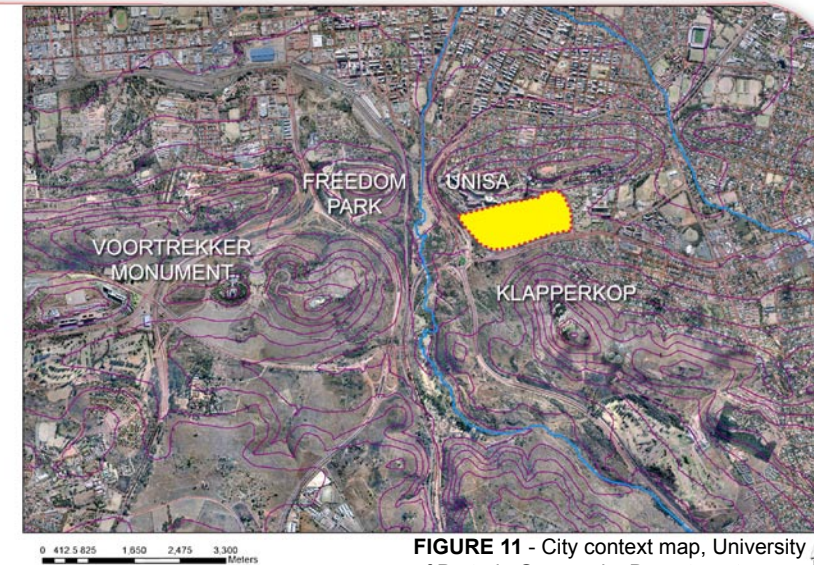


FIGURE 11 - City context map, University of Pretoria Geography Department, assembled by Author, 2008

2.1.2 History

-Kirkness Brickfields

Groenkloof campus is located on farm 419, which was a part of Lukasrand farm. The ownership of farm 419 was transferred to the government when a water shortage occurred in 1860 due to the large water usage by Lukasrand (Peacock, 1955:70).

Lukasrand is situated in the Fountains Valley and the two major springs feeding the Apies River is located here. Farm 419 was exchanged for the block between Potgieter Street, Vermeulen Street, Schubart Street and Church Street (erfs-273-311) to obtain water rights and solve the water shortage in Pretoria (Peacock, 1955:120).

John Johnston Kirkness was a joiner from Orkney and came to Pretoria in 1879 with his contracting business (Allen 1950). The brickfields were taken over by Kirkness from a bankrupt Italian firm who held the republican concession for brickmaking in 1887 (Bolsmann, 1958:86).

The Raadsaal would be one of many buildings in Pretoria built by Kirkness. The Kirkness bricks were used all over South Africa (Muller, 1985:167). Kirkness later became the mayor of Pretoria in 1907.

Figure 14 is a photograph of the original lithographed Surveyor General's Office map of Pretoria dated December 1900. Next to the impression of JJ Kirkness "brickworks" indicate the location of the Kirkness brickworks in 1900. The location of the Government Farm 419 (Groenkloof campus) is also indicated.

FIGURE 13 (A) - Fountains Valley traffic circle showing the two new fountains, by Jan, info photo 2030, title id IS 594532, Tswh. info in 3311441, 1961

FIGURE 13 (B) - Aerial view of the Fountains Circle with the brickfields of J.J Kirkness on the left, info photo 1900, title id IS 593912, Tswh. info in 3307532, 1958

FIGURE 13 (C) - J.J Kirkness brickfields at the fountains, info photo 2654, title id IS 602674, Tswh. info in 3348244, 1935

FIGURE 13 (D) - J.J Kirkness brickfields at the fountains, info photo 2655, title id IS 602674, Tswh. info in 3348343, 1935

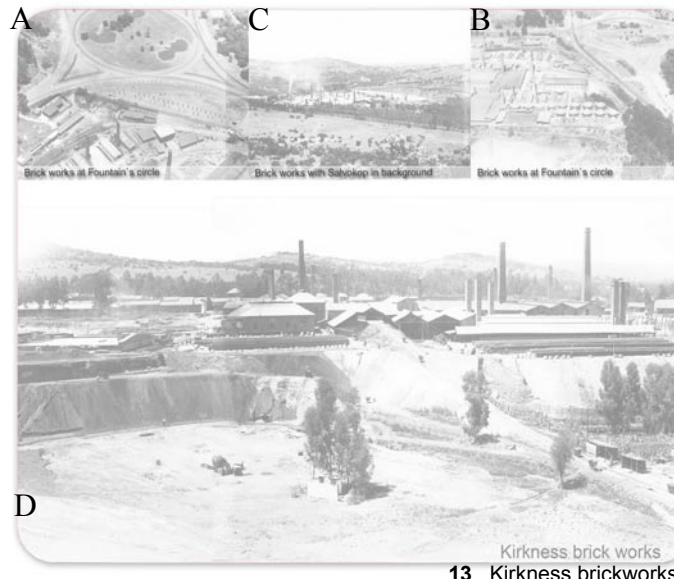
-Jacaranda plantation

Pretoria has the colloquial name of the Jacaranda City. This is of course due to the many Jacaranda trees along the streets. Very few people realize that the presence of the trees was due to an accident. James Clarke (a horticulturist in the 1900's) got commissioned to plant trees in the government nursery in Groenkloof.

historic



Jacaranda seeds were by accident included in a seed order. Clarke planted these seeds and unwittingly started the Jacaranda City (Stadsraad - Nuusbrief Nov. 1978). The government farm on which Groenkloof campus is situated is said to have been used as a plantation for Jacaranda saplings which were then planted on the roadside throughout the city.



13 Kirkness brickworks

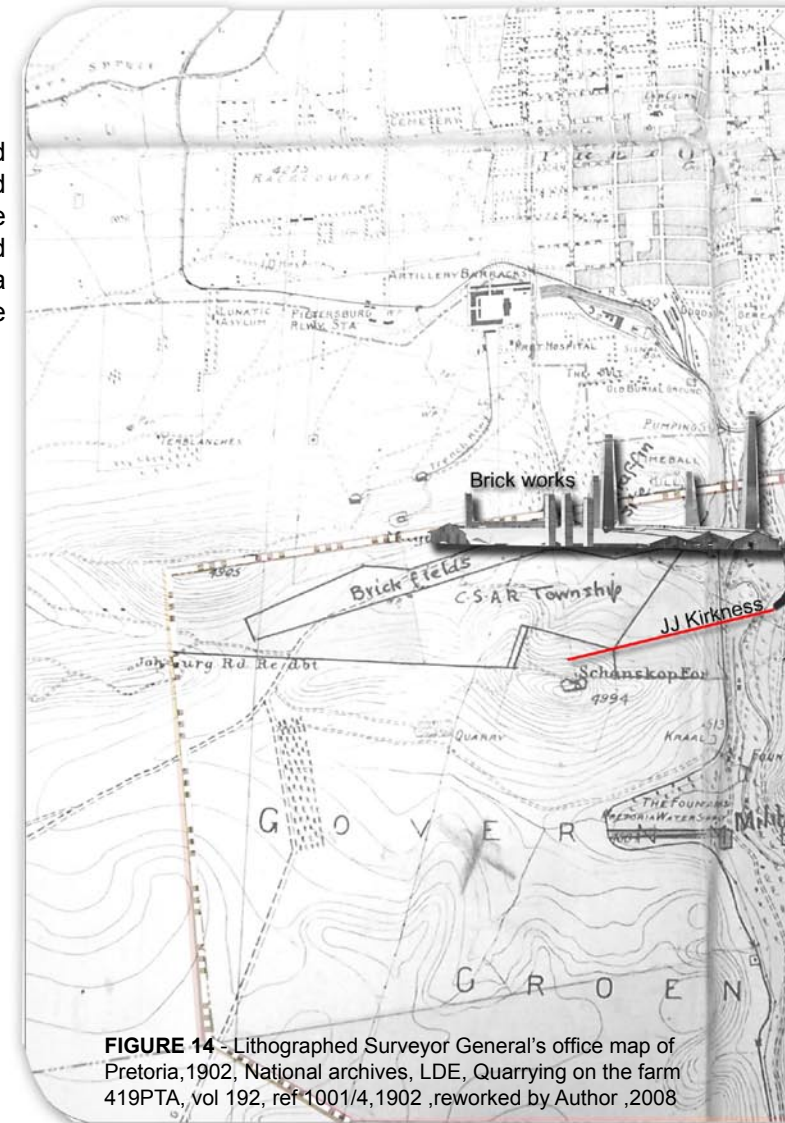


FIGURE 14 - Lithographed Surveyor General's office map of Pretoria, 1902, National archives, LDE, Quarrying on the farm 419PTA, vol 192, ref 1001/4, 1902, reworked by Author, 2008

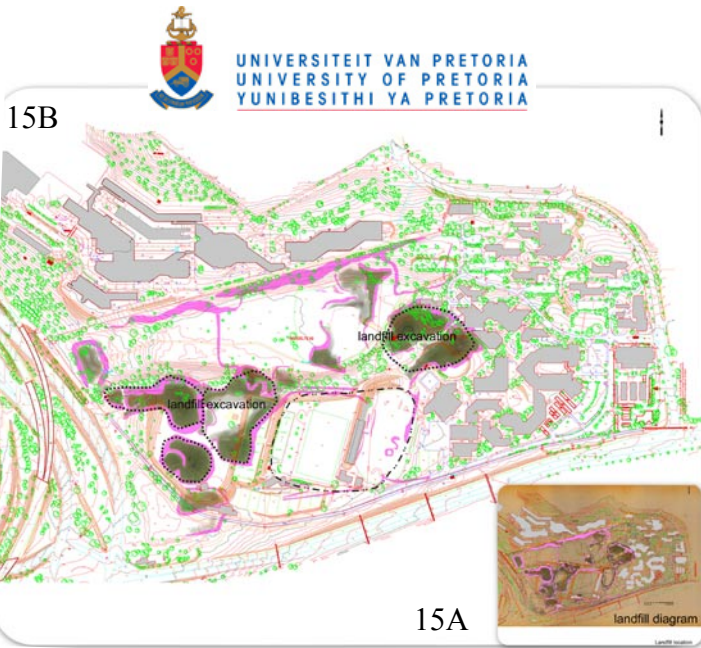
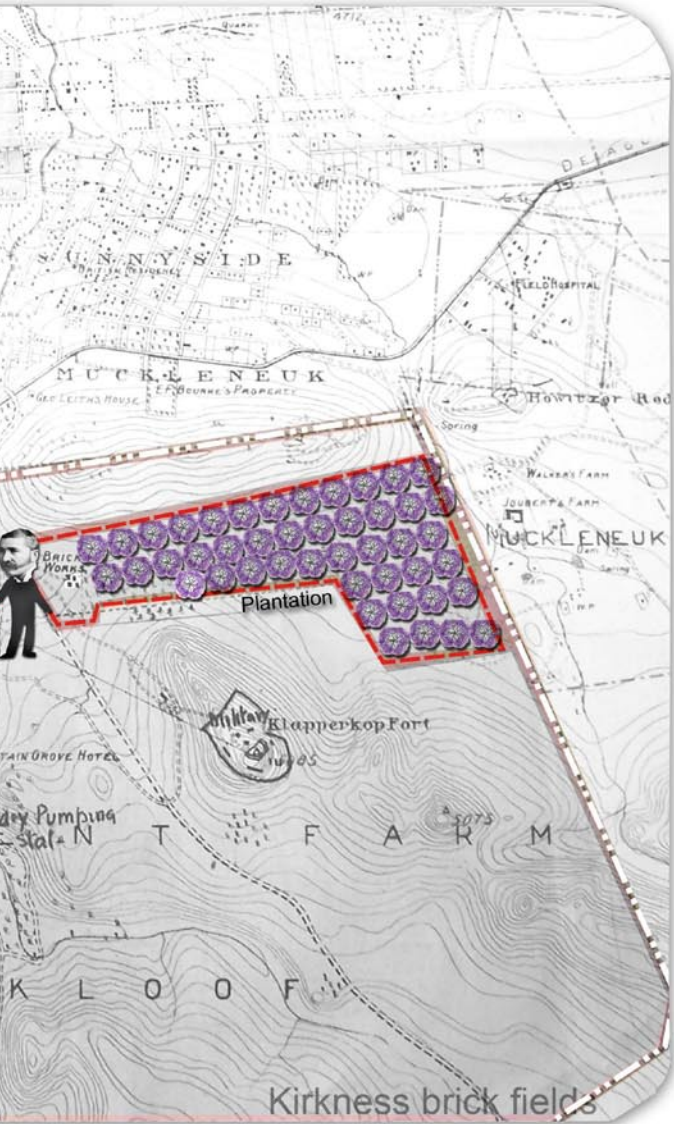


FIGURE 16 - Aerial photograph ,University of Pretoria, Van der Waal collection, stip 6 at no 117, 1954

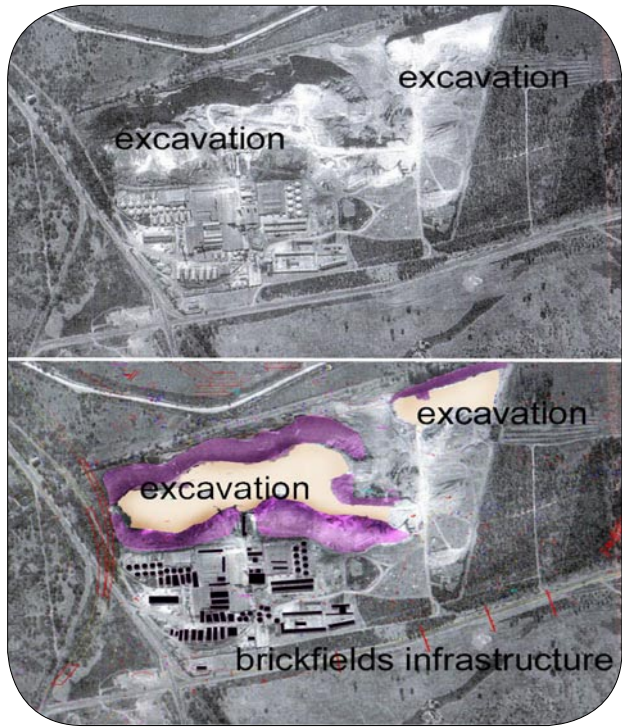


FIGURE 17 - Aerial photograph ,University of Pretoria, Van der Waal collection, stip 6 at no 117, 1954, reworked by Author, 2008

FIGURE 15 B- Landfill location diagram, University of Pretoria archive, J-3-2-1-D, Pretoria teachers college proposal, Taljaard Carter and associate architects,1973,reworked by Author, 2008

FIGURE 15 A- Landfill location diagram, University of Pretoria archive, J-3-2-1-D, Pretoria teachers college proposal, Taljaard Carter and associate architects,1973,reworked by Author, 2008

-Landfill site

Due to the excavation of clay at the Kirkness brickfields, large depressions in the landscape were left when brick production came to an end. These excavations functioned as Pretoria's landfill site during the following years. Figure 16 is an aerial photograph of the depressions. In Figure 17 the infrastructure of the brickfields is highlighted. Only the building on the far southern corner remains on the site today. Figure 15 (A) shows the original plan of the landfill site. In Figure 15 (B) the existing infrastructure is overlaid with the landfill plan that maps the location of the dump areas. These dump areas are circled with dots and indicate areas on the site with possible compaction problems.



FIGURE 18 – Photograph A of model, University of Pretoria archive, J-3-2-1-D, Pretoria teachers college proposal, Taljaard Carter and associate architects, 1973

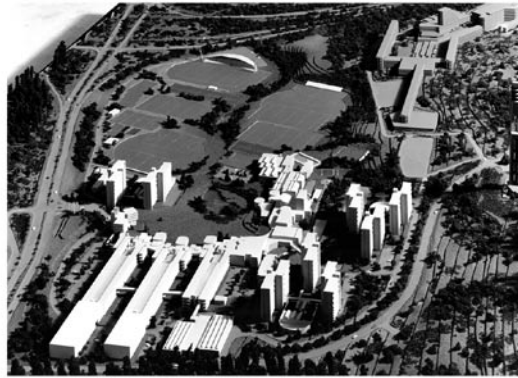


FIGURE 19 – Photograph B of model, University of Pretoria archive, J-3-2-1-D, Pretoria teachers college proposal, Taljaard Carter and associate architects, 1973

SLEUTEL

- A. ADMINISTRASIEBLOK
- B. LEESBLOK
- C. WETenskappe
- D. BUREAUBLOK
- E. AMFITEATER
- F. SPOORTERMINUM EN SAAL
- G. KAMPE
- H. WEDER
- I. LIGGAANDE OPVINDING
- J. TROESSE OPVINDING
- K. DRONKBOU
- L. DRAAI SWELKWARTEER
- M. WATROE SWARTIERE
- N. SWARTSWARTIERE
- O. WATROE SWARTIERE
- P. ESTELLE EN KAMPE
- Q. FOUWELING VAN 1980
- R. BAKTERYING
- S. TROESSE OPVINDING

- 1. KLEINER
- 2. WEDER
- 3. KAMPE
- 4. SWARTSWARTIERE
- 5. SWARTSWARTIERE
- 6. SWARTSWARTIERE
- 7. SWARTSWARTIERE
- 8. SWARTSWARTIERE
- 9. SWARTSWARTIERE
- 10. SWARTSWARTIERE
- 11. SWARTSWARTIERE
- 12. SWARTSWARTIERE

VOORGESTELDE NUWE KONTOERE



MEESTER PLAN

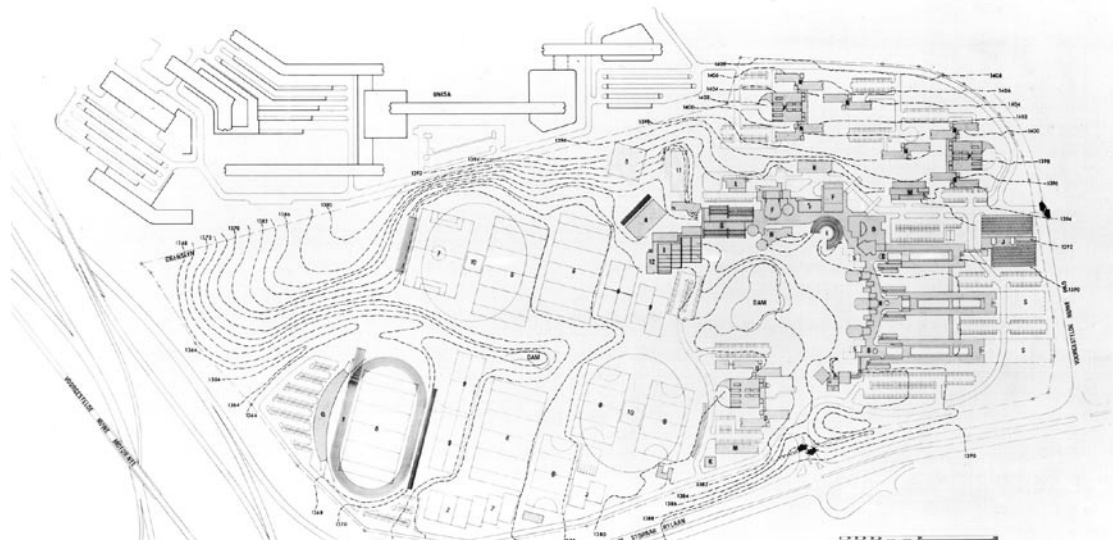


FIGURE 20 - Sketch plan of the proposal in photos A & B, University of Pretoria archive, J-3-2-1-D, Pretoria teachers college proposal, Taljaard Carter and associate architects, 1973

FIGURE 21 - Impact of Unisa and the Telkom tower on the city skyline, University of Pretoria archive, J-3-2-1-D, Pretoria teachers college proposal, Taljaard Carter and associate architects, 1973

-Timeline of the Teachers College

1-10 July 1902:

The Conference of Teachers in Town and Refugee Camp Schools in Transvaal and Orange River Colony, establish the “Normaal Schools” in Johannesburg and Pretoria to train teachers (Oberholzer, 1952:17-19)

1903:

The Johannesburg “Normaal School” closes and 40 students are transferred to Pretoria. The 2 institutions merge and is named the “Transvaal Normaal College” (Oberholzer, 1952: 17-19)

1908:
The Transvaal University College (the University of Pretoria) is established. The first students include students from the Normaal College.

1974:

The education of secondary school teachers was then the sole responsibility of the University of Pretoria.

1975:

New College grounds are bought in Groenkloof.

1978:

The Teachers College Pretoria together with the University of Pretoria agrees to the training of teachers in conjunction with one another.

1988:

The Teachers College Pretoria moves to the new campus in Groenkloof.

8 October 2001

The Teachers College Pretoria is incorporated into the University of Pretoria.

2004:

The High Performance Centre School (A UP sports talent school) for scholars from grade 3-12 is established on Groenkloof campus.

Figure 18 is a photograph of a model of one of the proposals for the design of The Teachers College Pretoria. Figure 19 is another view of the same model. This proposal was not built. Figure 20 shows a plan of the model in Figures 18 & 19. Figure 21 indicates the dramatic impact that Unisa and the Telkom tower have on the urban context.

-UP

Figure 22 shows the sports field of Groenkloof campus as viewed from Unisa. Figure 23 is the view towards the east, with the Telkom tower in the background. Figure 24 shows the existing dam on Groenkloof campus.



FIGURE 22 - Panorama towards Klapperkop, by Author, 2008



FIGURE 23 - Panorama towards the east, by Author, 2008



FIGURE 24 - Panorama of existing dam and main campus, by Author, 2008



FIGURE 25 - Local analysis diagram, by Author, 2008



2.1.3 Local - Existing facilities

As indicated in Figure 27, Groenkloof campus has residential buildings located in the north-easterly corner of the campus. The academic buildings are arranged around the existing irrigation dam. The north-western (upper) and south-western (lower) quarters of Groenkloof campus have existing sportfields. The upper sportfields are used as parking by students. The lower (and more developed sportfields) have a grass athletics fields, rugby / soccer field, netball and tennis courts, a cricket field and a swimming pool.

FIGURE 26 is a panorama towards the north-east, showing the dramatic impact of Unisa and the Telkom Tower on the site context.

Opportunities:

- Groenkloof campus has ample space for development.
- The surrounding cultural and natural setting makes the location of the site optimal.
- The campus is lower than the roads around the site. This allows visual access onto the site.
- The steep slope that separates the upper and lower sportfield has terrace potential.
- The architectural line and shadow rhythm on Unisa's façade can be continued on Groenkloof campus.

Constraints:

- The existing buildings are not legible, this causes disorientation.
- The existing dam has aesthetic qualities, but the dam edges are steep and dangerous for physically challenged.
- The lack of a ring road system makes vehicle circulation difficult.

FIGURE 27 - Aerial photograph of Groenkloof campus, University of Pretoria Geography department, assembled by Author, 2008



FIGURE 26 - Panorama towards the north, by Author, 2008

- Hydrological potential



Figure 32 is a stormwater diagram of Groenkloof campus. A large stormwater channel bends around the campus southern boundary. Four pipes guide the water underneath George Storrar Drive into the channel. This channel drains stormwater from Klapperkop (Bergklapper Loop) and Groenkloof residential area. This channel terminates in an inlet that pipes the stormwater underneath the highways (to the west of the site) and flows into the Apies River (refer to 2.1.1).

Stormwater from Groenkloof campus is channelled into the existing irrigation dam. The dam overflows into an eroded drainage line that becomes a wetland. This drainage line is called the Kerameikos Loop. The sport fields' drainage system also drains into the wetland. The wetland terminates at a drainage point that connects the water to the Apies River. Figure 28 shows the wetland at the western end of the site. In Figures 29 & 30 the eroded drainage ditch is shown. Figure 31 shows the inlet of the wetland drainage point that leads to the Apies River.

Opportunities:

- The large volumes of stormwater running past the site has great recreational and ecological potential for Groenkloof campus.
- The existing drainage system connected to the Apies River makes the upgrade of this drainage line less complicated.
- Groenkloof campus has ample space to reroute water onto.

Constraints:

- The water quality of the water flowing in the channel.
- Cost of intervention will be large.
- The Water Users Licence Application will be needed
- NEMA and Section 21 of the Water Act of 1994 will impose restrictions.

FIGURE 32 - Hydrology diagram of Groenkloof campus, by Author, 2008

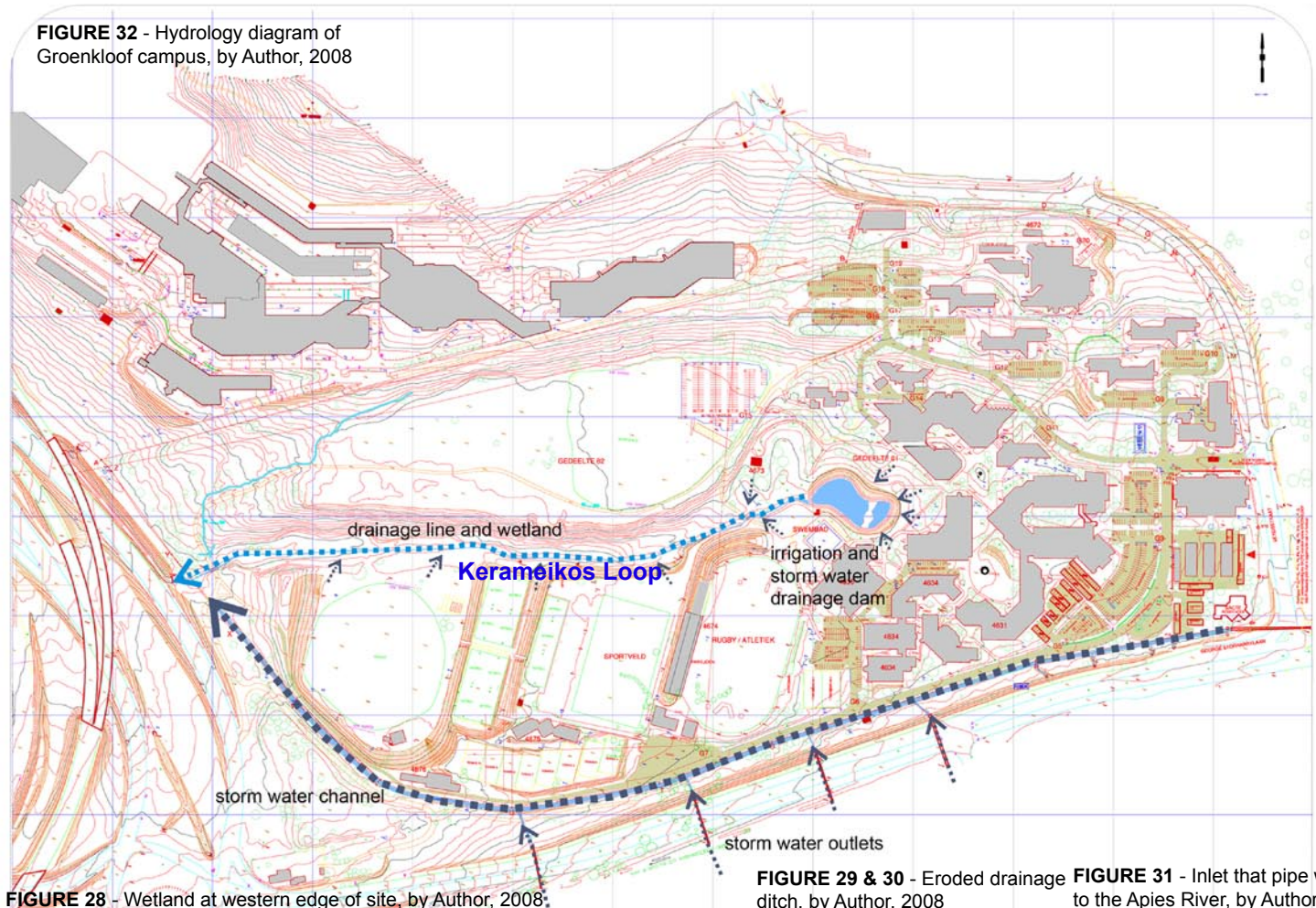


FIGURE 28 - Wetland at western edge of site, by Author, 2008.

FIGURE 29 & 30 - Eroded drainage ditch, by Author, 2008

FIGURE 31 - Inlet that pipe water to the Apies River, by Author, 2008



- Existing circulation

EXISTING FACILITIES

HYDROLOGY

CIRCULATION

VEGETATION

GEO TECHNICAL

HERITAGE

SLOPE

VISUAL

INTERVIEWS

Figure 33 is a vehicle and pedestrian analysis. Groenkloof campus has one entrance along Leyds Street and a service entrance further up in Leyds Street. Vehicle circulation is simple and walking is encouraged by strategically located parking areas. Traffic is not a problem as the low student numbers cause little congestion. No formal road exists connecting the upper and lower sports fields.

The architectural illegibility of the buildings contributes to pedestrian and vehicle disorientation. No prominent pedestrian circulation hierarchy exists. The pedestrian movement is scattered. The existing dam acts as the campus "heart", this space is not celebrated or user-friendly.

Opportunities:

- A ring-road system can easily be implemented by extending the existing roads.
- The service road along Leyds Street could become another entrance.
- Positioning bulk parking for those students parking on sportsfields could structure pedestrian movement.

Constraints:

- A bridge is needed to complete the ring road between the upper and lower terrace.

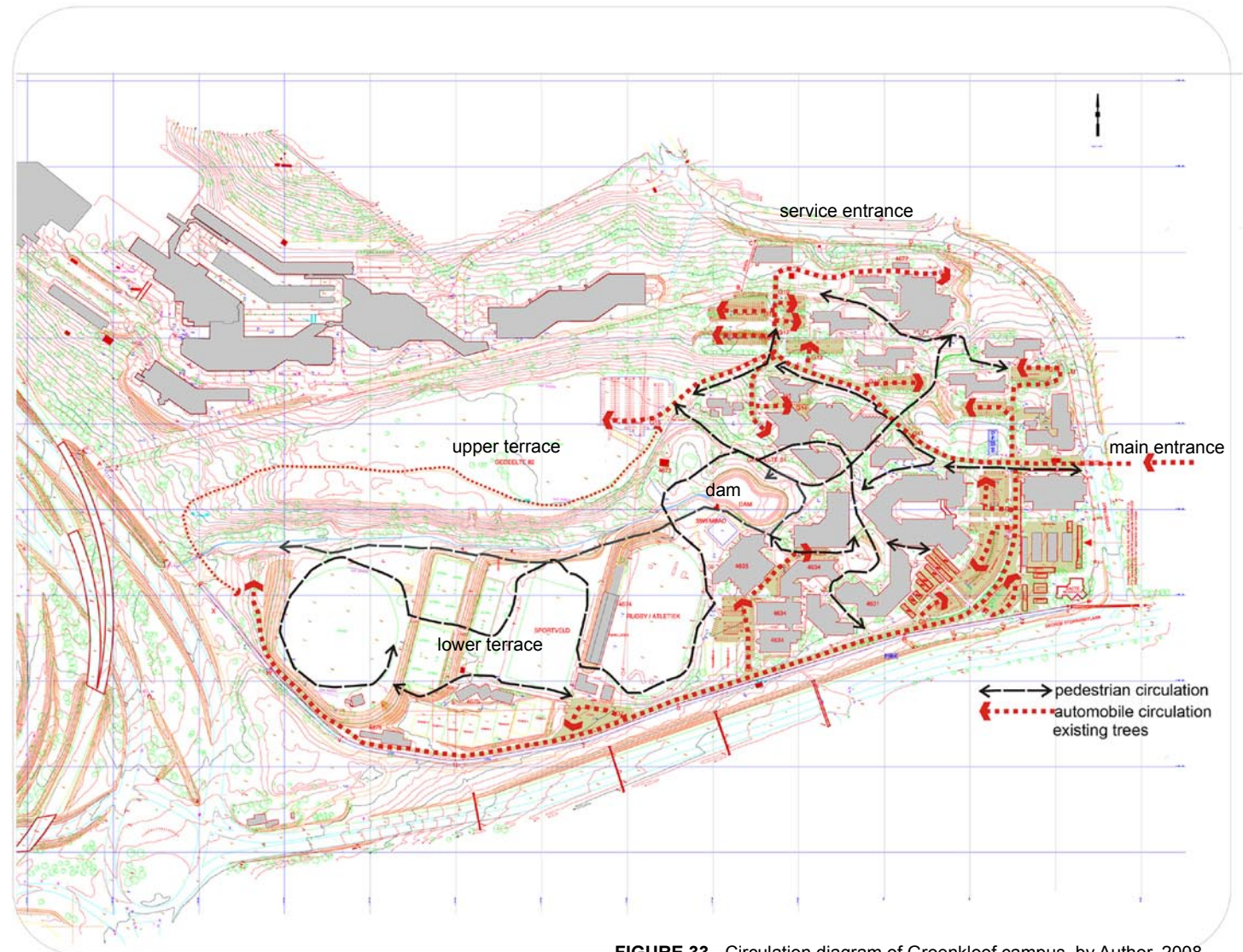


FIGURE 33 - Circulation diagram of Groenkloof campus, by Author, 2008

- Existing vegetation

EXISTING FACILITIES

HYDROLOGY

CIRCULATION

VEGETATION

GEO TECHNICAL

HERITAGE

SLOPE

VISUAL

INTERVIEWS

Figure 34 indicates the existing trees and “green” areas on Groenkloof campus. The built campus has rolling landscapes with lawns and manicured gardens. The landscape around the existing dam consists of lawns and indigenous and exotic trees. The drainage line and wetland system are covered with lawn and typical wetland species. Many of the large Eucalyptus trees that grew in the drainage way were removed and only a few remain around the irrigation dam.

The upper sports field is partially rehabilitated on the western edge and the grass is cut short on the eastern end of the sportsfield. The lower sportsfield is fully manicured lawn and rounded off by indigenous trees.

Opportunities:

- Groenkloof campus has large open green spaces that could easily be adjusted to satisfy the proposed development.
- Existing trees are well established and irrigation systems are in place.
- The proposed scheme aim to replace all “natural” sportsfields with synthetic fields. Synthetic fields are more costly initially but have long term benefits ecologically and financially.

Constraints:

- Many exotic species will have to be removed.



FIGURE 34 - Vegetation diagram of Groenkloof campus, by Author, 2008

- Geo-technical investigation



Figure 36 shows sections through the landfill site. The subsurface shale was covered with broken bricks before landfill filled these excavations. The yellow in the diagram indicate shale, the grey represent the rubble and the broken brick course is shown by the red-brown layer. Figure 37 shows the landfill site plan overlaid with one of the proposals for the Teachers College.

Opportunities:

- Exposing these “history layers” could attract tourist and historians to Groenkloof campus.

Constraints:

- Compaction and soil stability problems due to the landfill.
- Possible ground water contamination by the landfill.

FIGURE 35 - Legend of landfill sections, by Author, 2008

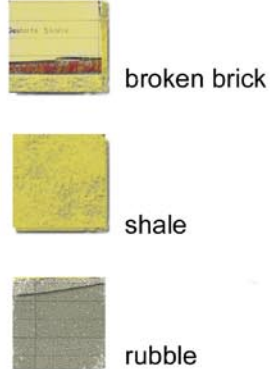


FIGURE 36 - Sections through landfill, University of Pretoria archive, J-3-2-1-D, Pretoria teachers college proposal, Taljaard Carter and associate architects, 1973, reworked by Author, 2008

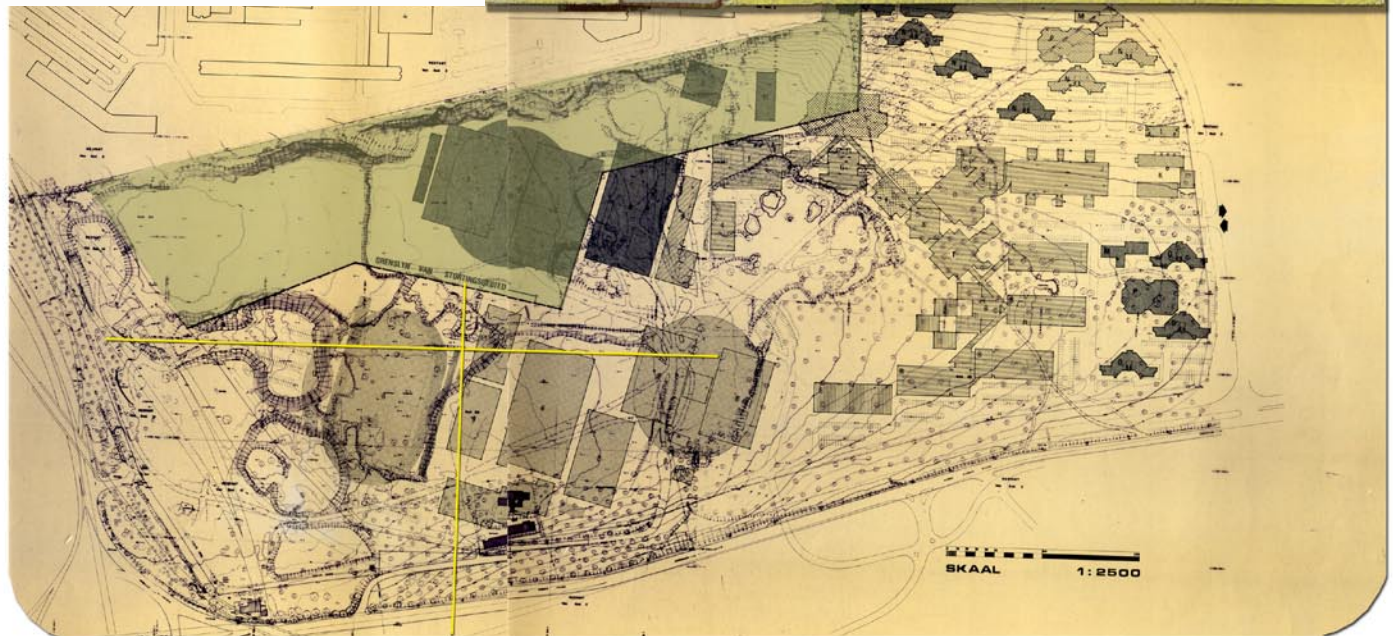
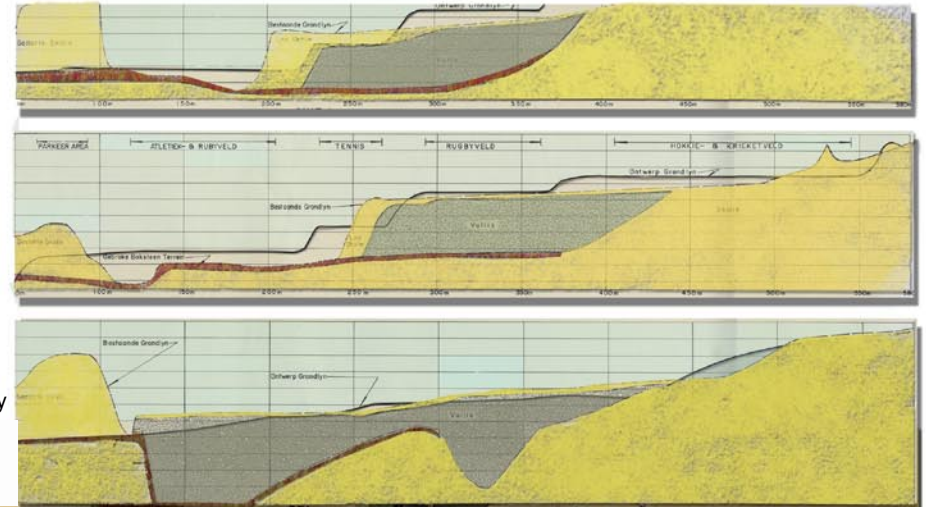


FIGURE 37 - Landfill site plan, University of Pretoria archive, J-3-2-1-D, Pretoria teachers college proposal, Taljaard Carter and associate architects, 1973, reworked by Author, 2008

- Heritage overlay diagram
(Figure 39)



Opportunities:

- The brickfield chimneys have aesthetic potential. The scale of these structures could function as floodlights or climbing walls.
- The chimney structures created a sense of place and the reintroduction of these strong vertical elements could enhance the cultural and historic context of the area.

Constraints:

- Reinventing the brick towers will have large cost implications.
- The chimneys must have a function to make these structures feasible.



FIGURE 38 - Design inspiration from relevant history, by Author, 2008

FIGURE 39 - Lithographed Surveyor General's office map of Pretoria, 1902, National archives, LDE, Quarrying on the farm 419PTA, vol 192, ref 1001/4, 1902, reworked by Author, 2008

- Slope analysis



The locations of the sections done to analyse the slope are shown in Figure 40.

Figure 43 is section A through Groenkloof campus. Unisa's terraces, the upper sportsfields, drainage line, lower sportsfields, stormwater channel and George Storrar Drive can be seen in this section.

Figure 42 is section B. The upper and lower sportsfields are separated by a dramatic step in the landscape. The visual access onto the site is enhanced with George Storrar Drive situated higher than the campus. Klapperkop and Unisa have full visual access onto Groenkloof campus.

Opportunities:

- The visual access onto the site requires the proposed scheme to be aesthetically and functionally attractive.
- The views of surrounding monuments expand the context of the site. These vistas should be enhanced.

Constraints:

- The proposed scheme must act as a base for Unisa.
- This scheme must not compete with the grandeur of this gateway into the city but enhance the sense of place.

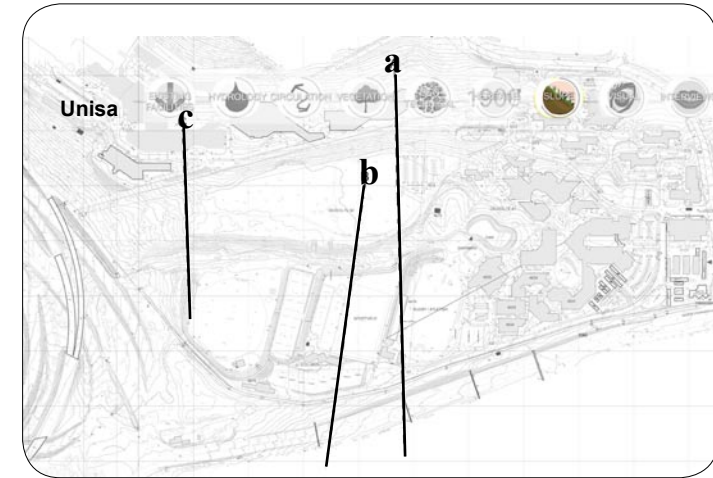


FIGURE 40 - Plan of Groenkloof campus that indicate section locations, Author, 2008

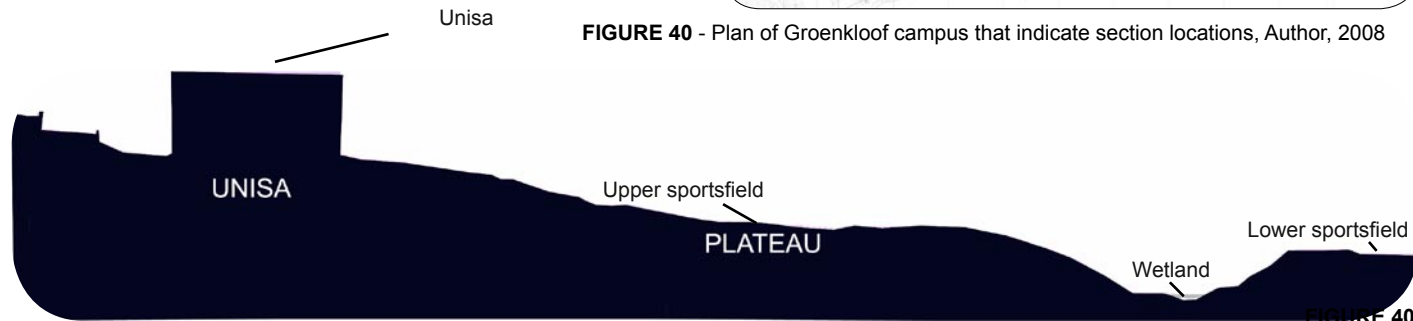


FIGURE 41 - Section C, Author, 2008



FIGURE 42 - Section B, Author, 2008

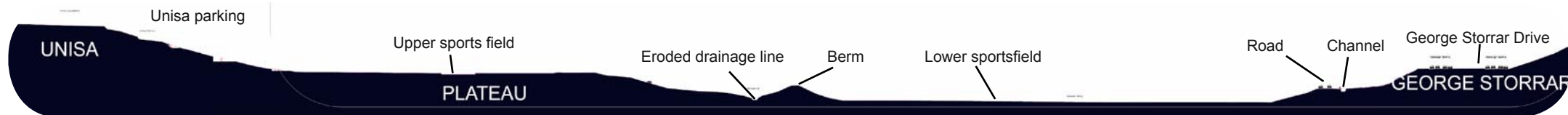


FIGURE 43 - Section A, Author, 2008

- Photographic analysis



Figure 44 indicates the city of Groenkloof campus. The dots are cultural and historical monuments. The lines show vistas towards these monuments from Groenkloof campus.

Figure 44a shows the vista towards the west with the Voortrekker monument, Freedom Park and Unisa.



FIGURE 44 A - View towards the west, Author, 2008

Opportunities:

- These vistas extend the site context to beyond the boundary line of Groenkloof campus.
- Enhancing these visual connections to surrounding monuments will tie Groenkloof campus to the cultural context.

Constraints:

- The grandeur of Unisa could easily be cluttered by additions to this southern gateway into Pretoria.
- The proposed scheme should enhance the existing setting.

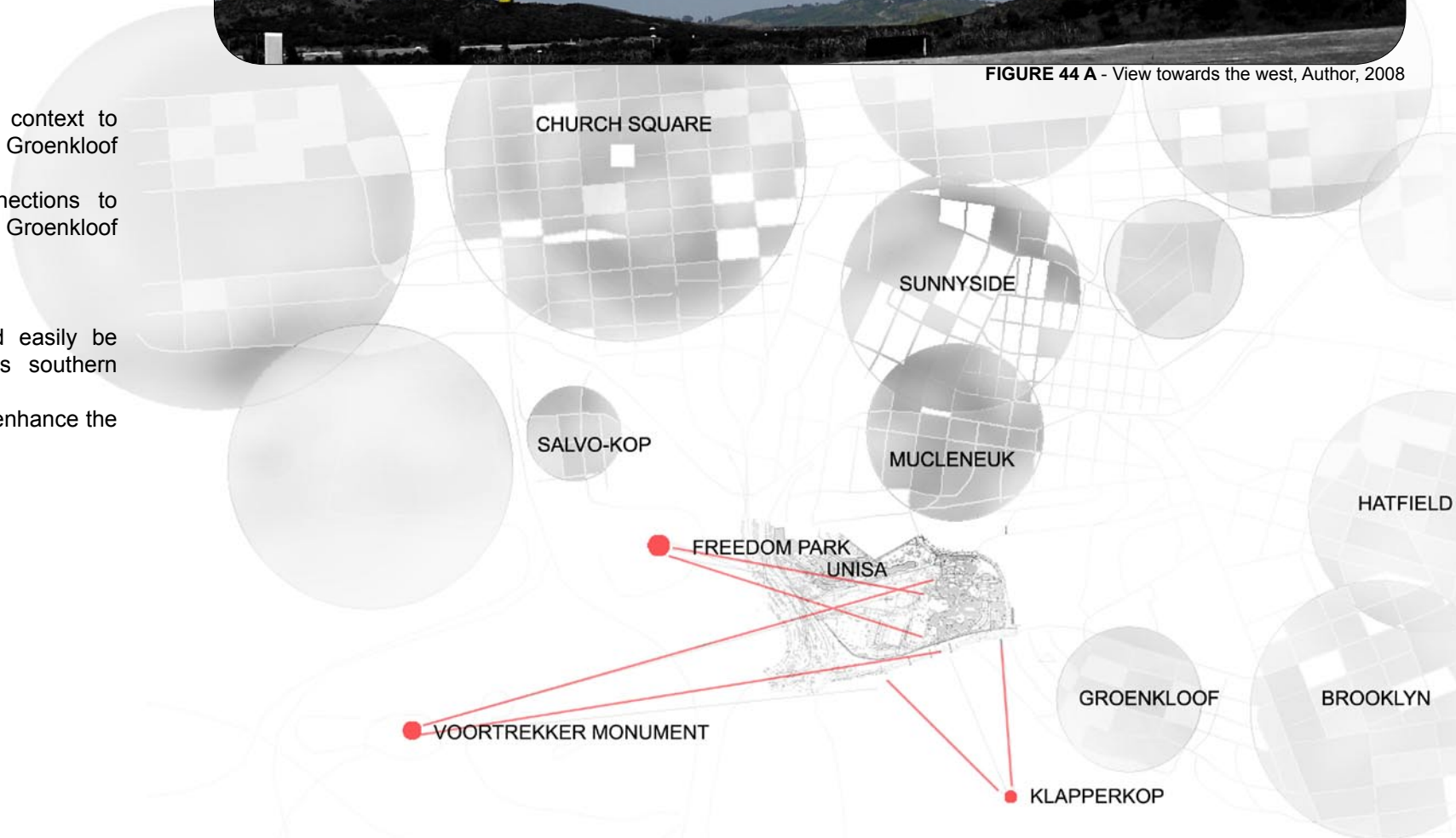


FIGURE 44 - City context diagram, Author, 2008



- Interviews and University policy on sport

According to Van der Merwe, G. 2008, the only rowing facility on campus is the L.C de Villiers dam. This water body has apparently had many water quality problems, and the shape and length of this dam is not optimal for flat water rowing. Groenkloof has been considered for new canoeing facilities. Van der Merwe, G. (2008) mentioned that flat water, slalom and white river rafting facilities are needed in Gauteng as these sportsmen travel great distances to train in rivers and dams.

Van Zyl, R. (2008) (a white-water athlete) explained the various components of flat rowing, white water kayaking and white water slalom.

Rowing is a sport where athlete's race against each other on relatively flat water, such as rivers, lakes, the ocean or man-made channels. The boats are propelled by the forces on the oar blades as they are pushed against the water. This is said to be one of the oldest Olympic sports.

In **white-water kayaking** a kayak is maneuvered on a moving body of water, typically a white-water river or synthetic course. White-water kayaking can range from gentle moving water to dangerous white-water rapids. River rapids are graded (like ski runs) according to the challenge and danger of the rapids. White-water grades range from 1 (easiest) to 6 (the most difficult and dangerous).

Grade 1 can be described as water moving gently with ripples. Grade 6 is described as severe or almost "unrunnable white-water",



such as the Niagara Falls.

Slalom is a technical and competitive form of kayaking, and the only white-water event at the Olympic Games. Racers paddle as fast as possible from the top to the bottom of a designated section of river while correctly negotiating gates (a series of double-poles suspended vertically over the river).

Soccer:

"The Tuks Soccer Club has, over the last three years, grown from three teams to 43 teams, making it one of the largest clubs in South Africa. It offers opportunities for participation in and specialized coaching to groups ranging from 8-year old children to students, women's teams as well as senior and semi-professional players". (University of Pretoria strategic plan, 24 September 2002)

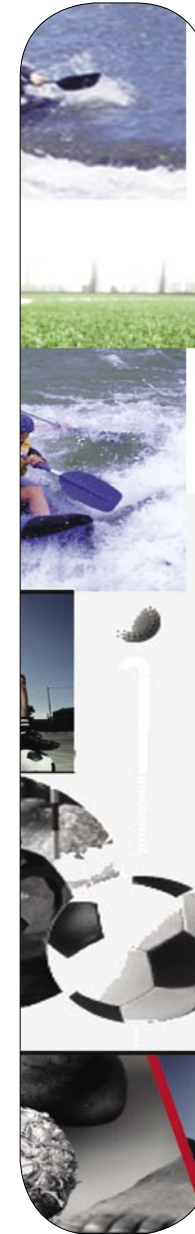
The soccer clubs currently practicing on Groenkloof campus were interviewed to understand the needs of these sport teams.

These include:

- Club house
- Dribble areas
- Events space

Hockey team:

"...and hockey with 47 outdoor teams" (University of Pretoria strategic plan, 24 September 2002). Hockey teams were



interviewed on L.C de Villiers sports field to determine whether more facilities are needed. The following needs emerged:

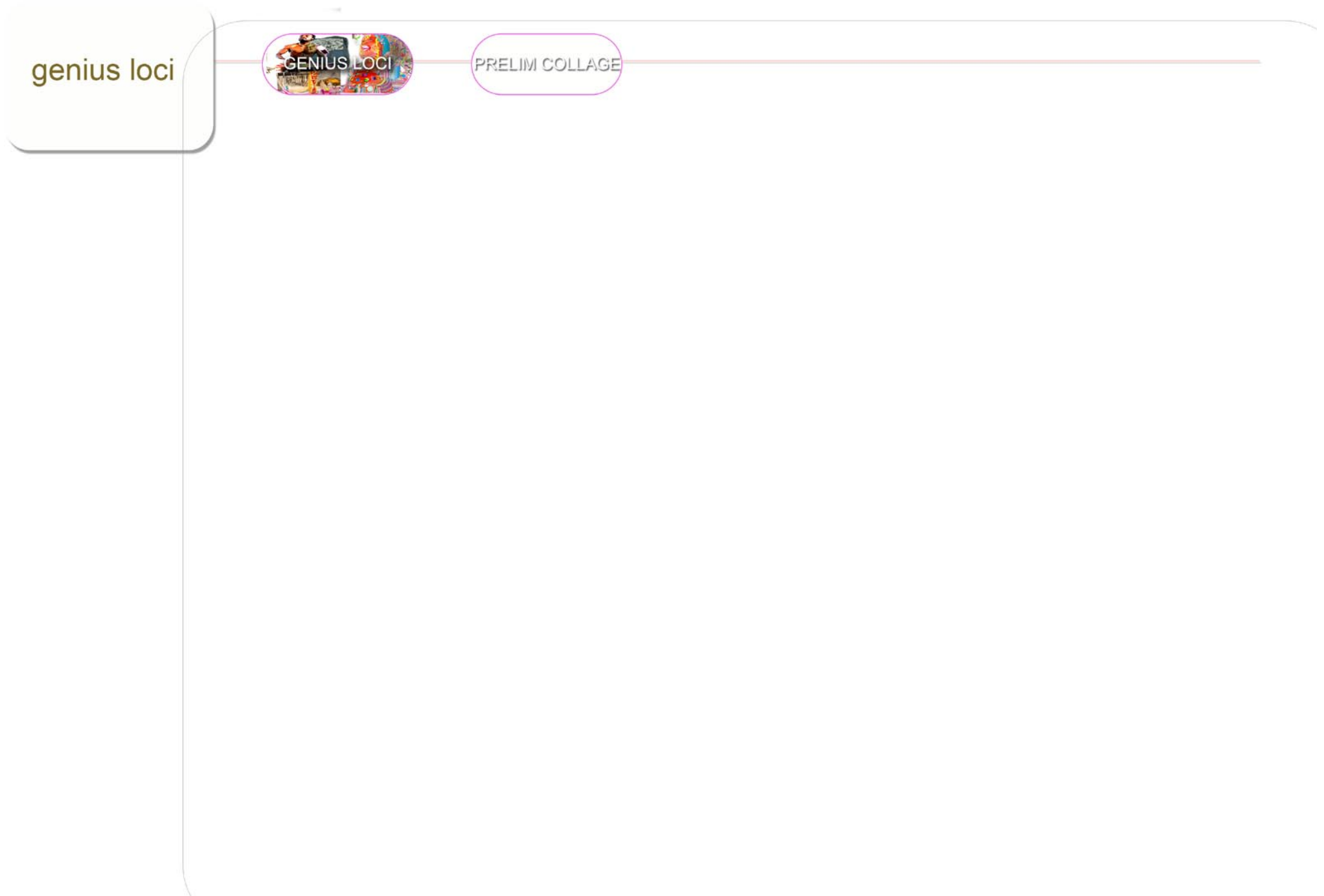
- Club house
- More astro turf
- Dribble goals practice areas

Opportunities:

- Some of the existing sport infrastructure on Groenkloof campus could easily be integrated into a new development plan for hockey and soccer facilities.
- The large demand for soccer and hockey facilities enforce the proposal of a HPC catering for these sports.
- Groenkloof campus has already been identified as a possible site for water sport facilities.

Constraints:

- Some existing sport facilities on Groenkloof campus will have to be demolished to provide soccer and hockey facilities.
- The soccer and hockey facilities on L.C de Villiers campus must be reshaped to become sports fields that service the rest of the sports types catered for by the HPC on L.C de Villiers.
- Large amounts of water are needed to satisfy a rowing and slalom facility. Municipal water is not a sustainable source.



2.1.4 Genius loci

The genius loci is an important principle in garden and landscape design. It is referenced by Alexander Pope with the following lines from *Epistle IV, to Richard Boyle, Earl of Burlington*:

*“Consult the genius of the place in all;
That tells the waters or to rise, or fall
Or helps th’ ambitious hill the heav’ns to
scale,
Or scoops in circling theatres the vale;
Calls in the country, catches opening glades,
Joins willing woods, and varies shades from
shades,
Now breaks, or now directs, th’ intending
lines;
Paints as you plant, and, as you work,
designs”.*

*“... all must be adapted to the genius of the
place, and ... beauties not forced into it, but
resulting from it’.*

The distinctive atmosphere of the pervading spirit at Groenkloof campus is the setting nestled between four hills. Groenkloof campus is the podium to Unisa and part of the green banks that flows in to the southern gateway of Pretoria. Groenkloof campus looks like a stepped tapestry seen from Klapperkop. The drainage line is the heart line and separates the upper and lower terrace of the campus.

- Collage

The analysis has highlighted various opportunities and constraints. A collage was put together communicating all ideas in pictures. Hockey, soccer, water sport, habitat creation, recreation, day-night activities, heritage, modern finishes and hydraulic potential are illustrated in the collage.



PRELIM COLLAGE

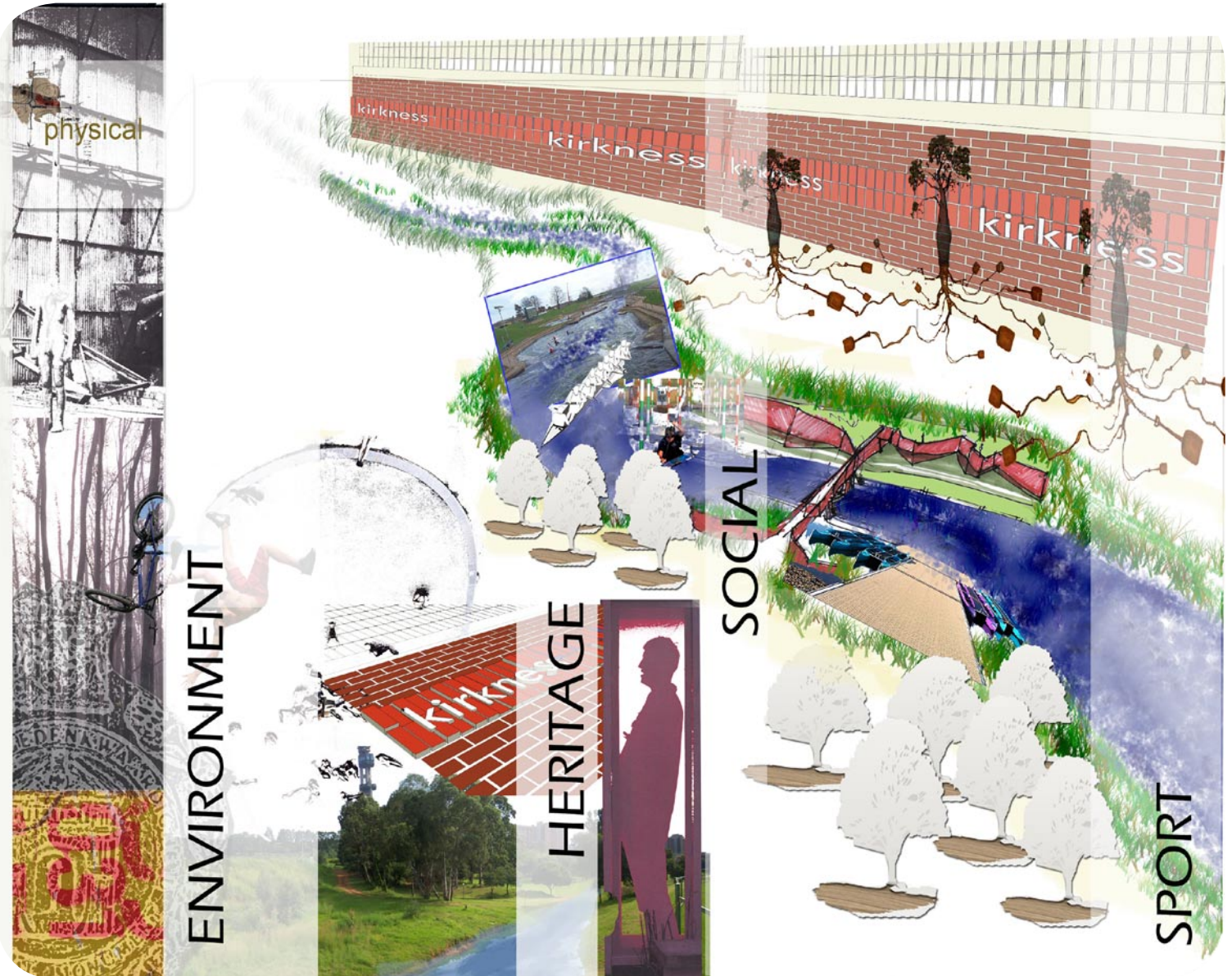
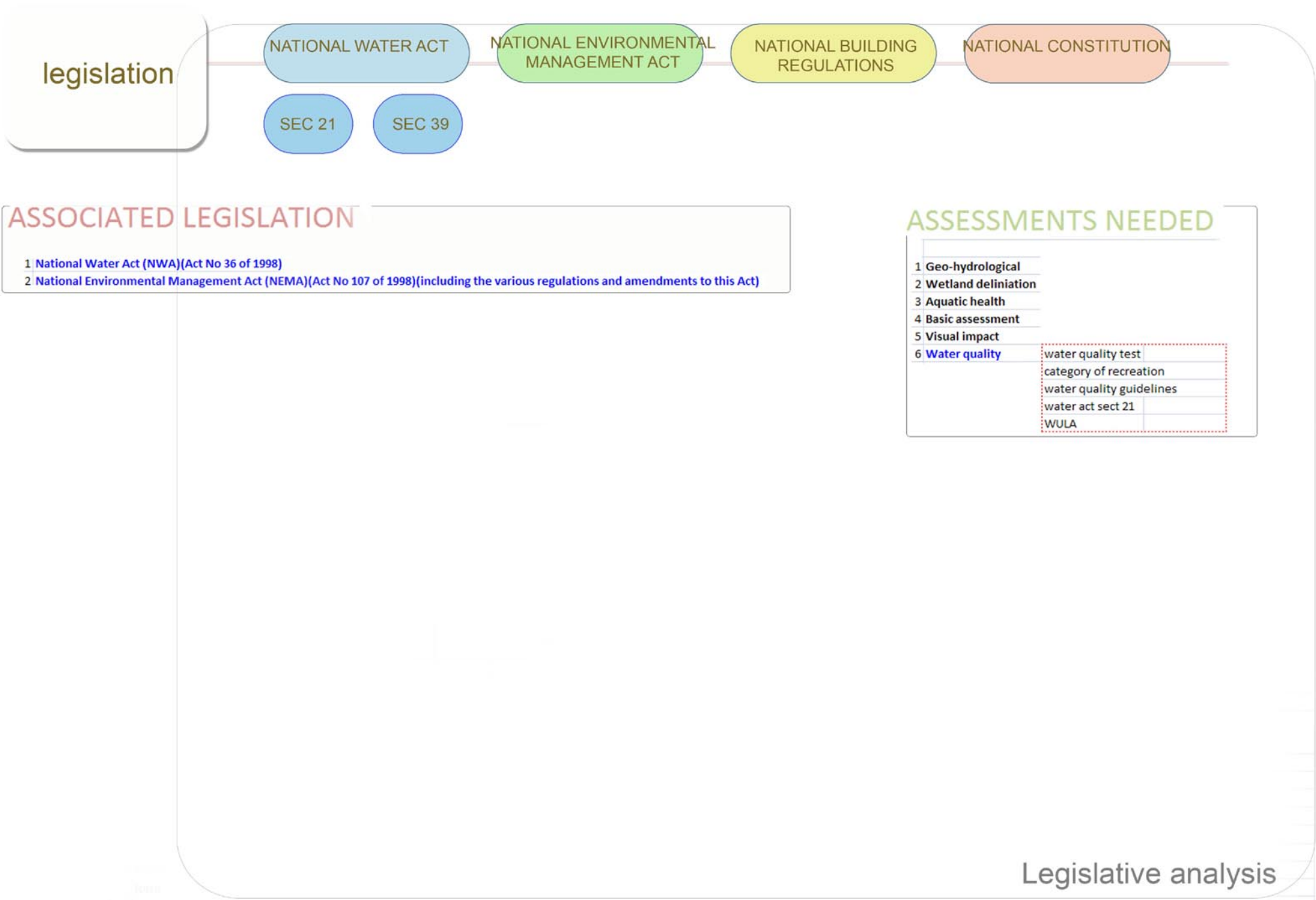


FIGURE 47 - Concept collage, Author, 2008



legislation

NATIONAL WATER ACT

NATIONAL ENVIRONMENTAL
MANAGEMENT ACT

NATIONAL BUILDING
REGULATIONS

NATIONAL CONSTITUTION

SEC 21

SEC 39

ASSOCIATED LEGISLATION

- 1 National Water Act (NWA)(Act No 36 of 1998)
- 2 National Environmental Management Act (NEMA)(Act No 107 of 1998)(including the various regulations and amendments to this Act)

ASSESSMENTS NEEDED

- 1 Geo-hydrological
- 2 Wetland deliniation
- 3 Aquatic health
- 4 Basic assessment
- 5 Visual impact
- 6 **Water quality**

water quality test
category of recreation
water quality guidelines
water act sect 21
WULA

Legislative analysis

FIGURE 48 - Legislative analysis diagram, Author, 2008

2.1.5 Legislation

Parts 5.1, 5.2, 5.3, 5.9 and 5.11 of Section 21 of the National Water Act (Act No 36 of 1998) and Section 39 of the National Water Act (Act No 36 of 1998) 398, could have some impact on the proposed development. These sections were investigated.



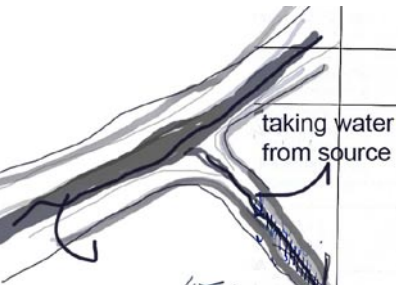

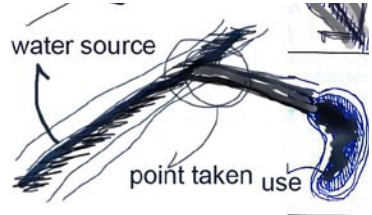
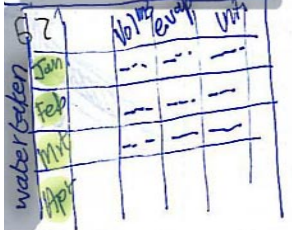
<p>Section 21 of the National Water Act (Act no 36 of 1998)</p>			
<p>(5.1) Taking water from a water source:</p>			
<p>Taking water from a water source is a water use of section 21 of the NWA. A water source includes a river, stream, dam, spring, aquifer, wetland, lake, and pan.</p>		<p>Abstracting water from an off-channel dam having no catchment (a balancing dam), a channel, or a pipeline is not taking from a resource.</p>	<p>channel to (m), a pipeline from a</p> 
<p>The water use occurs at the point where the water is taken from the source and not at the point where it is applied.</p>		<p>Monthly volumes of water to be taken must be specified in a schedule, by the applicant.</p>	

FIGURE 48-77 Author, 2008

<p>(5.2) Storing water:</p>			
<p>Storing of water is a water use which may require a license in terms of Section 21 (b) of the National Water Act.</p>		<p>Every dam with a wall more than 5 m high, or which is capable of storing more than 50 000m³, may pose a dam safety risk, needs to be classified and may need Dam Safety licenses to construct and to impound, in addition to the water use license.</p>	
<p>(5.3) Impeding or diverting the flow of water in a water course:</p>			
<p>An obstruction in the flow of water in a watercourse or diverting some or all of the flow from a watercourse are water uses which may require a license in terms of Section 21 (c) of the National Water Act. The diverted water must eventually be returned to the natural water course.</p>		<p>- to facilitate water flow monitoring through measuring weirs in order to attenuate floods or to move a stream from its current location to facilitate activities that would deteriorate the resource quality of the stream should it remain in its current position.</p>	
<p>(5.9) Altering the bed, banks, course or characteristics of a watercourse:</p>			
<p>This water use refers to the physical changes made to a watercourse, for instance, to widen or straighten the channel of a river. A license in terms of Section 21 of the National Water Act will be required to authorize such activity.</p>		<p>Alterations of the bed and banks are usually needed for construction and infrastructure development near or across a river.</p>	

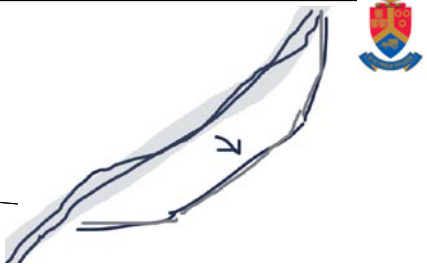
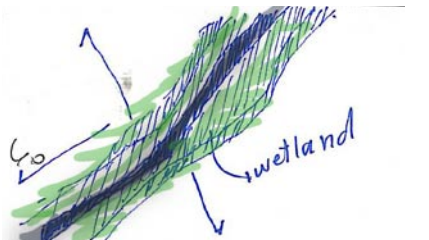
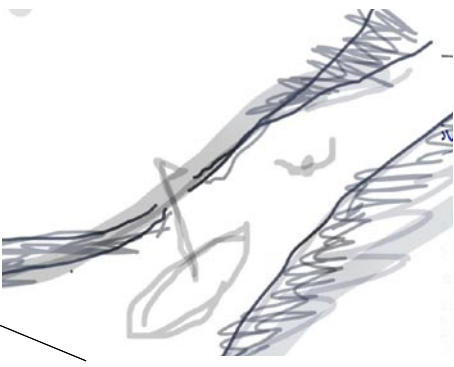
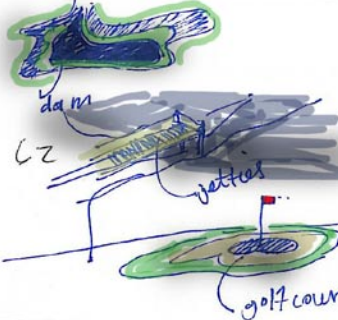
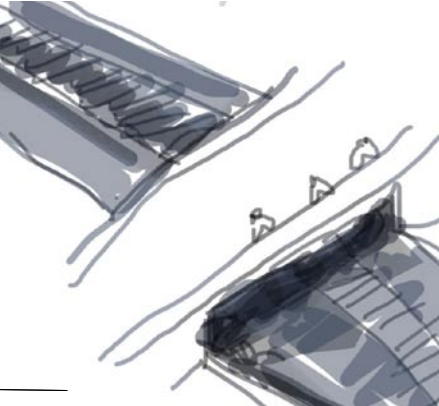
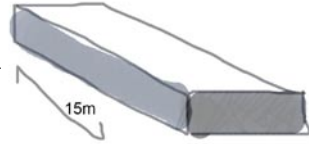
<p>Diversion of a water course: The river channel is usually constructed or replaced with a canal that may extend for several kilometers from the original course.</p>		<p>UNIVERSITEIT VAN PRETORIA UNIVERSITY OF PRETORIA YUNIBESITHI YA PRETORIA</p> <p>more than 500m upstream or downstream from the boundary of any wetland or estuary is a Section 21 (i) water use.</p>	
<p>(5.11) Using water for recreational purposes:</p>			
<p>This water use recreation is restricted to activities using water bodies for recreational activities such as swimming and boating, and will in future be regulated by means of a Section 21(k) authorization. No water use license is required for this water use.</p>		<p>The establishment of dams, jetties, and golf courses are not considered to be using water for recreation as they may involve other water uses, such as taking and storing of water and altering the bed and banks of watercourses, and would need to be licensed in terms of the appropriate section.</p>	
<p>General authorisation in terms of Section 39 of the National Water Act (no 36 of 1998) no 398.</p>			
<p>Impeding or diverting the flow of water in a watercourse:</p> <p>"DIVERTING FLOW" means the temporary or permanent diversion of flow for (d) Construction and maintenance purposes ofbridges..-</p> <p>"IMPEDING FLOW" means the temporary or permanent obstruction or hindrance to the flow of water into watercourse by structures built either fully or partially in or across a watercourse including...bridges and culverts..weirs...structures for water abstraction...slipways</p>			

FIGURE 48-77 Author, 2008

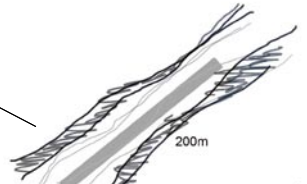


Any structure built in a water course does not...

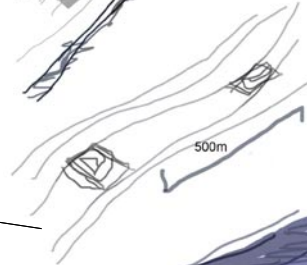
-exceed foundation width of 15m



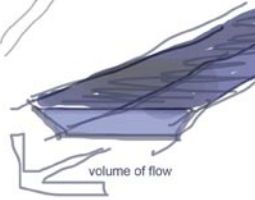
-exceed a length of 200m measured from one side to the other



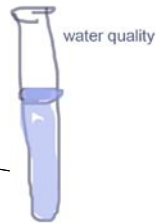
-does not occur within a distance of 500m upstream or downstream of a another that impedes or diverts flow on the same watercourse, measured along the water course



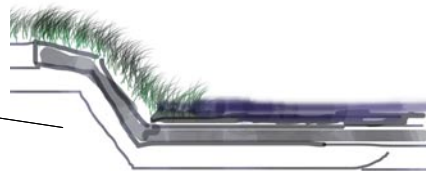
-volume of the flow is not reduced except for natural evaporative losses



-water quality is not detrimentally affected



-strict erosion control measures are to be taken during and after construction to ensure no erosion of the beds of the banks of a water course takes place



-Rehabilitation of riparian habitat integrity by ensuring that during rehabilitation only indigenous species are used in restoring the bio-diversity.



-Rehabilitation of disturbed and degraded riparian areas to restore and upgrade the riparian habitat to sustain a bio-diverse riparian ecosystem;



-Rehabilitation of disturbed and degraded riparian areas to restore and upgrade the riparian habitat to sustain a bio-diverse riparian ecosystem;



-Removal of all alien vegetation and new alien vegetation recruitment must be controlled



FIGURE 48-77 Author, 2008



Altering the bed, banks or characteristics of a watercourse

“Altering the bed, banks or characteristics of a watercourse” means the temporary or permanent alteration of a water course for...
...construction and maintenance purposes of infrastructure such as....bridges, water abstraction structures, structures for slope stabilization and erosion protection.....”

-The alteration activity does not **extend for more than 50m continuously** or a **cumulative distance of 100m** on that property or land measured along the water course.

-Any structure built partially in or across a watercourse does not exceed

-**a height of 10m**, measured from the natural level of the bed of the watercourse on the downstream face of the structure to the crest of the structure

-**a width of 10m**, measured at the widest part of the structure;

-**a length of 50m**, measured from edge of the water course to the other

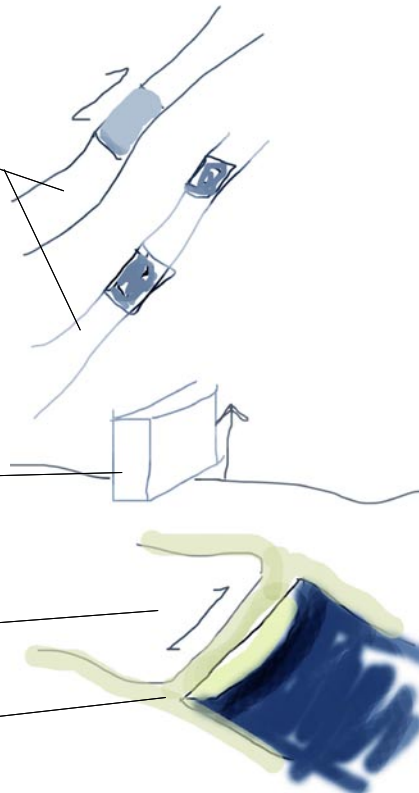


FIGURE 48-77 Author, 2008

2.2 Synthesis

-Contextual

Groenkloof campus is set in a rich cultural and environmental setting. The Apies River, Unisa, Voortrekker monument, Freedom Park and Klapperkop enhance the Groenkloof context.

- Historical

Groenkloof campus has a rich historic relevance. The Kikkess brickfields, the landfill period and the development of the Teachers College all enhance the historic richness of Groenkloof campus.

- Local

Groenkloof has ample space for development and existing infrastructure. Groenkloof needs a “catalyst” to generate new activities and visitors. The stormwater channelled on the boundary of Groenkloof has great potential if rerouted onto Groenkloof campus. The vistas towards the surrounding monuments broaden the boundaries of the site and should be emphasised.

- Genius loci

Groenkloof has unique qualities, not only in terms of physical makeup, but of how the site is perceived. It is the responsibility of the architect and landscape architect to be sensitive to these unique qualities, to enhance them rather than to harm them.

- Legislation

Parts 5.1, 5.2, 5.3, 5.9 and 5.11 of Section 21 of the National Water Act (Act no 36 of 1998) and Section 39 of the National Water Act (no 36 of 1998) 398, could impact on the proposed development.

2.3 Concept

Figure 78 is a diagram of the design concept for Groenkloof campus. The “heart” symbolizes a new catalyst for the campus, the line through the heart symbolize a “green spine” that stitch activities together. The smaller lines indicate detail design that commemorate cultural significance.

- The catalyst for Groenkloof campus is the HPC. This facility will cater for soccer, hockey and water sports.
- A green spine (stormwater management plan) is proposed that ties the built campus and sports facilities together.
- A material selection that reflects the relevant history will be assembled and used in the detail design of the proposal.

2.4 Brief

The client is the University of Pretoria and the HPC development group.

- Incorporate a HPC on Groenkloof campus that caters for soccer, hockey and water sport facilities. The Groenkloof campus should be transformed into a sports park able to function day and night. Circulation and parking should be dealt with on a master plan level. Incorporate a storm water management plan for Groenkloof campus. The material selection used should have historic relevance.

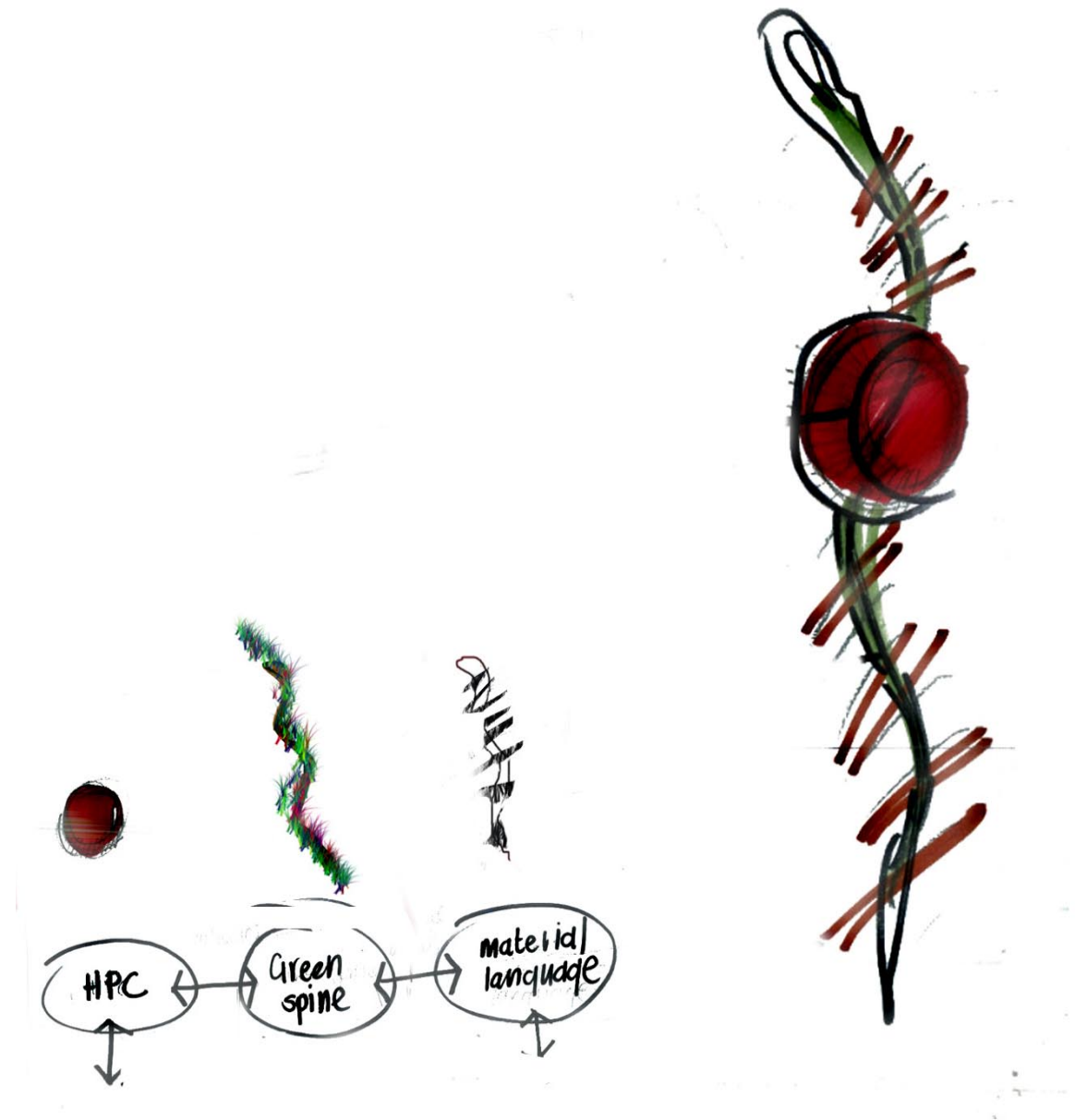


FIGURE 78 - Concept diagram, Author, 2008

Chapter 3

Design goals and guidelines

3.1 Environment

- 3.1.1 Stormwater
- 3.1.2 Ecology
- 3.1.3 Integration with sport, social and heritage

3.2 Heritage

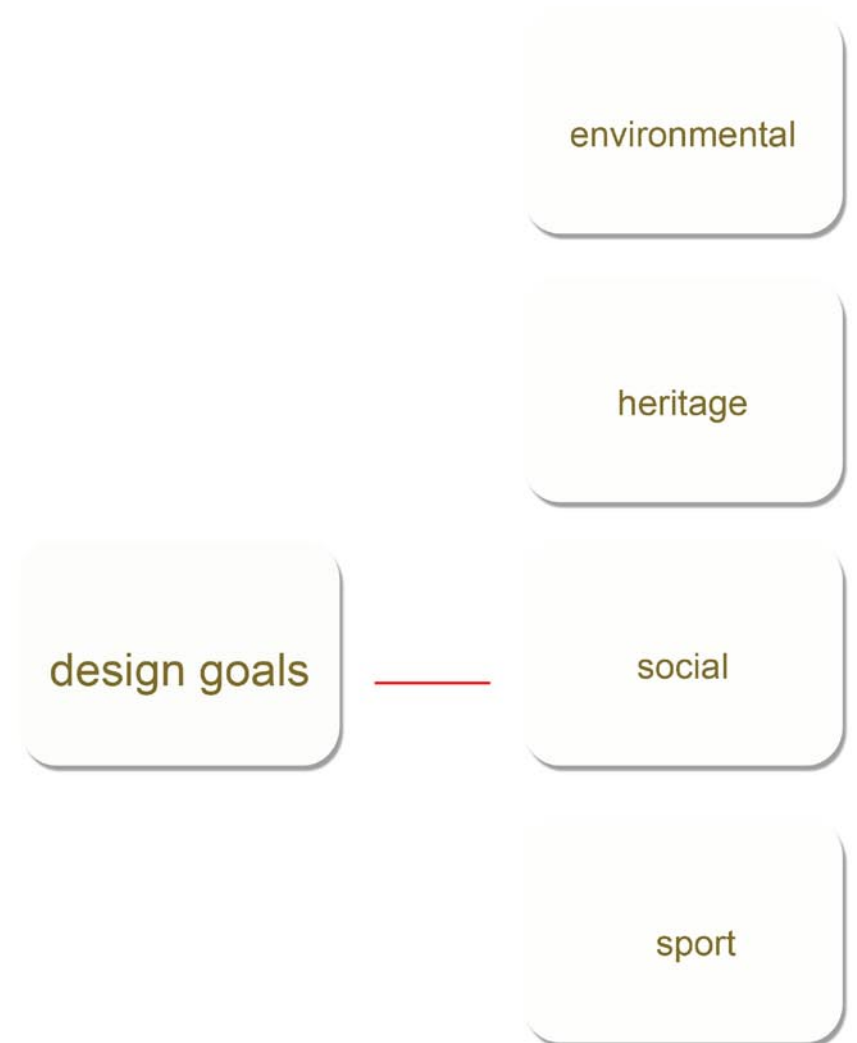
- 3.2.1 Levels of scale
- 3.2.2 Chimneys

3.3 Social

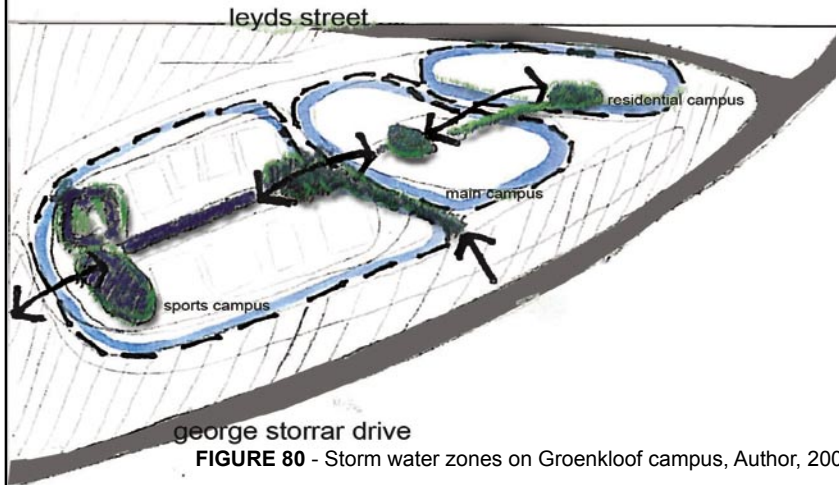
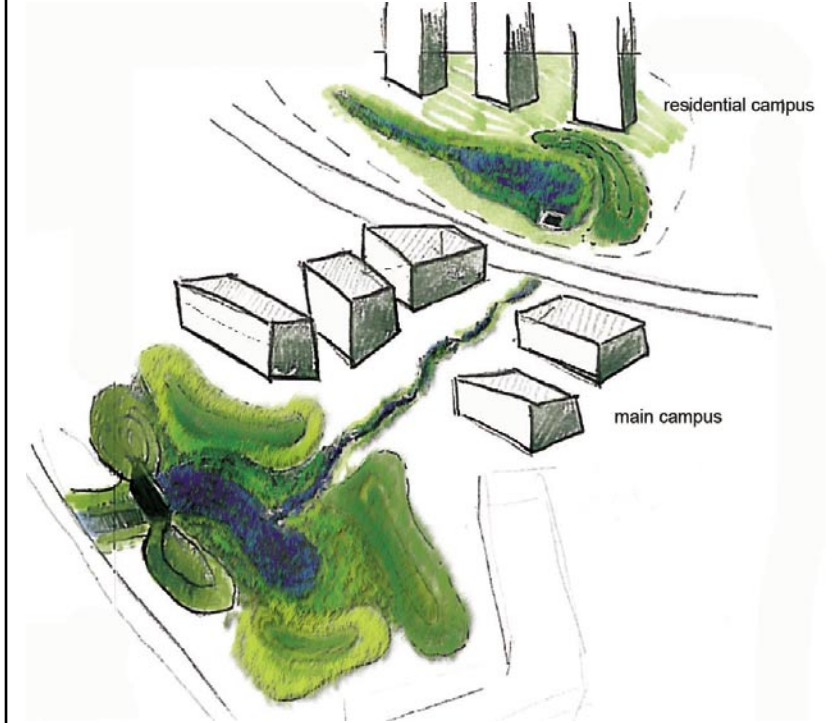
- 3.3.1 Providing for all visitors

3.4 Sport

- 3.4.1 Hockey
- 3.4.2 Soccer
- 3.4.3 Water sport



Design goals

	Environment		
	<p>3.1.1 Stormwater</p> <p>A -Stormwater runoff on Groenkloof campus should be collected and dammed.</p> <p>-residential area</p> <p>-main campus</p> <p>B -The existing dam should be incorporated into the stormwater management plan of the site.</p> <p>-existing dam</p>	<p>1- Groenkloof campus` stormwater management plan should be dealt with in zones.</p> <p>2- The storm water run-off from the residential campus must be collected and dammed (dam 1) to irrigate this portion of the campus.</p> <p>1- The overflow of dam1 should flow through the campus in bio-swales to the existing dam (dam 2).</p>	 <p>FIGURE 80 - Storm water zones on Groenkloof campus, Author, 2008</p>  <p>FIGURE 81 - Dam 1 with overflow in to bio-swale that flow in to Dam 2 (existing dam) , Author, 2008</p>

C
-Storm water from Klapperkop and Groenkloof residential area should be rerouted on to Groenkloof campus.

1- Stormwater calculations should be done to determine whether there is enough stormwater runoff to accommodate the scheme.

-existing channel

2- The existing channel should be kept .The concrete edges should be “softened “by widening the channel and allowing plant growth on the edges.

-weir

3- Implement weirs to dam water in the channel so that water can be captured and rerouted onto Groenkloof campus.

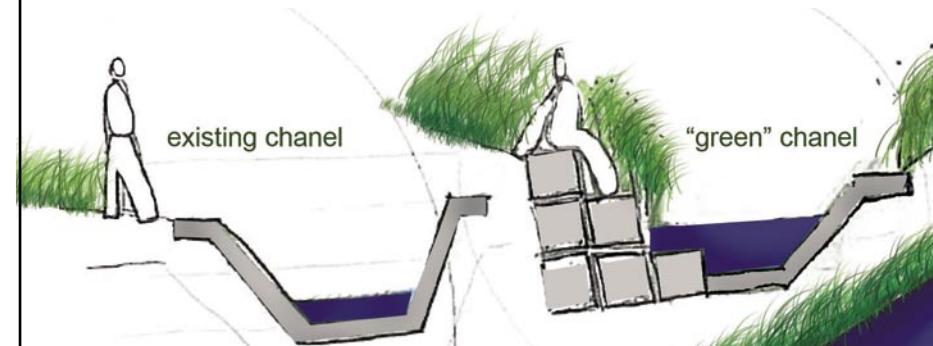


FIGURE 82 - Existing channel and proposed channel, Author, 2008

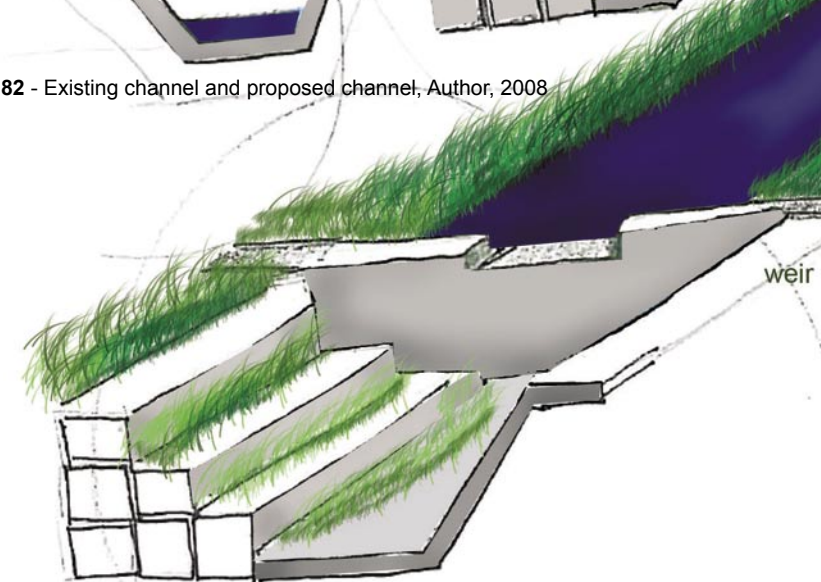


FIGURE 83 - Weir damming storm water in existing channel, Author, 2008

D
-The water quality of the stormwater brought on to site should be improved by implementing the following:

-silt pond

1- A silt pond allows sedimentation to settle at the bottom of the pond. This pond must be lined with concrete for easy maintenance by a bobcat.

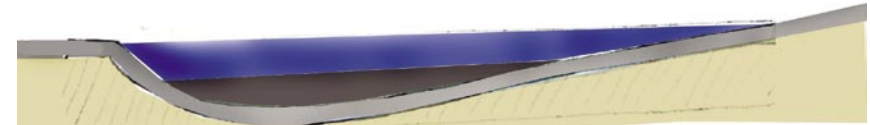


FIGURE 84 – Silt pond, Author, 2008

-oil trap

2- Oil traps better the quality of stormwater by separating the oil from the stormwater. Compartments in the oil trap separate the oil from the water.

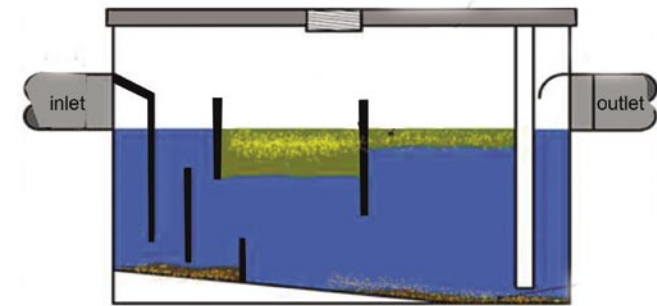


FIGURE 85 - Oil trap, Author, 2008

-bio swale

3- A bio-swale is a planted shallow channel that slows water down. The plants in this system act as bio-filters.

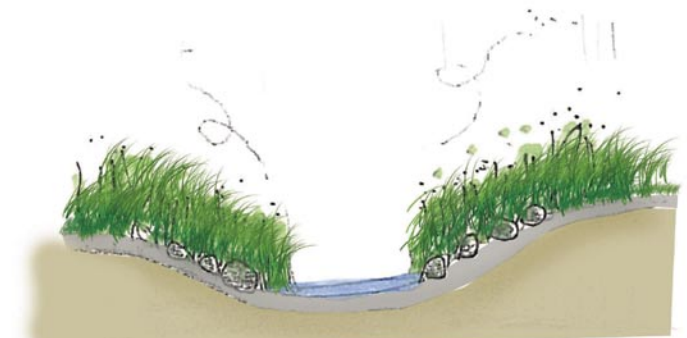


FIGURE 86 - Bio swale, Author, 2008

-filtration ponds

1- Filtration ponds filter water through dams lined with plants. These ponds will attract birds, insects, and frogs. These ponds should be able to sustain fish.

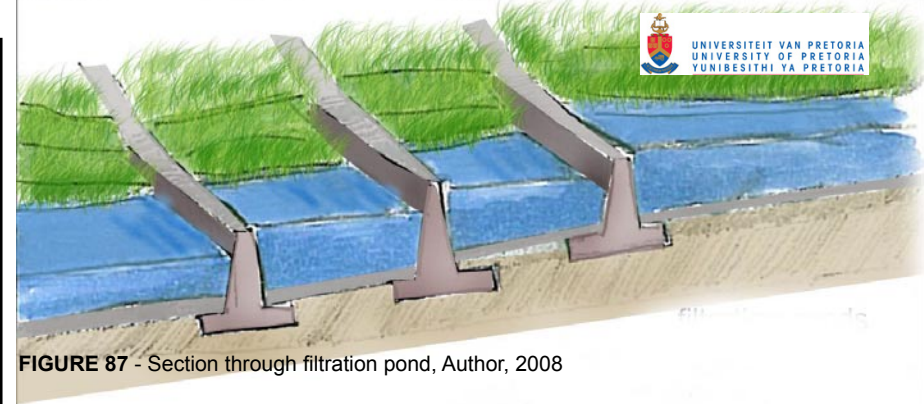


FIGURE 87 - Section through filtration pond, Author, 2008

2- Water flow through these filtration ponds should be planned in such a way so that no stagnant water areas occur.

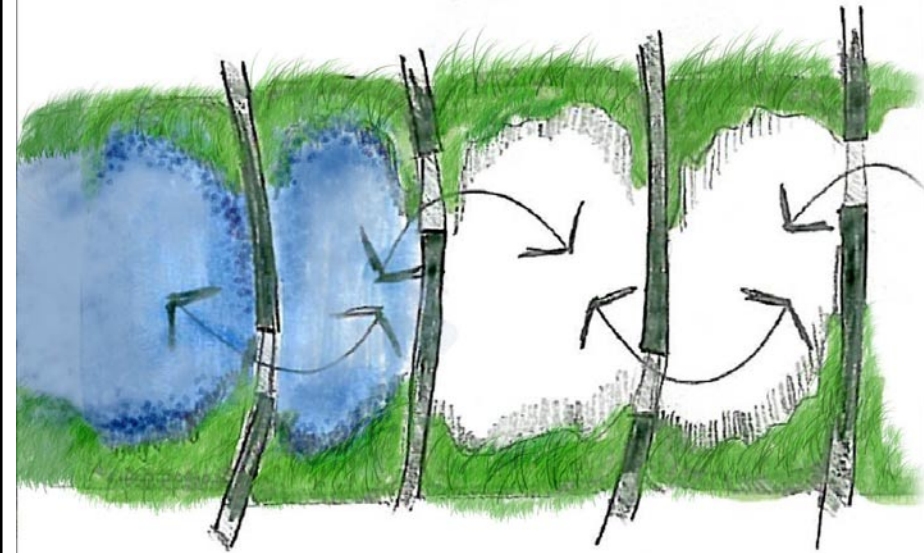


FIGURE 88 - Weir location and water flow, Author, 2008

3- The weirs of these filtration ponds should also act as pedestrian bridges with "waiting areas" or viewing decks along them.



FIGURE 89 - Weir of filtration pond acting as pedestrian bridge, Author, 2008

4- The edge design of these ponds should discourage pedestrians from getting too close to the water edge.

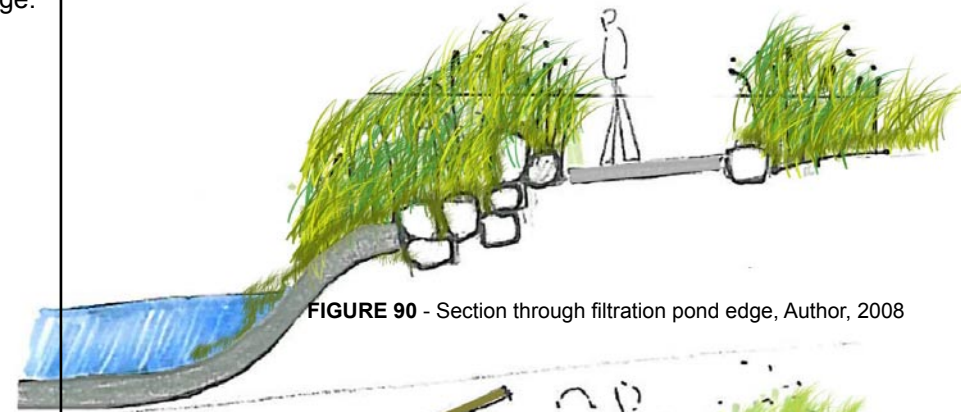


FIGURE 90 - Section through filtration pond edge, Author, 2008

5- A bird hide must be implemented on the edge of the filtration pond.

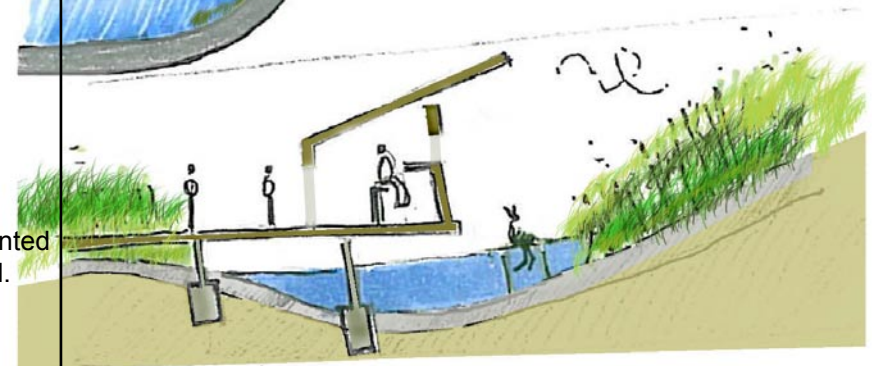


FIGURE 91 - Bird hide in the filtration pond, Author, 2008

E
-Underground water

-existing conditioned

1- The sub soil landfill could contaminate ground water if large amounts of water leach through this material.

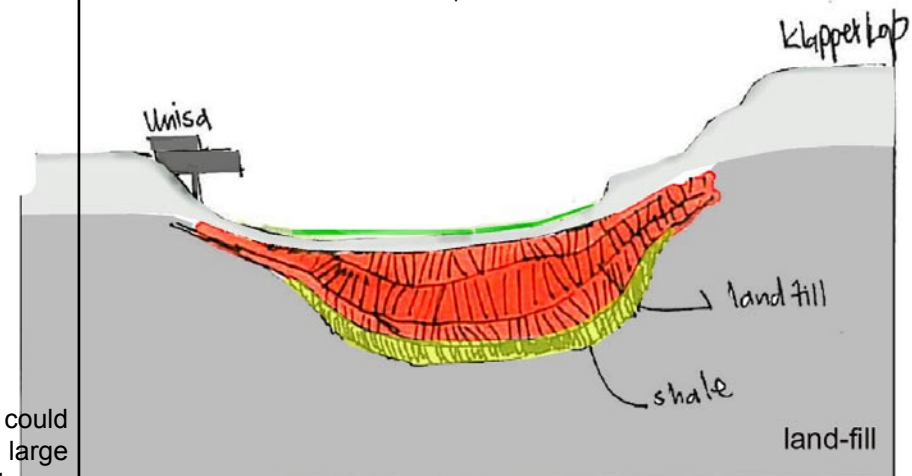


FIGURE 92 - Diagrammatic section of the geo-technical condition, Author, 2008

-possible ground water contamination

2- Specialist consultants should be brought in to assess the situation and provide recommendations and guidelines.

-control measures

3- As this topic is out of the scope of this thesis it will only be recommended here that ground water monitoring points are set up so that water quality monitoring could take place.

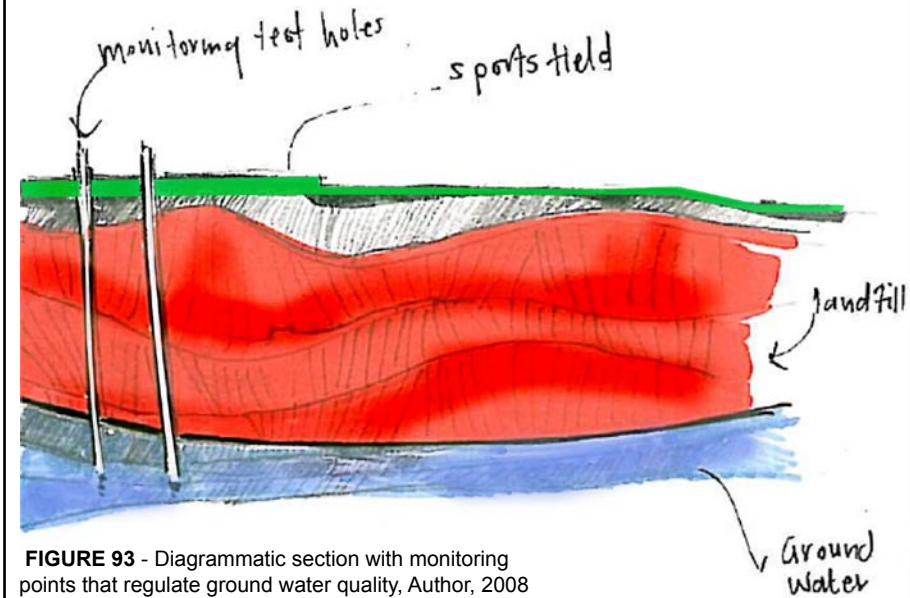


FIGURE 93 - Diagrammatic section with monitoring points that regulate ground water quality, Author, 2008

3.1.2 Ecology

A

-Exotic species

-removal and reuse

1- All exotic species other than *Jacaranda mimosifolia* must be removed and replaced with indigenous species.

2- The wood of the removed trees must be reused in this scheme as:

-tree guards

-wood pecker nests

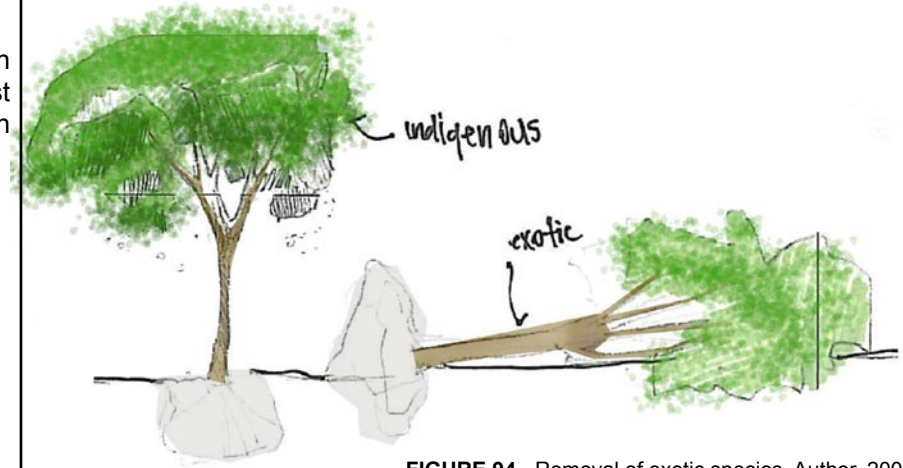


FIGURE 94 - Removal of exotic species, Author, 2008

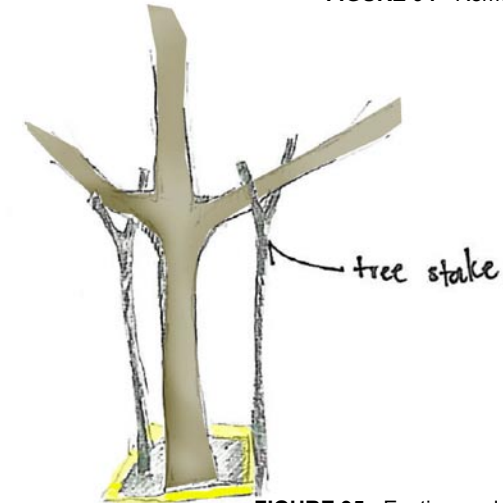


FIGURE 95 - Exotic wood used as tree stakes, Author, 2008



FIGURE 96 - Habitat creation, Author, 2008

B
-Indigenous species

-landscape features

-habitat creation

C
- Synthetic Sport fields

1- All sportsfields should be synthetic.
Synthetic fields have less maintenance
and water needs.

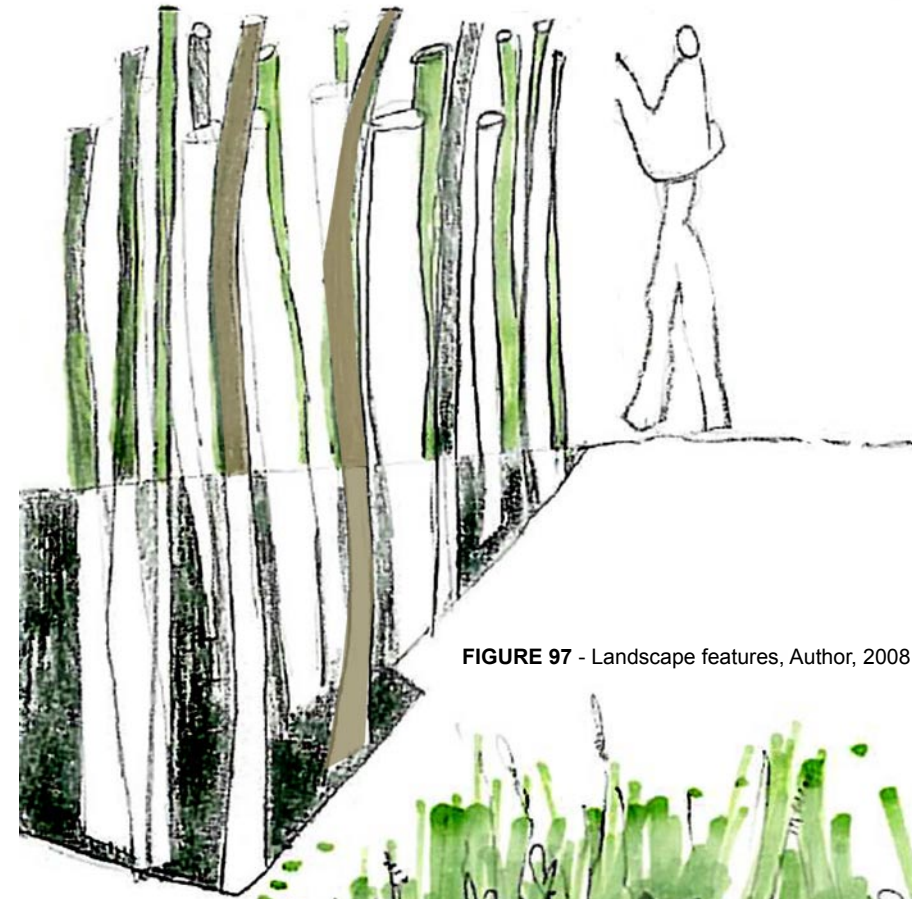


FIGURE 97 - Landscape features, Author, 2008



FIGURE 98 - Bio-degrading wood for habitat creation, Author, 2008

products

2- Water storage collection points should be located next to the sportsfields.

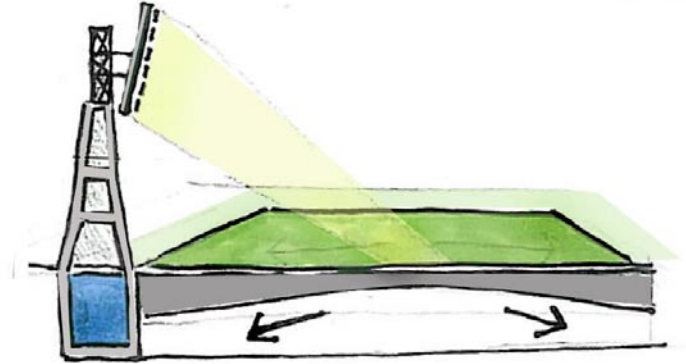


FIGURE 99 - Diagrammatic section showing water storage in base of towers, Author, 2008

-drainage

3- Sportsfield drainage should be implemented by specialists.

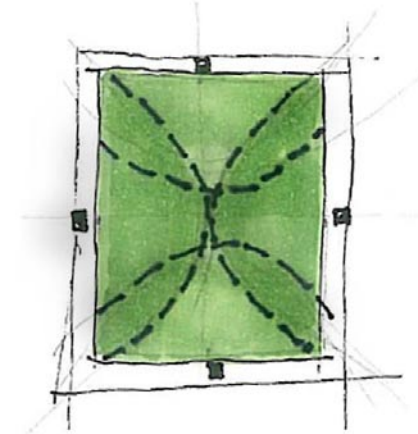


FIGURE 100 - Diagram indicating water collection points next to fields, Author, 2008

D
-Habitat creation

1- Specie selection in this scheme should attract birds, insect, frogs, lizards and small mammals.



FIGURE 101 - Habitat creation, Author, 2008

- filtration pond
- bio-swale
- planting species

2- The filtration ponds and bio-swales should be planted with plants that allow nesting and nest building material for bird species.

- storm water spine through campus

3- A storm water system running through the Groenkloof main and sports campus will enhance the ecology on Groenkloof campus.

- E**
- Onsite nursery

1- A nursery should be implemented on site to supply plant material and maintain the landscape of Groenkloof campus. Groenkloof campus nursery will also create jobs.

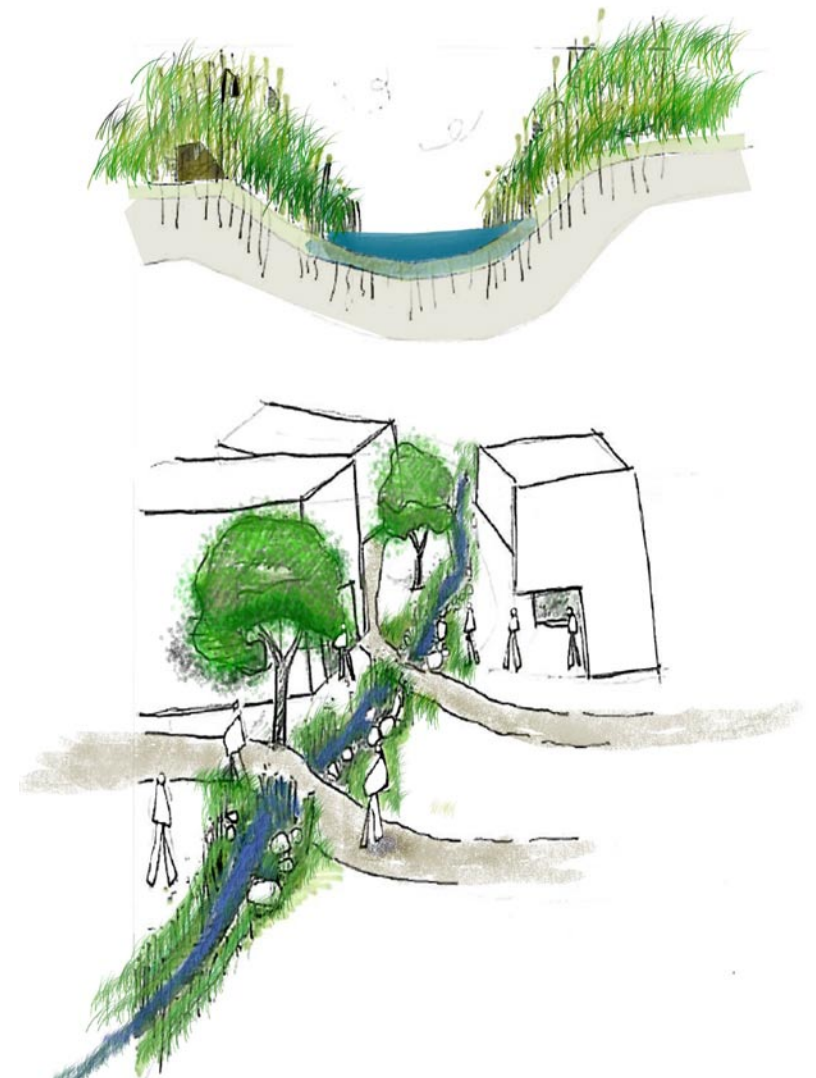


FIGURE 102 - Perspective of bio-swale running through Groenkloof campus, Author, 2008

F
-Onsite compost system and worm farm

1- Healthy aerated soil will ensure healthy plant matter. In close proximity to the nursery a compost plant and worm farm should be put into operation.

A
-Storm water used in sport and recreation

1- Stormwater filtered through the silt pond, oil trap, bio-swale and filtration ponds will be of a better quality than stormwater that is not bio-remediated. Contact with filtered, moving water is better than contact with non-filtered stagnant water.

-rowing facilities

2- A linear rowing facility should be implemented at the end of the filtration ponds

3.1.3 Integration of sport with, social and heritage goals.

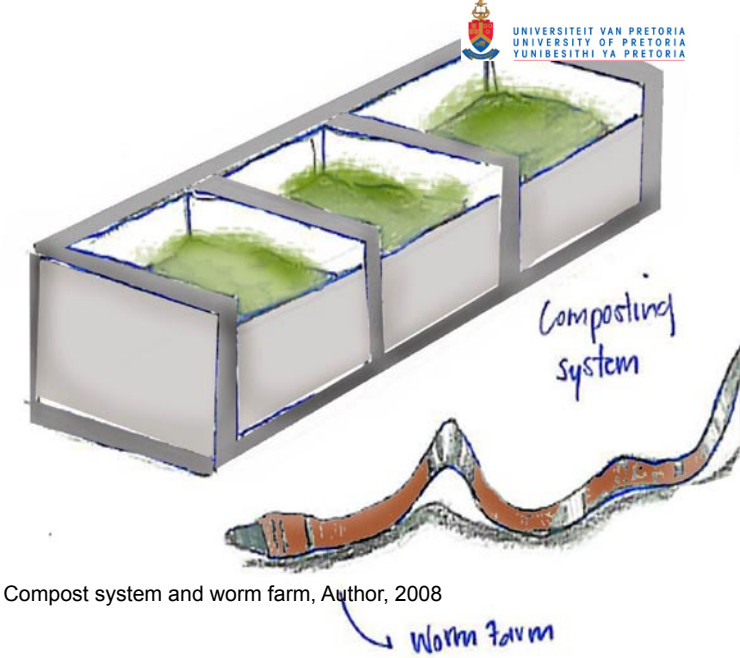


FIGURE 103 - Compost system and worm farm, Author, 2008

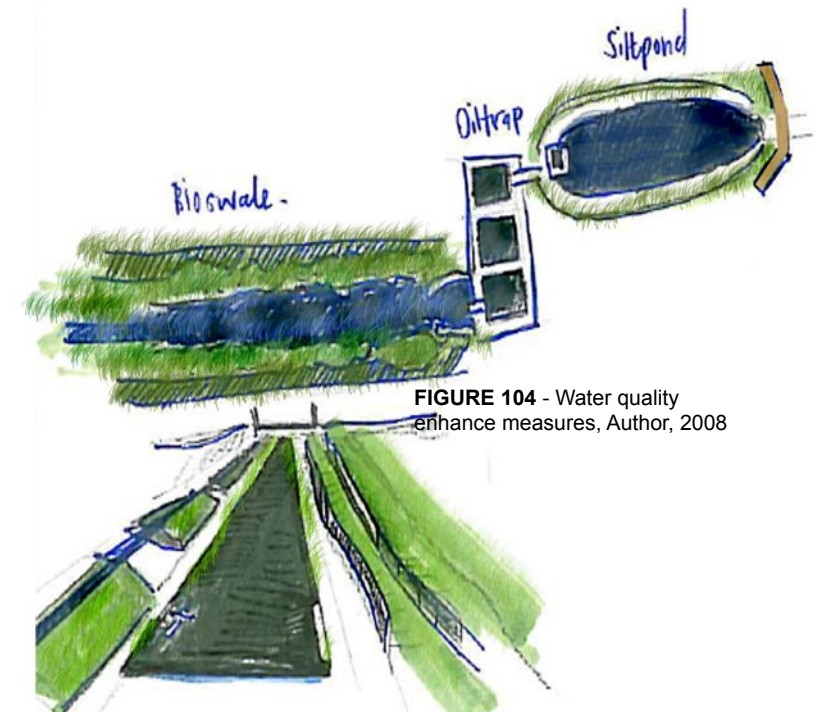


FIGURE 104 - Water quality enhance measures, Author, 2008

FIGURE 105 - Rowing facility with filtered water, Author, 2008

-slalom course

3- A slalom course must be developed.



slalom course

-recreation

4- Walkways, gathering spaces and seating areas must be designed along the dams' edges.



walkway along dams

-irrigation

5- The stormwater management should be planned to satisfy irrigation and aesthetic needs of this scheme by:

6- dividing the site into irrigation zones. Each area should have a collection dam to satisfy the irrigation needs for that portion in summer.

FIGURE 106 - Slalom course and walkways next to filtration pond and irrigation dam, Author, 2008

-the dam with the most capacity should be located at the lowest point of the site.

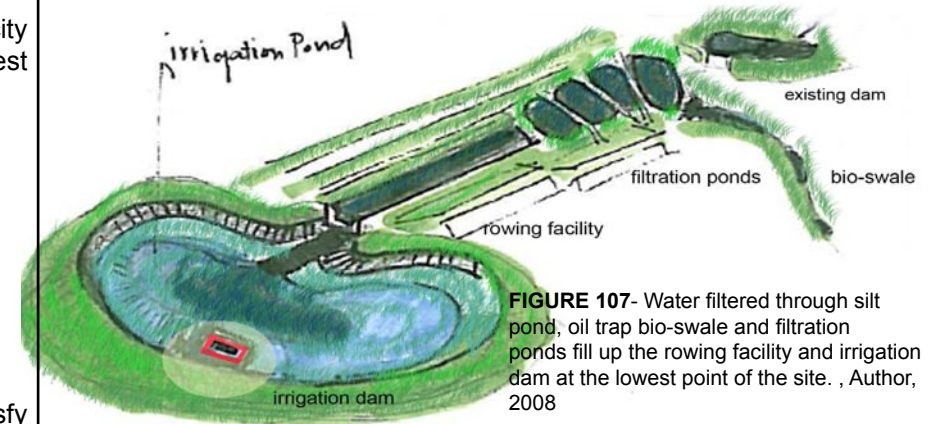
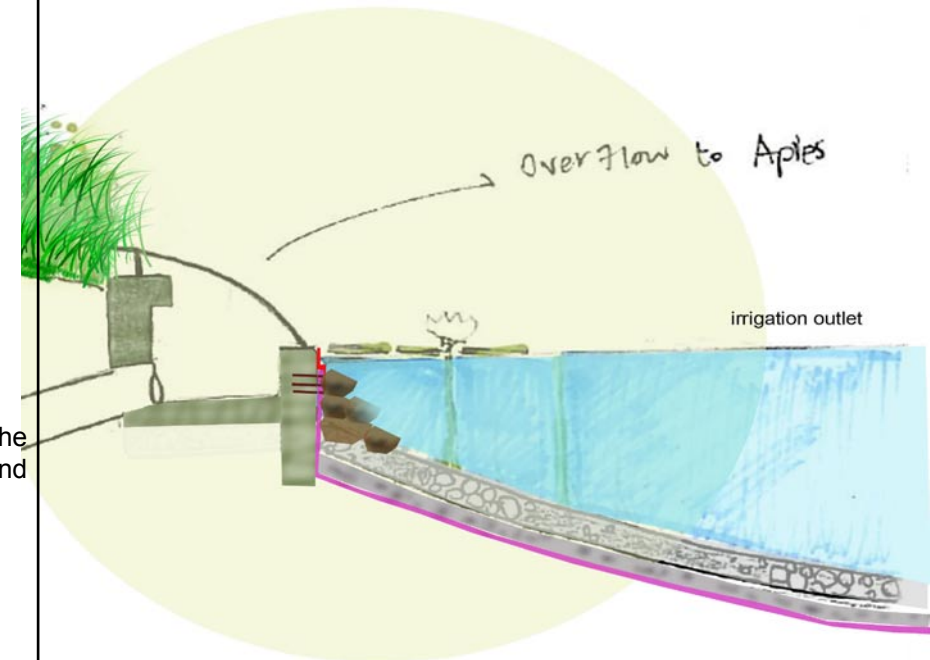


FIGURE 107- Water filtered through silt pond, oil trap bio-swale and filtration ponds fill up the rowing facility and irrigation dam at the lowest point of the site. , Author, 2008

This water in this dam must satisfy irrigation needs of the upper campus in summer and the sport campus in summer and winter.



-water back to Apies River

6-The existing overflow in to the Apies River should be retained and upgraded.

Heritage

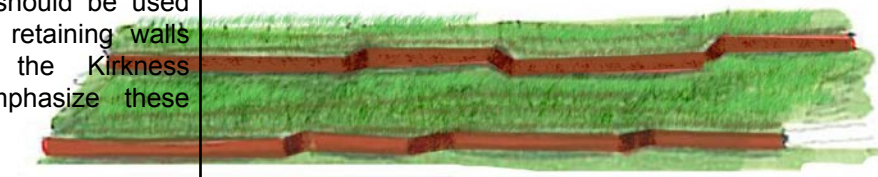
3.2.1 Levels of scale

A
-respond to Unisa's strong architectural lines.

1- The steep slope along the existing drainage line of the site should be terraced. The retaining walls used to create the terraces should be 4-5m high to match the large scale of Unisa.



2- Red clay brick should be used as finish on these retaining walls to commemorate the Kirkness brickfields and emphasize these walls.



3-The retaining walls should be lit up at night, to enhance the strong architectural lines of Unisa.

B
-enhance the vistas to surrounding monuments

C
-use red bricks in the detail design to commemorate the brick fields

1- The views towards Freedom Park and the Voortrekker monument should be enhanced by facing walkways and gathering spaces in the direction of these monuments.

1-walkways

-seating walls

-retaining walls with history story boards



FIGURE 112 - Vista's to surrounding monuments, Author, 2008

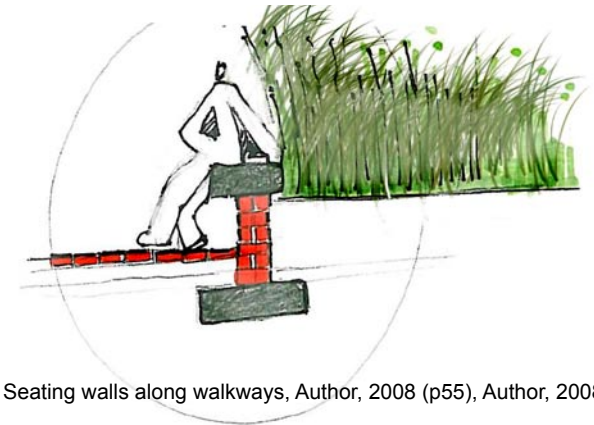


FIGURE 113 - Seating walls along walkways, Author, 2008 (p55), Author, 2008

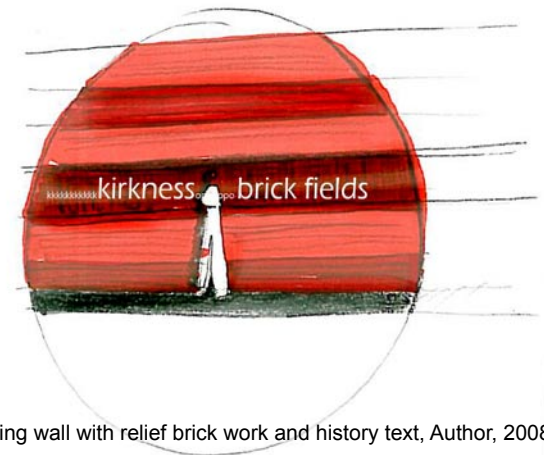


FIGURE 114 - Retaining wall with relief brick work and history text, Author, 2008

**3.2.2 Chimneys
(Kirkess brickfields)**

A
-celebrate the Kirkness brickfields
by reinventing the brick chimneys.

-The retaining walls can be used as canvasses that depict the cultural significance of Groenkloof.

- flood light tower
- orientation beacon
- refreshment shop

1- 25 to 30m red brick flood light towers should be placed onsite for lighting and aesthetic purposes.

2- Lower brick towers can be used as orientation beacons and landscape features.

3- These towers could be used as refreshment shops for the spectators and park users.

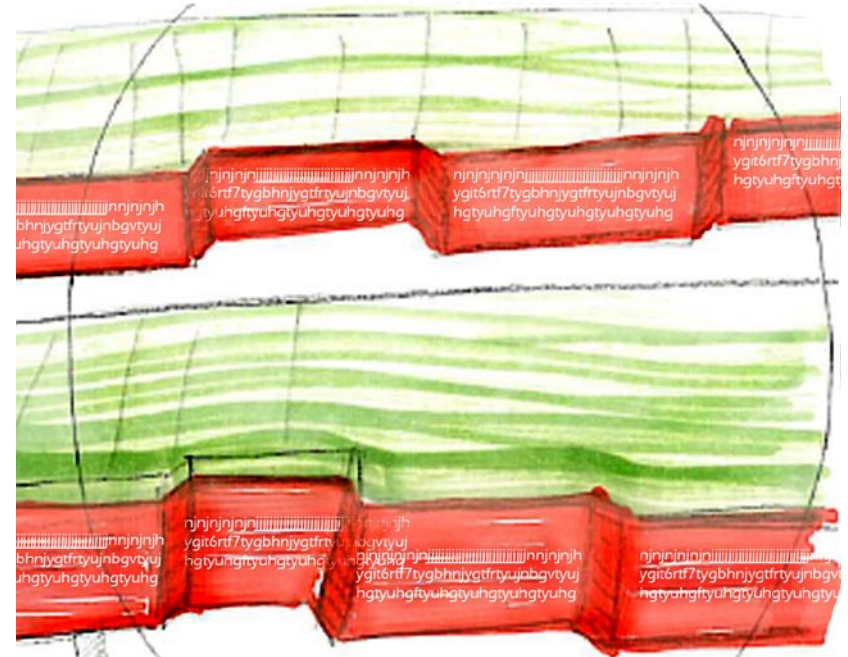


FIGURE 115 - Retaining walls with history text, Author, 2008

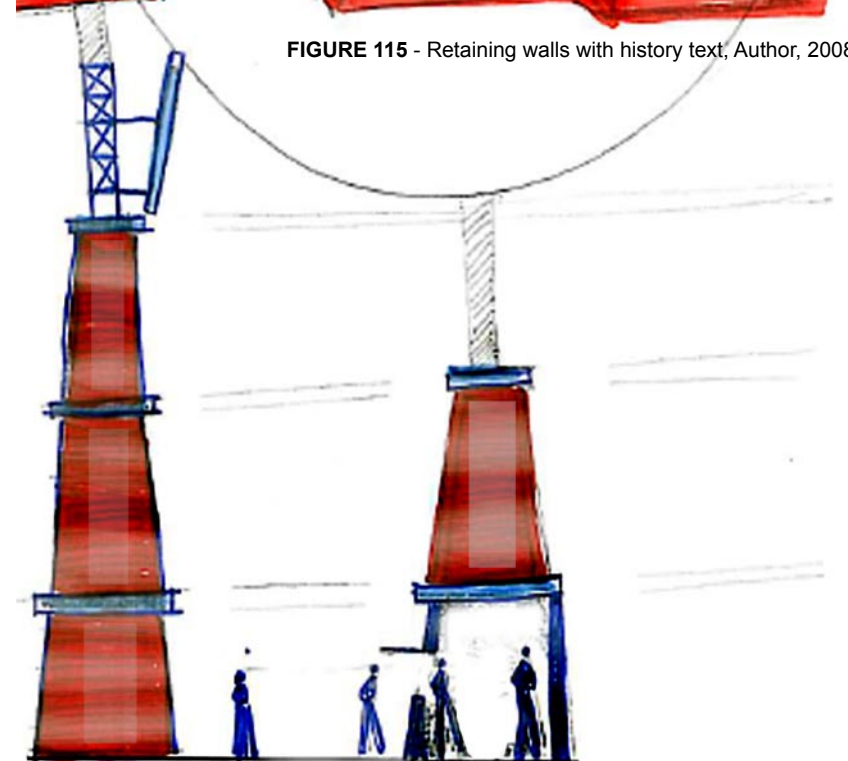


FIGURE 116 - Brick chimneys as floodlight structures and refreshment shop, Author, 2008

-ablution

4 -Ablution facilities can be accommodated in these brick structures.

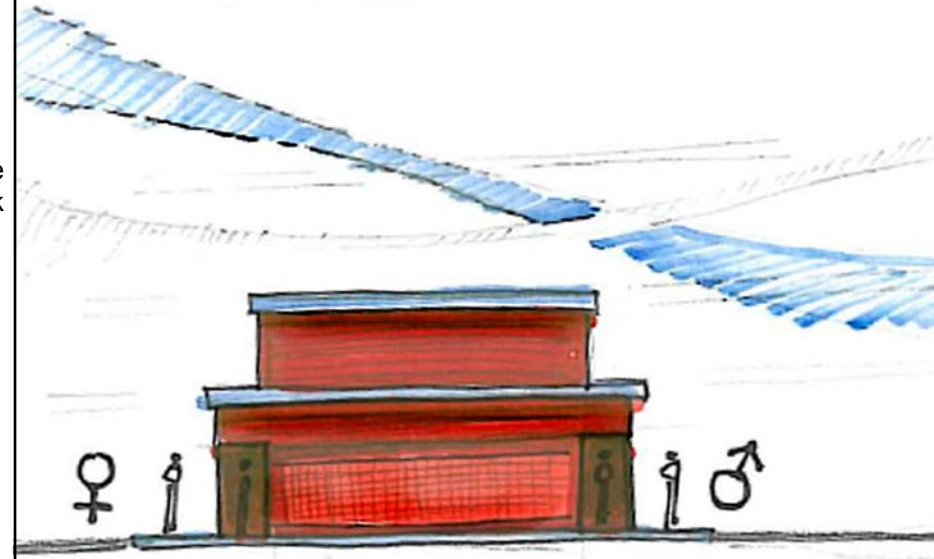


FIGURE 117 - Ablution facility with red brick, Author, 2008

-history story canvasses

5- The history of Groenkloof campus can be depicted on the sides of the brick towers

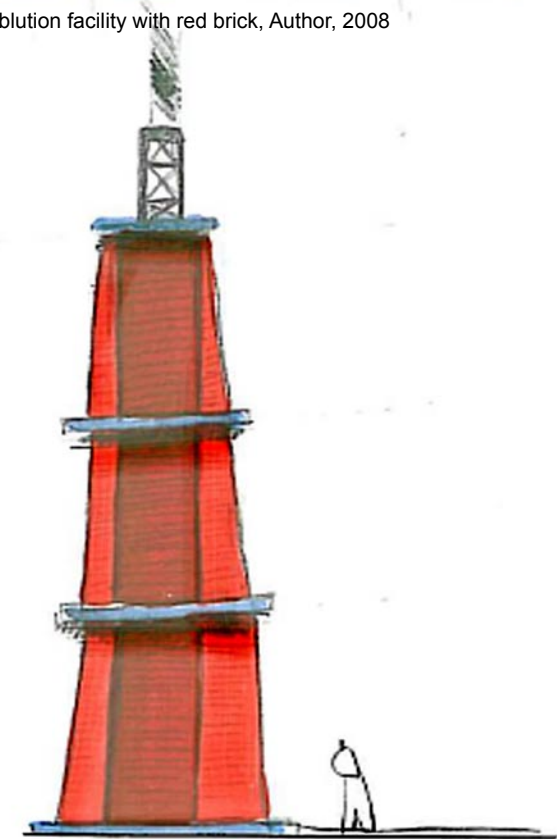


FIGURE 118 - Red brick tower with large up-light feature, Author, 2008

Social

3.3.1 Inclusive design

A

-Athletes

1- The existing clubhouses should be incorporated in the new developmental plan of Groenkloof campus.

2- Athletes should be provided with sports facilities of international standards

3- The HPC should be located near the hostels, cafeteria and HPC school.

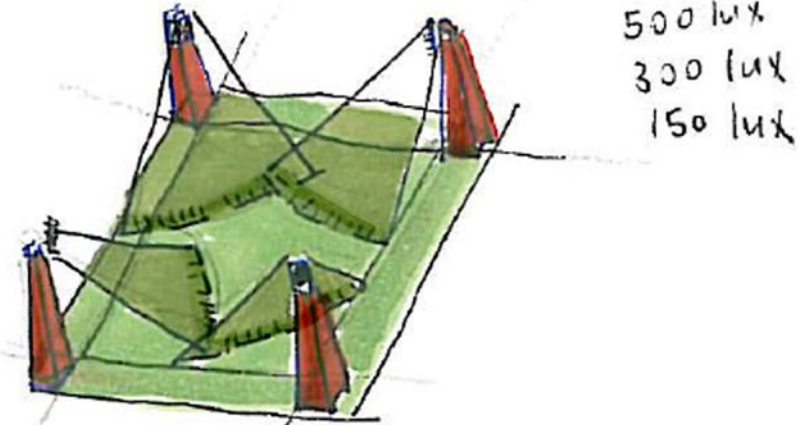


FIGURE 119 - Floodlight towers positioned around sports fields, Author, 2008

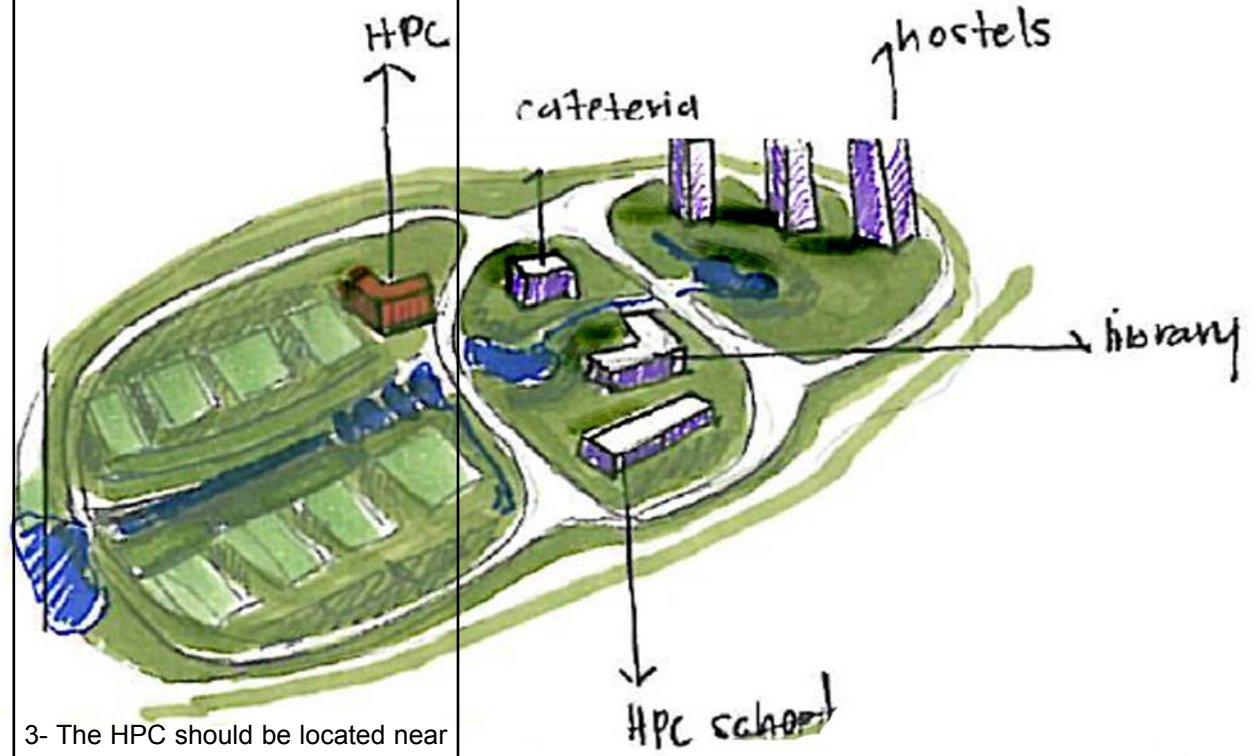


FIGURE 120 - The diagrammatic sketch indicate the proposed location of the HPC on Groenkloof campus, Author, 2008

B
Families

1- Pocket parks and walkways with history stories built in to the route should be implemented to accommodate families visiting the sports park.

C
-Elderly

D
-Physically challenged

1- All ramps should be 1:12 and benches with shade trees and drinking fountain provided at every 100m meters.

E
-Visually challenged

1- All history text should be translated to braille on plaques to accommodate the visually impaired.

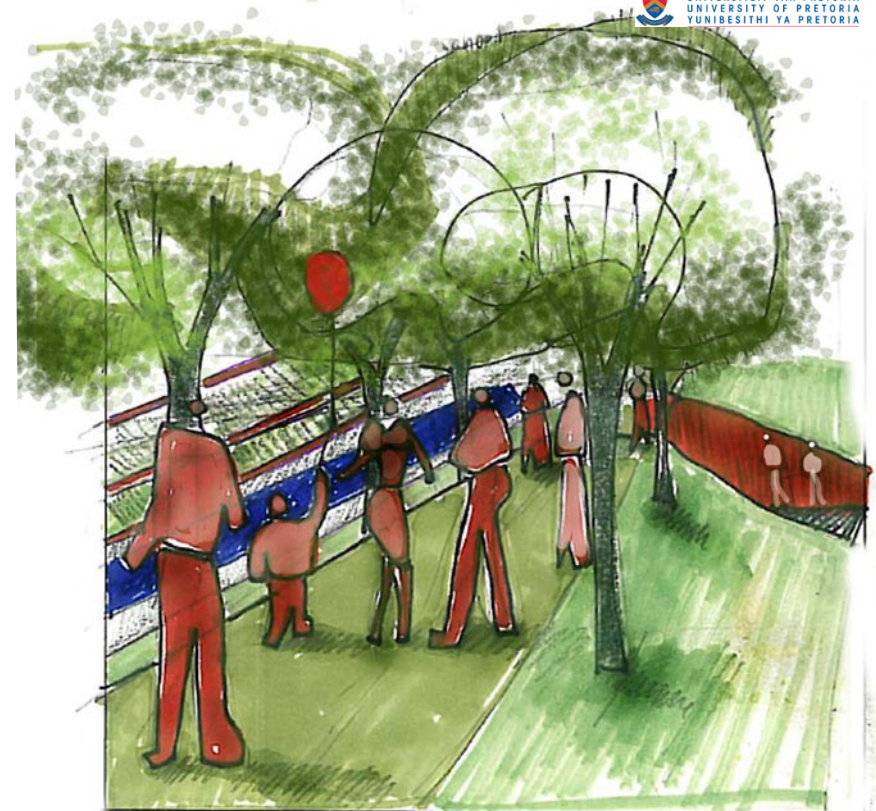


FIGURE 121 - Walkway with shade trees and views on to water sports, soccer and hockey fields, Author, 2008

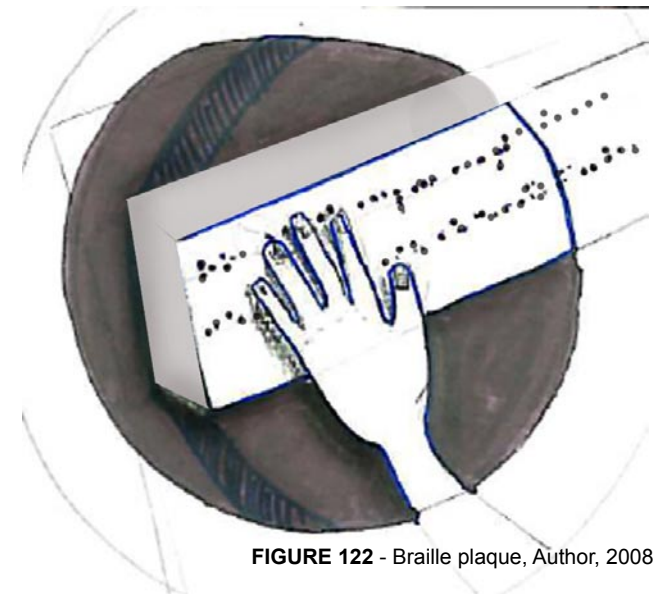


FIGURE 122 - Braille plaque, Author, 2008

F
-Spectators

1- Enough parking should be provided for visitors and spectators

2- Refreshment shops and ablution facilities should be suitably situated.

3- Spectator seating should have shade trees.

4- Vehicle circulation of the campus must enable large traffic volumes to flow through the campus. A ring road system must be implemented.

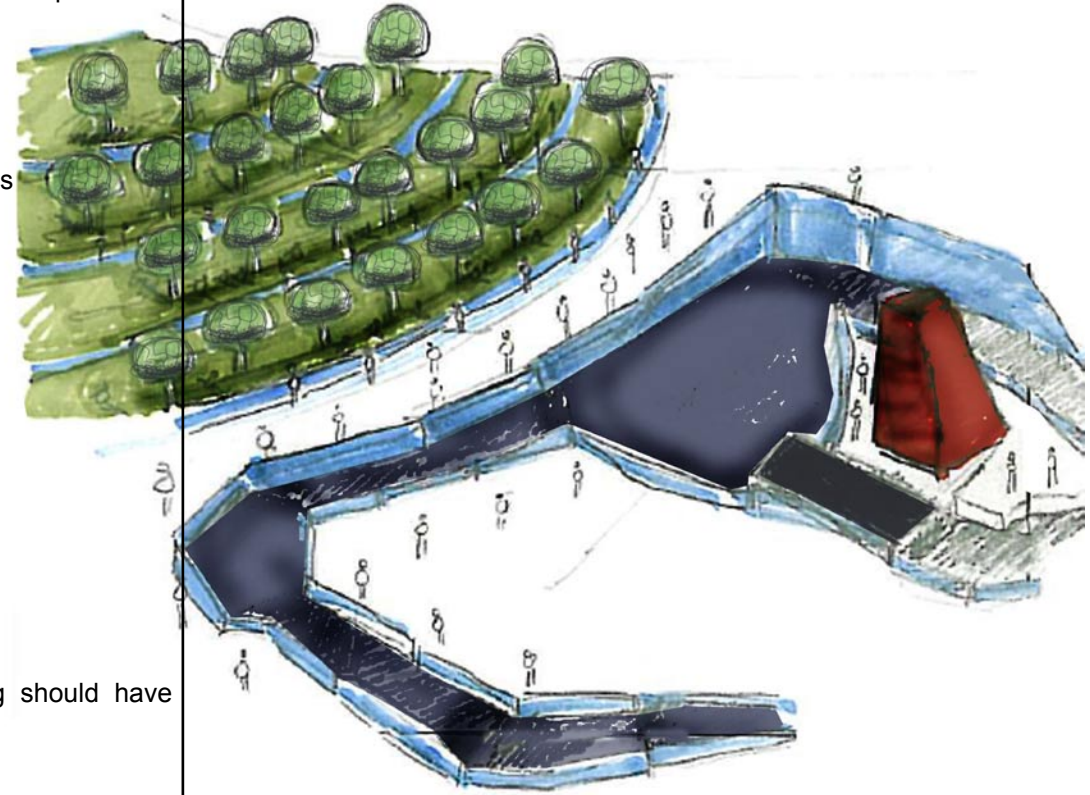


FIGURE 123 - Slalom course with shaded spectator seating, Author, 2008

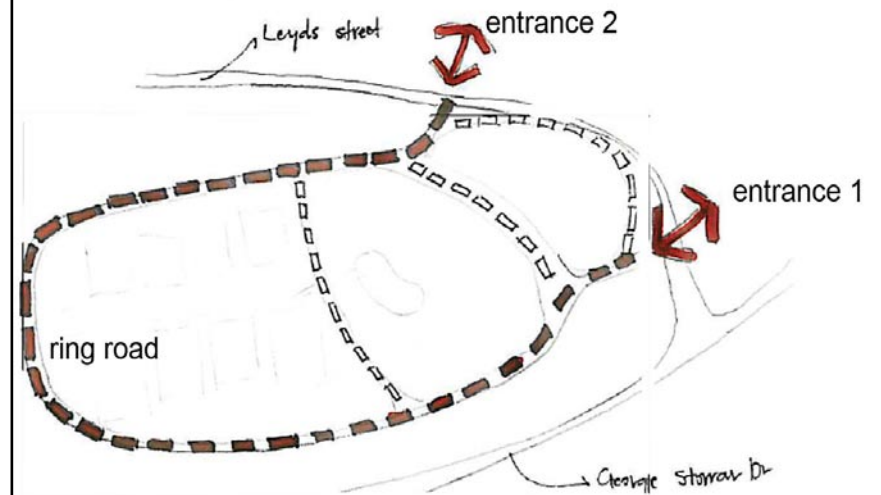


FIGURE 124 - Ring road diagram, Author, 2008

Sport

3.4.1 Hockey

A
-Facilities

-Spectators

1- Water storage facilities should be located next to the fields as synthetic hockey fields need to be kept wet throughout play time.

2- Seating for hockey spectators should be provided for next to the hockey fields.

3- Safety nets should be installed next to the hockey fields to protect the pedestrians and motor cars from injury or damage.

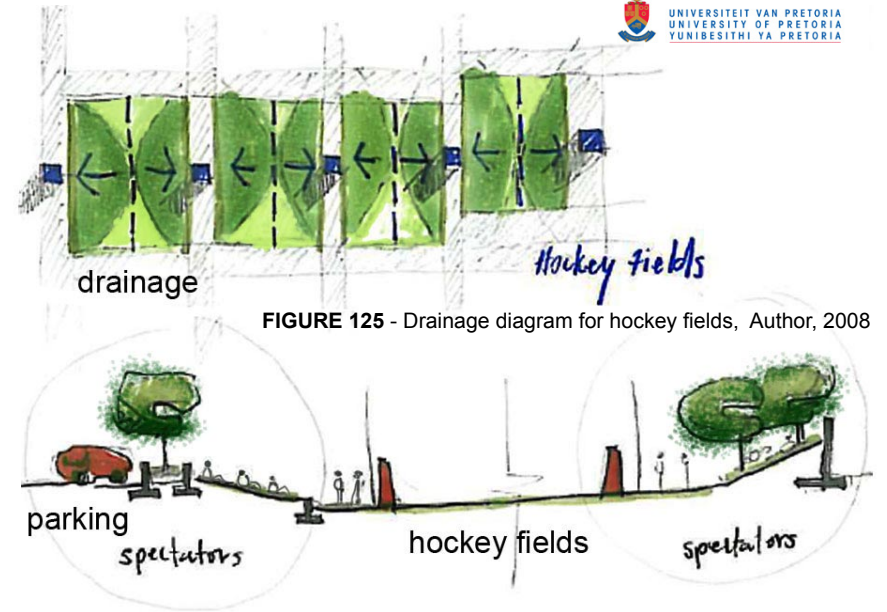


FIGURE 125 - Drainage diagram for hockey fields, Author, 2008

FIGURE 126 - Diagrammatic section of hockey fields with spectator stands, Author, 2008

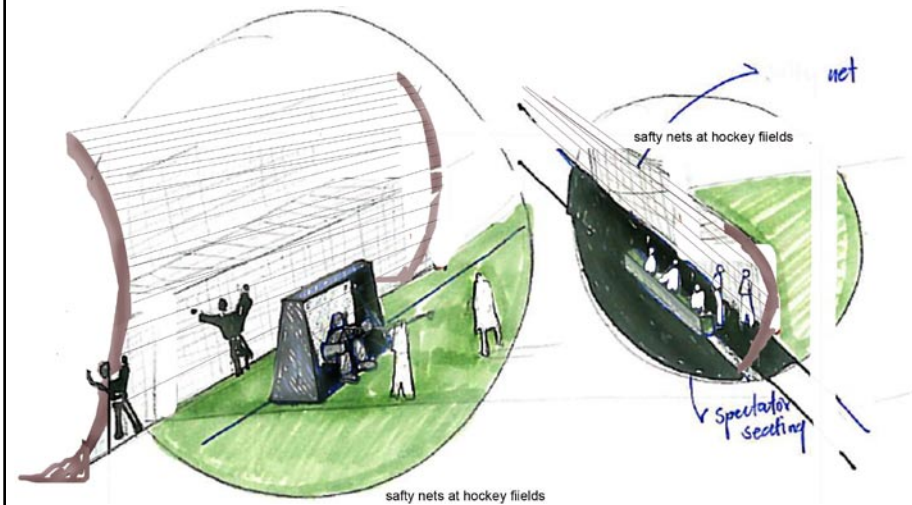


FIGURE 127 - Safety nets at hockey goal-posts, Author, 2008

3.4.2 Soccer

B

-Facilities

-Spectators

1- Water storage facilities should be located next to the fields as synthetic soccer fields needs to be moist and not drenched.

2- Seating for Soccer spectators should be provided for next to the soccer fields.

3- A spectator berm can be shaped using the "cut" soil from the dams. This berm will provide seating for rowing and soccer spectators.

4- The existing spectator stand should be extended onto the existing berm.

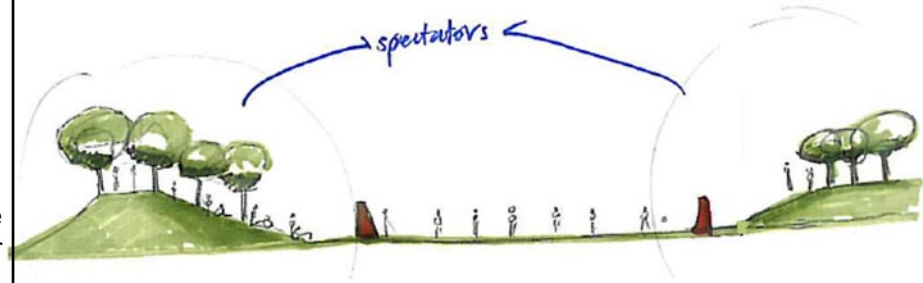


FIGURE 128 - Diagrammatic section of soccer fields with spectatorstands, Author, 2008

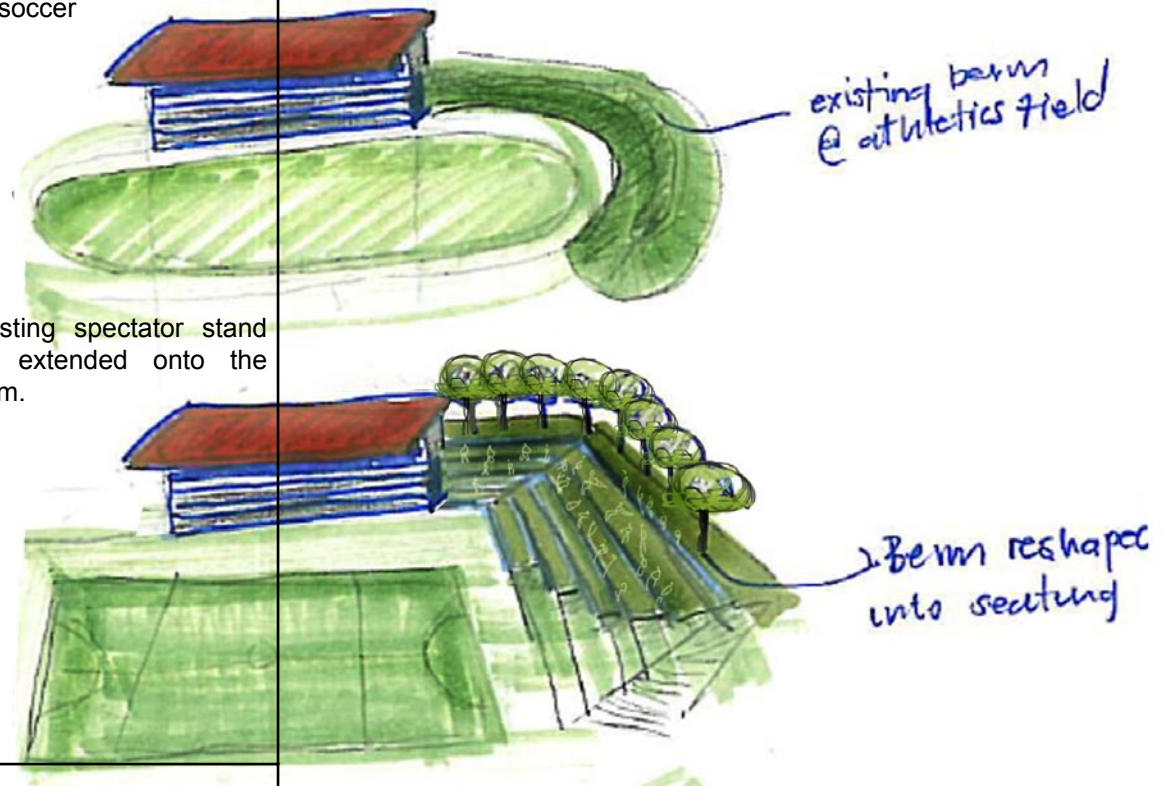


FIGURE 129 - Before and after of the existing berm changed to spectator stand, Author, 2008

3.4.3 Water sport

Rowing

C
-Facilities

-Spectators

1- The flat water rowing facility must be at least 300m long and 18m wide.

2- The edges of this rowing channel should absorb waves to minimize wave actions in the channel.

3- Access jetties should be provided at two ends of this facility.

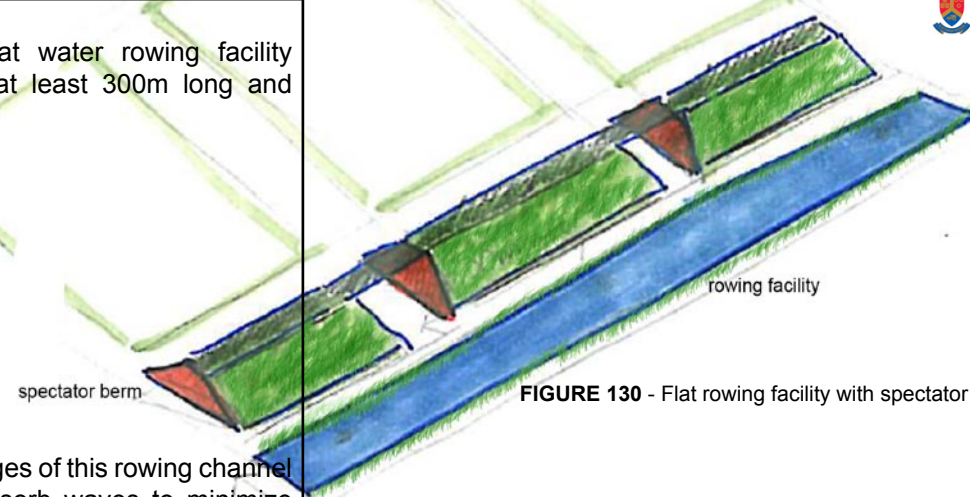


FIGURE 130 - Flat rowing facility with spectator berms, Author, 2008

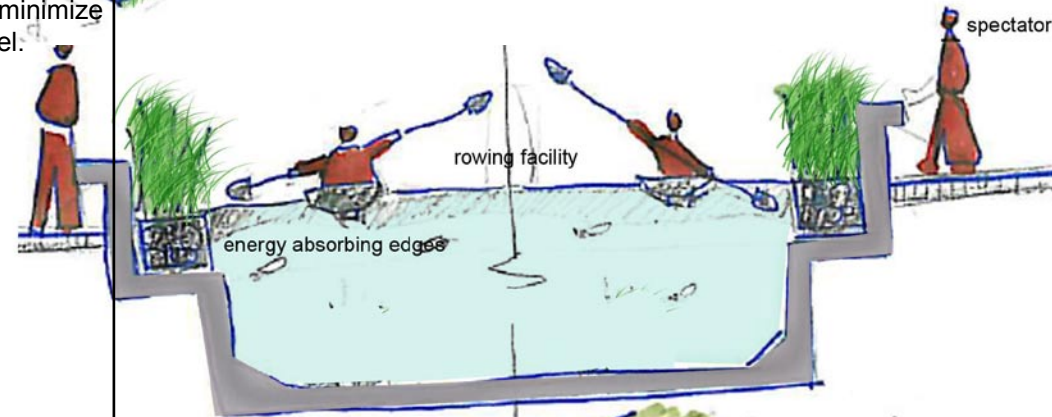


FIGURE 131 - Section through rowing channel with energy absorbing edges, Author, 2008

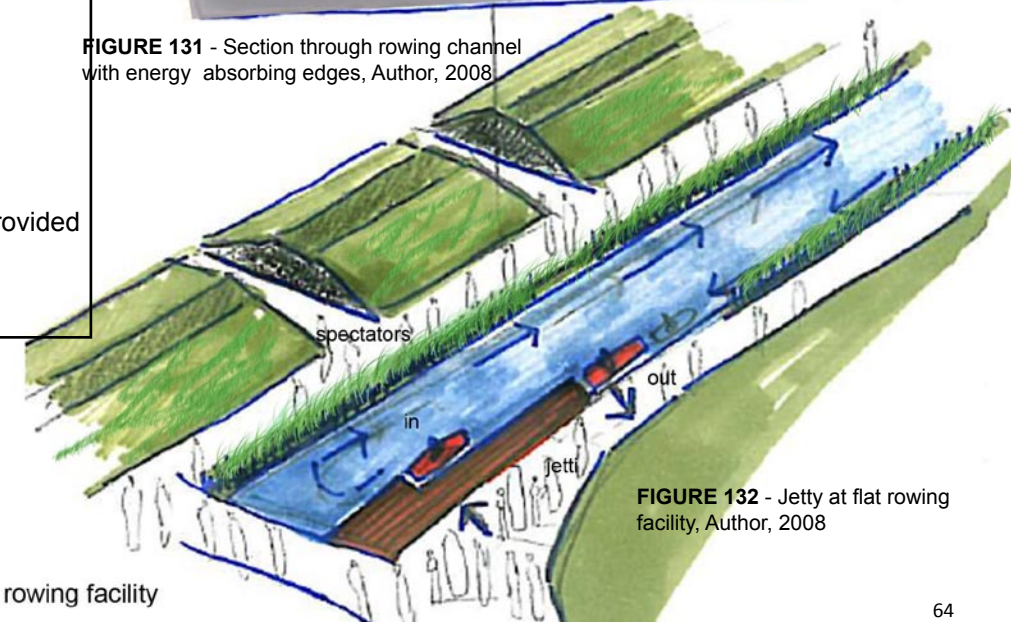


FIGURE 132 - Jetty at flat rowing facility, Author, 2008

4- Parking should be in close proximity to the rowing channel.

5- Rowing spectators should be accommodated for.

6- The flat rowing facility and the slalom course should be in close proximity to each other so that athletes can easily move from one facility to the next without crossing a road.

A walkway underneath the vehicle bridge will connect the two water sport facilities.

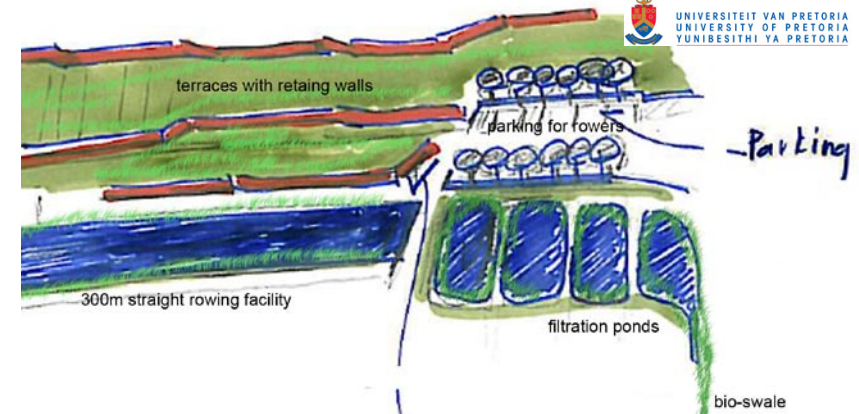


FIGURE 133 - Parking located near access point of rowing facility, Author, 2008

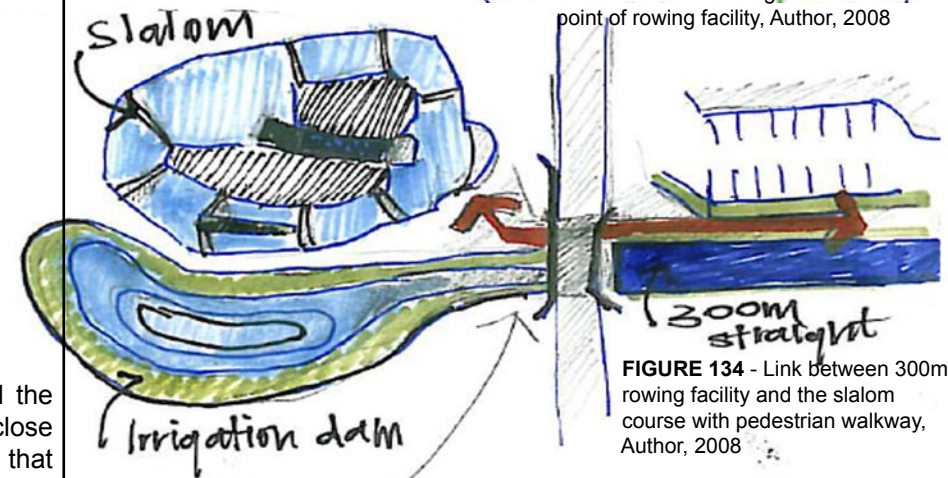


FIGURE 134 - Link between 300m rowing facility and the slalom course with pedestrian walkway, Author, 2008

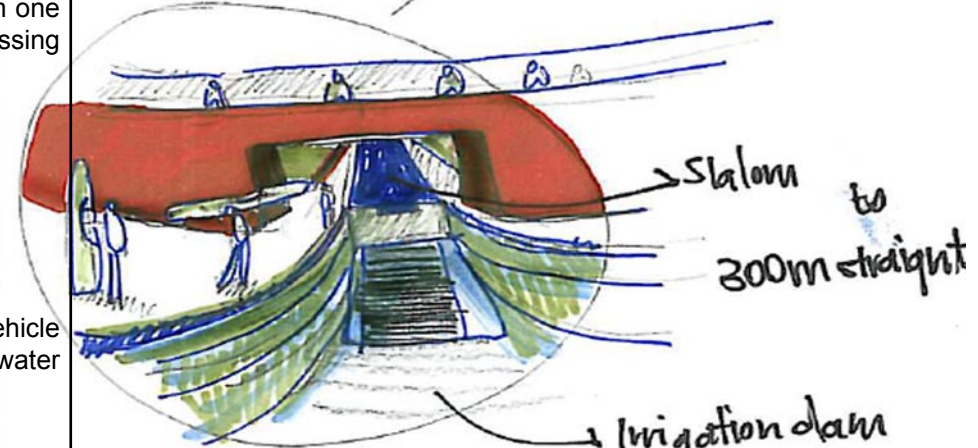


FIGURE 135 - Perspective of link between 300m rowing facility and the slalom course with pedestrian walkway underneath bridge. The rowing course overflows in to the irrigation dam., Author, 2008

Slalom course

D
-Facilities

1- The slalom facility should not be in the stormwater path. This facility needs constant maintenance and should be able to be emptied out at any time.

2- Water should be pumped from the irrigation dam to maintain the slalom course.

3- This course must cater for advanced slalom athletes and beginners. A challenging and less challenging leg is proposed.

4- Spectators and coaches should be able to move around the slalom course.

5- A red brick lookout tower that houses the pump systems for the slalom course should be implemented.

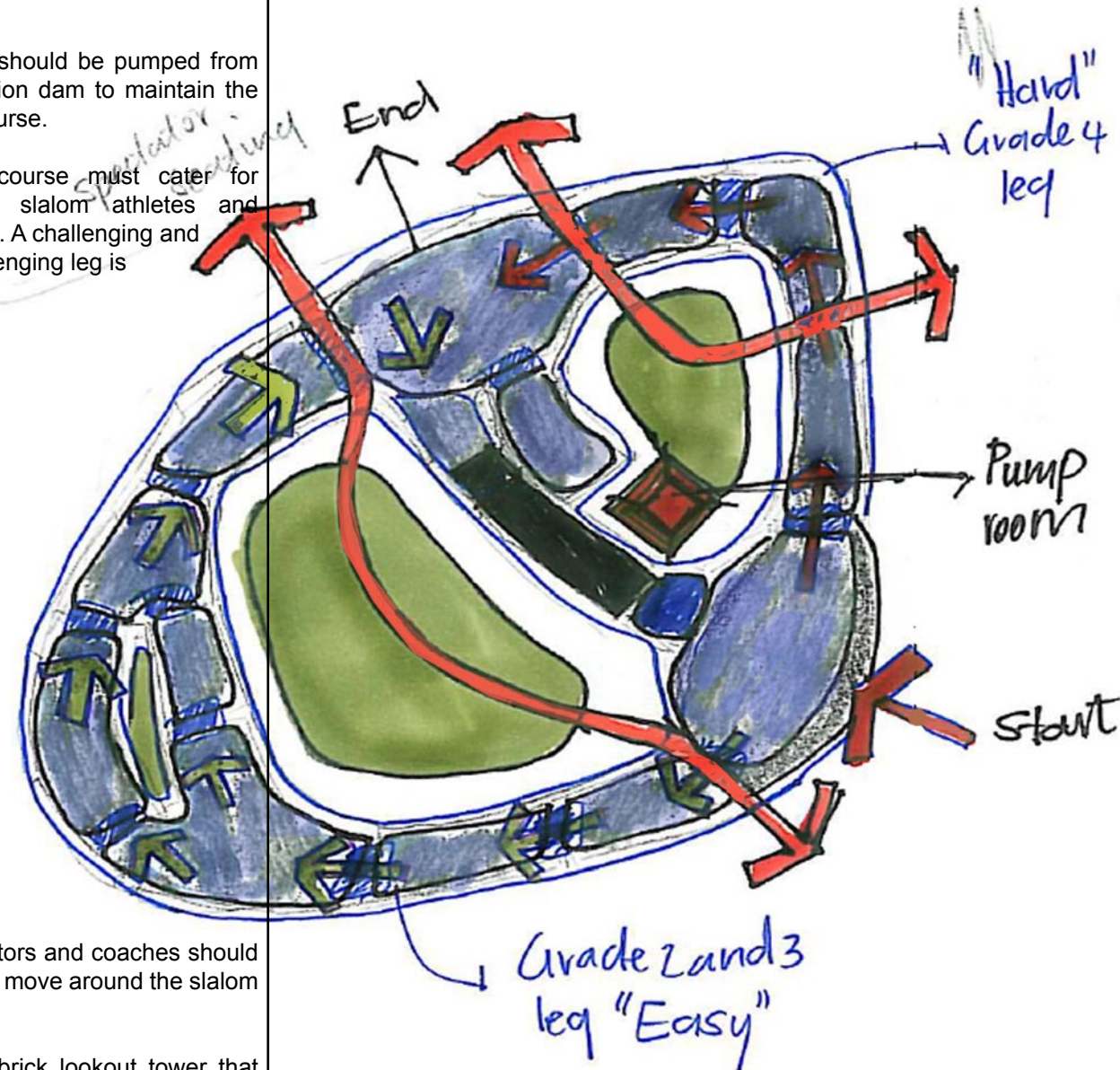


FIGURE 136 - Slalom course diagram showing the "easy" route with green arrows and "difficult" route indicated in red arrows, Author, 2008

-Spectators

6- The pump must be able to run on several speeds to make the course water speed adjustable.

3-types of speed

FIGURE 137 - Three-speed pump system, Author, 2008

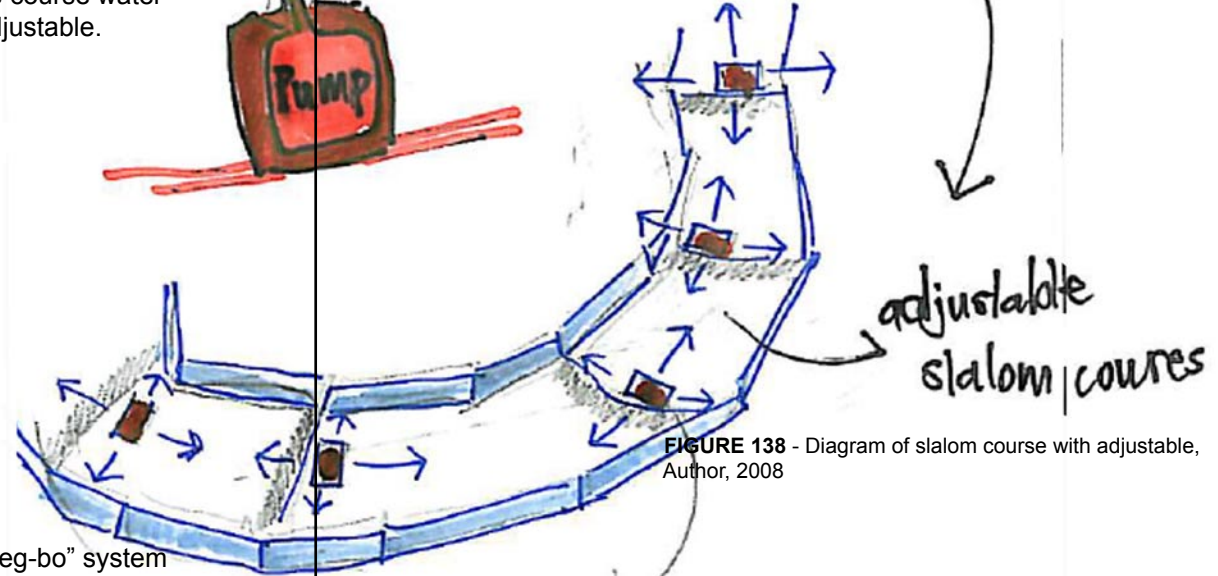


FIGURE 138 - Diagram of slalom course with adjustable, Author, 2008

7-The "peg-bo" system (a system that makes the course adjustment possible) should be used to construct each obstacle. (These obstacles can be moved around in the course, changing the difficulty and types of challenges in the course)

Peg-bo system



FIGURE 139 - Drawing of the Peg-board system in slalom course, Author, 2008

8-A screen berm should be shaped from the soil cut out from the slalom course to screen the slalom course from the highways. By so doing the slalom course will not compete or harm the southern gateway into the city.

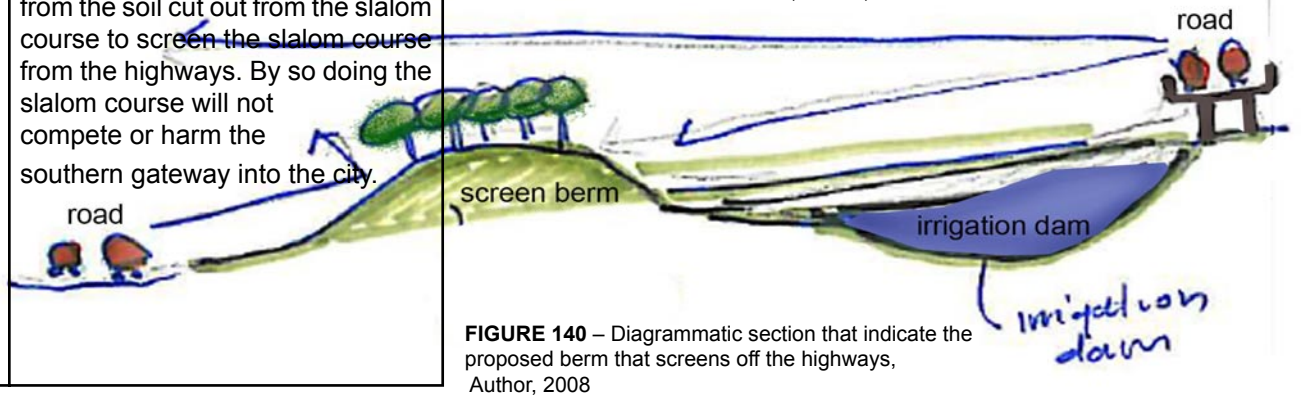
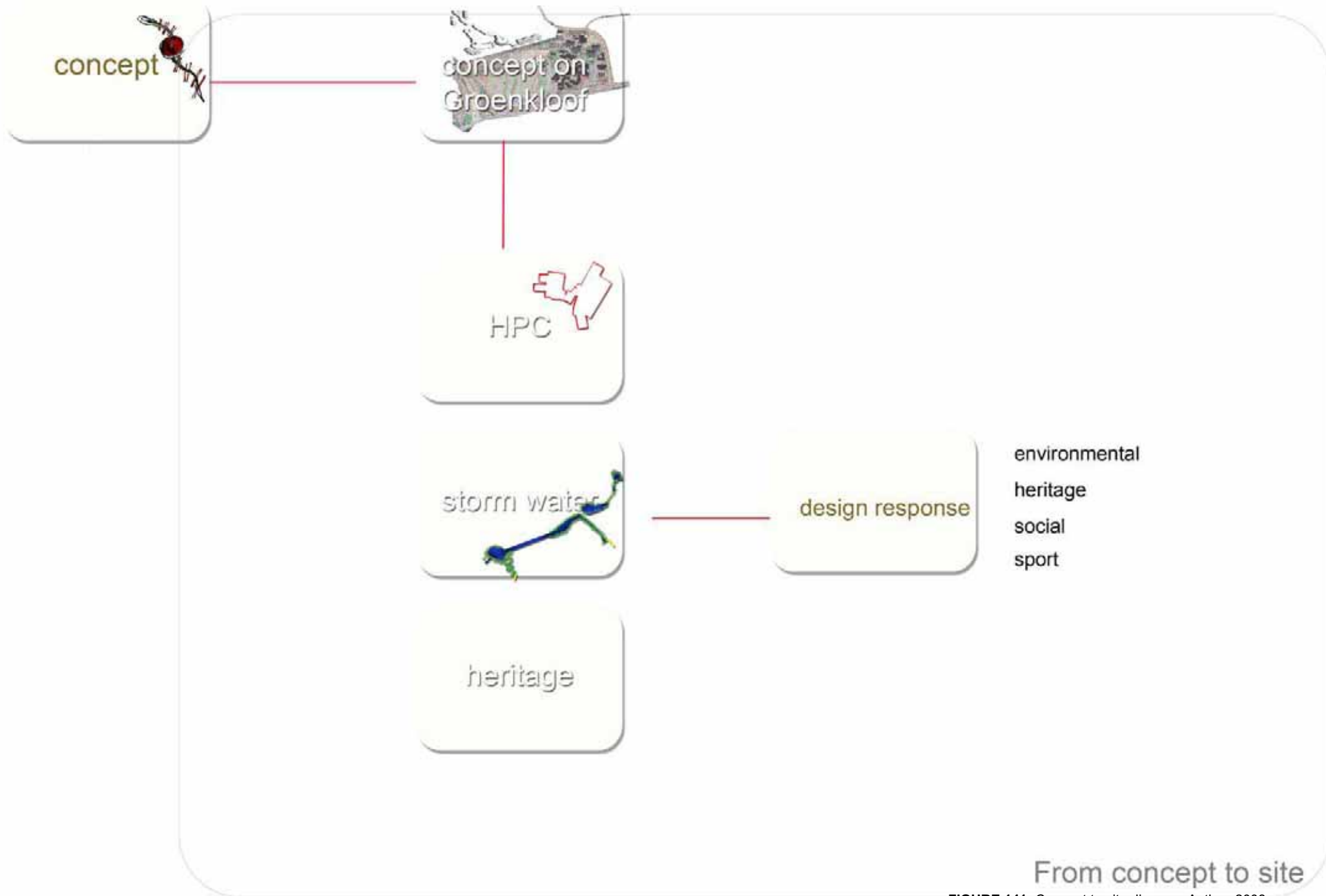


FIGURE 140 - Diagrammatic section that indicate the proposed berm that screens off the highways, Author, 2008

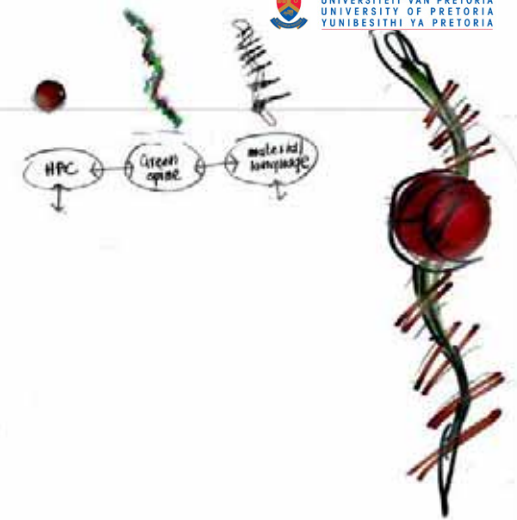
Chapter 4

Concept to site



From concept to site

FIGURE 141 -Concept to site diagram, Author, 2008



4.1 Concept diagram

- 4.1.1 Catalyst
- 4.1.2 Green spine
- 4.1.3 Material selection
- 4.1.4 Concept plans and sections

4.2 Concepts applied on Groenkloof campus

- 4.2.1 HPC (High Performance Centre)
 - 4.2.1.1 HPC (L.C de Villiers)
 - 4.2.1.2 UP future development plan
 - 4.2.1.3 HPC proposal for Groenkloof campus
 - 4.2.1.4 Groenkloof campus and proposed HPC
- 4.2.2 Green spine as stormwater management
 - 4.2.2.1 Stormwater framework
 - 4.2.2.2 Stormwater calculations
 - 4.2.2.3 Water quality
 - 4.2.2.4 Stormwater management plan and sport activities
- 4.2.3 Material selection sourced from relevant historical context
 - 4.2.3.1 Kirkness chimneys
 - 4.2.3.2 Red brick
 - 4.2.3.3 Jacaranda plantation grid
 - 4.2.3.4 Larger context response

4.3 Environmental, heritage, social and sport frameworks

4.1 Concept diagram

Figure 143 shows the concept implemented on Groenkloof campus. The red star represents the proposed location of the HPC. The HPC is placed close to the existing library, cafeteria and residential buildings on Groenkloof campus. The green arrow indicates the proposed green spine. The spaces linked by the “green spine” will celebrate relevant history.

4.1.1 Catalyst

The HPC needs sports facilities that cater for soccer, hockey and water sports. The hockey fields are proposed on the upper and smaller sportsfield and the soccer fields placed on the lower terrace. The water sport facilities are situated in the “drainage line” and forms part of the green spine.

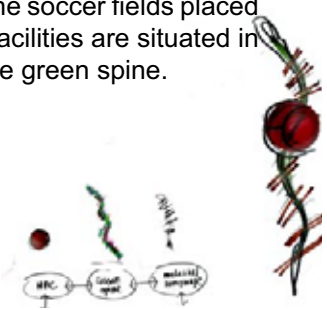


FIGURE 147 - Concept, Author, 2008

4.1.2 Green spine

This system will be a stormwater management plan with strategic retention dams connected with overflow channels. These “channels” will have interactive ecological edges that filter water and enhance the aesthetic qualities of Groenkloof campus.

The onsite stormwater and stormwater rerouted onto the site from the existing stormwater channel will be the source of water for recreational activities, maintenance and water sport facilities.

4.1.3 Material selection

The Kirkness brickfields chimneys are reinvented as floodlights and beacons with red brick tower structures. Using red clay brick in paving and street furniture is a way of commemorating the brick works, but it can easily be overdone and the significance lost. These bricks are used to emphasize and frame features. The HPC is a world class facility and the material usage and detail design must reflect this.

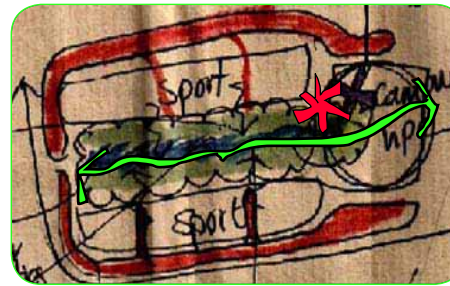


FIGURE 143 -Catalyst on Groenkloof campus, Author, 2008



FIGURE 144 – Stormwater spine on Groenkloof campus, Author, 2008

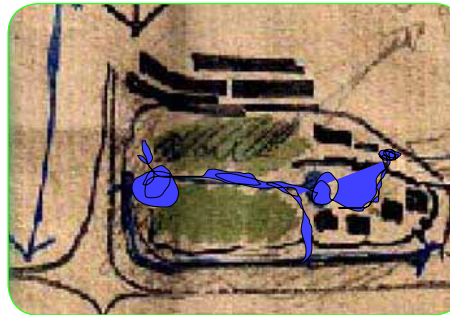


FIGURE 145 –Dams in the green spine, Author, 2008



FIGURE 146 -Monuments around Groenkloof, Author, 2008

4.1.4 Concept plans and sections

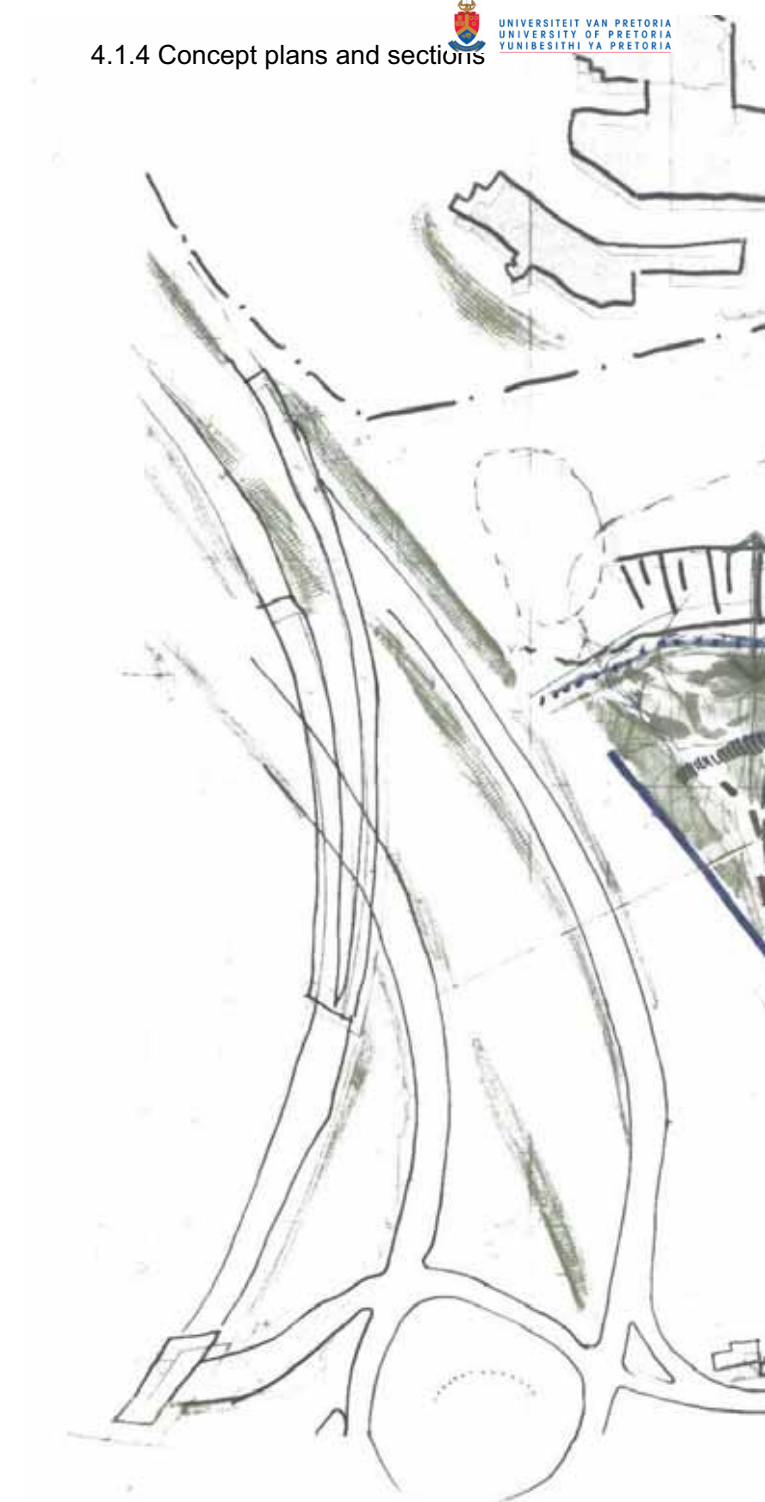




FIGURE 148 – Design development 1, Author, 2008

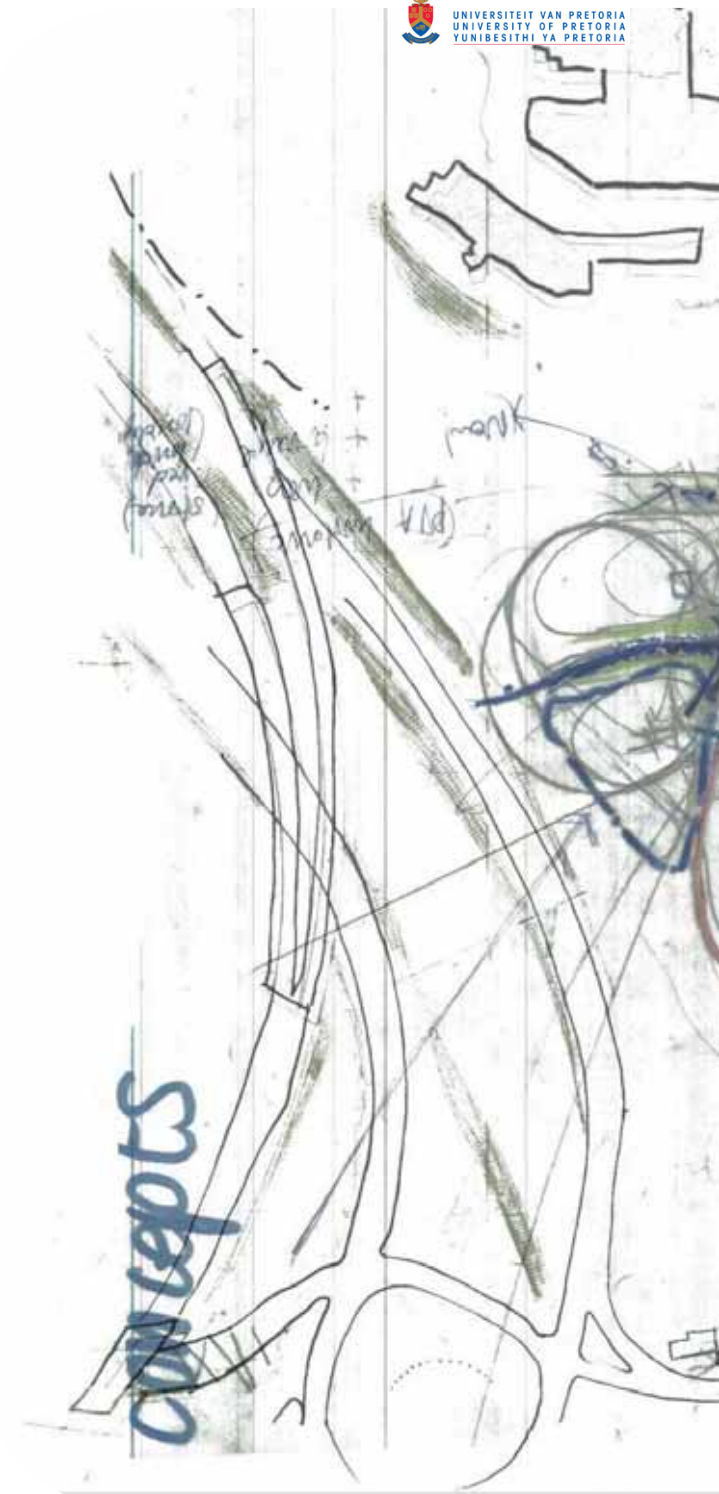


Figure 148 was the first concept site layout. The existing facilities, slope and open spaces were drawn. In Figure 149 large volumes of stormwater are dammed onsite, pedestrian circulation is considered, the HPC was placed onsite and a new entrance implemented.

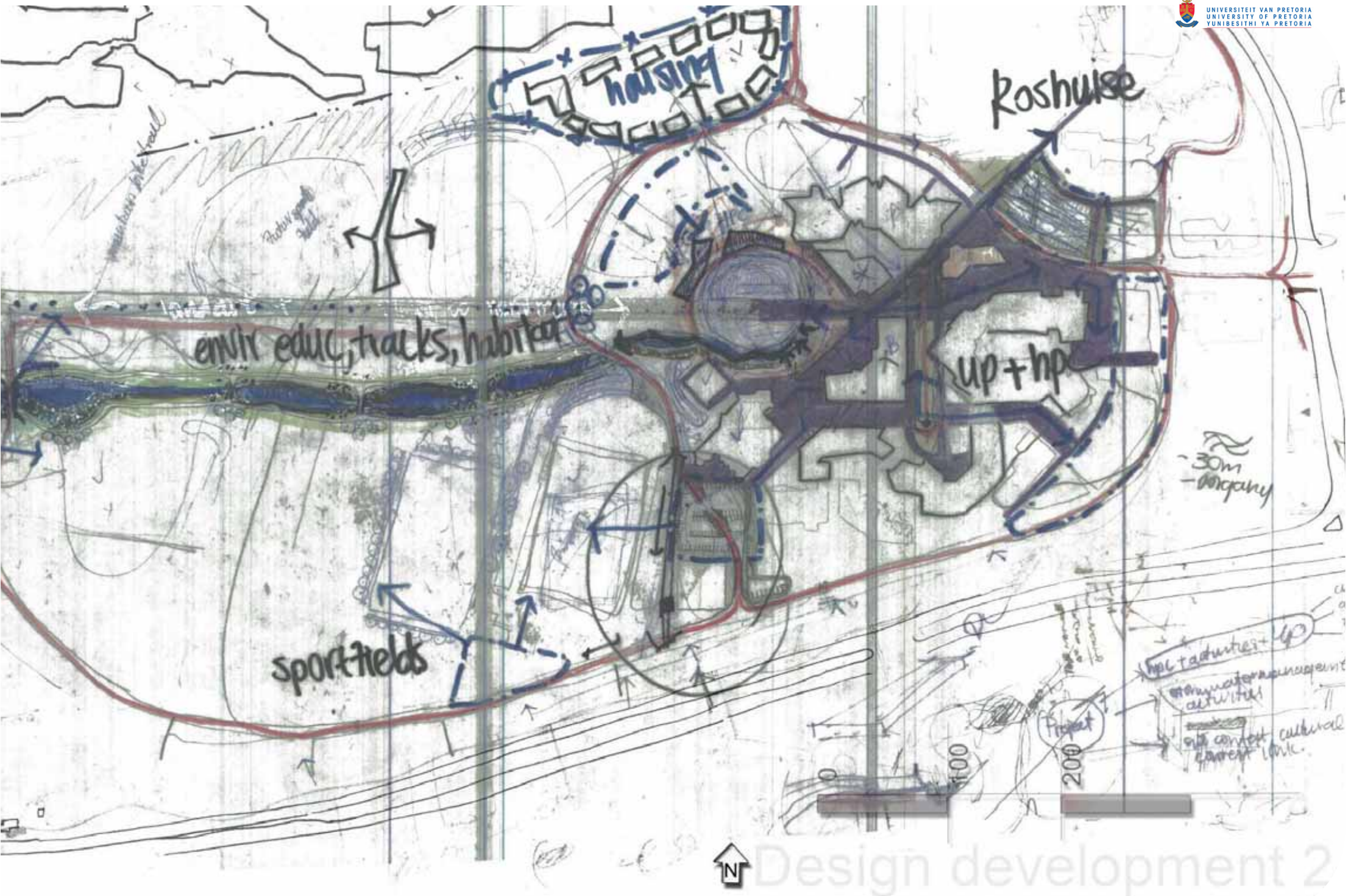


FIGURE 149 – Design development 2, Author, 2008



In Figure 150 a linear land art line was added with red brick towers for emphasis. The stormwater dams had ecological education trails and bird hides.

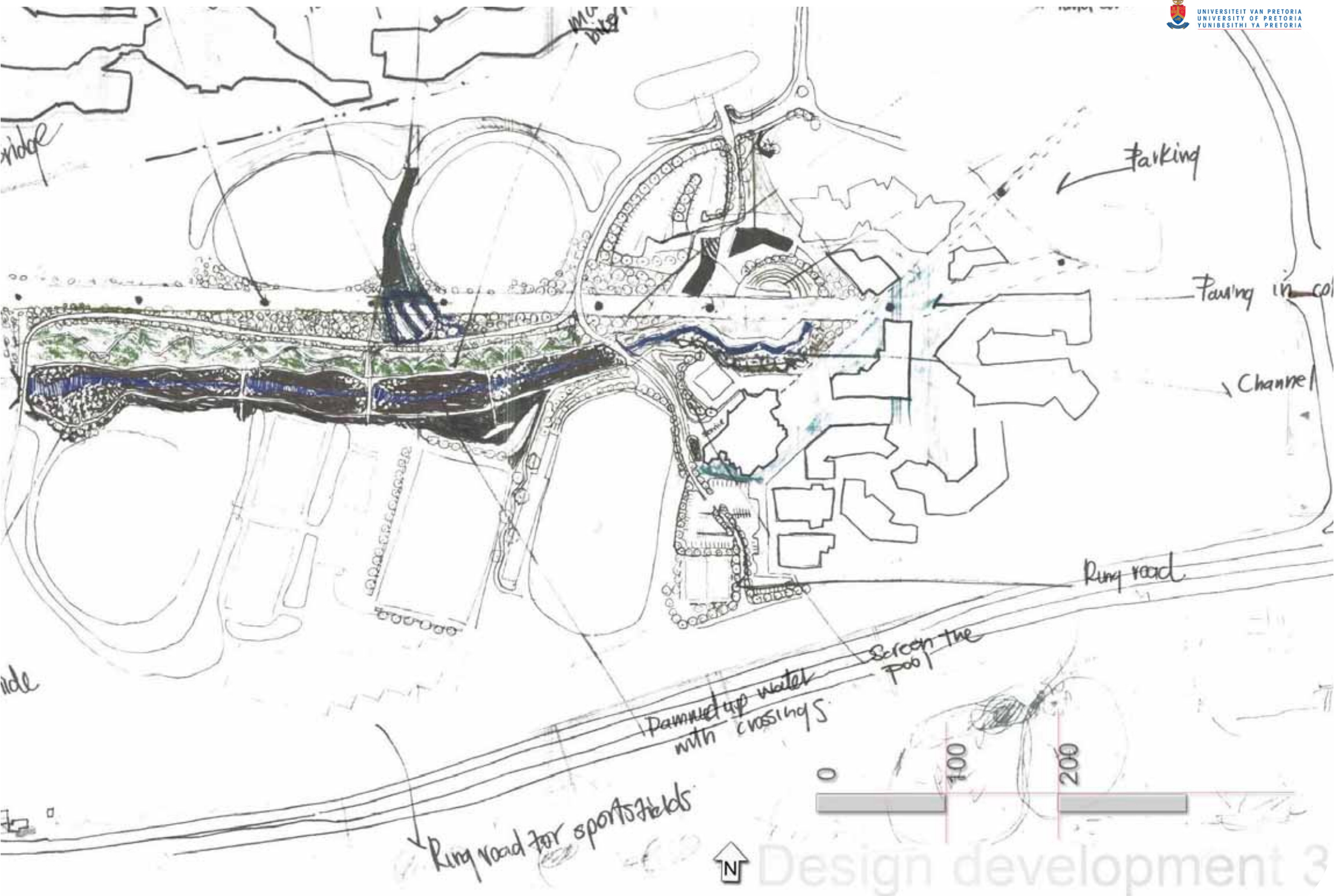
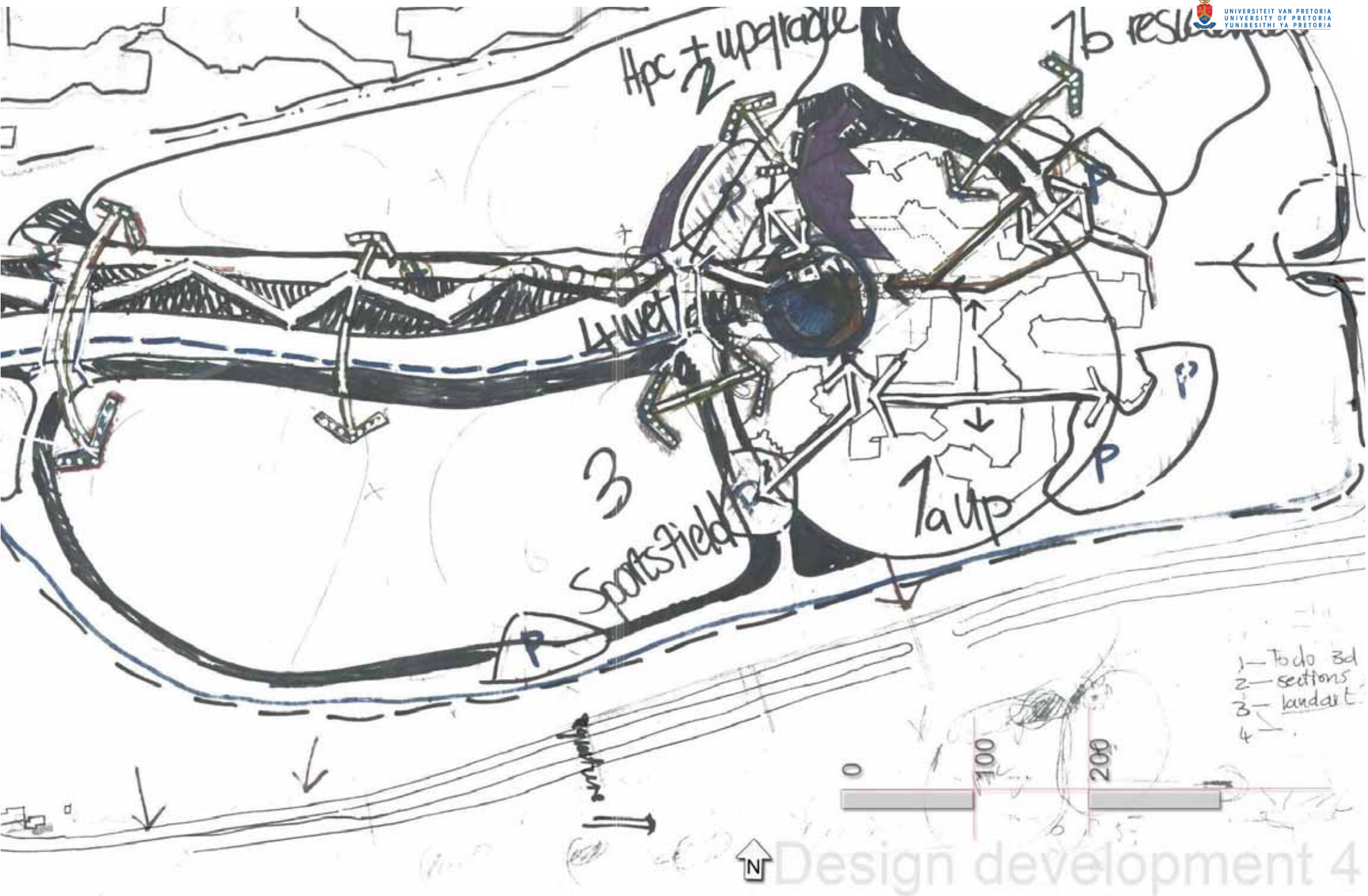


FIGURE 150 – Design development 3, Author, 2008

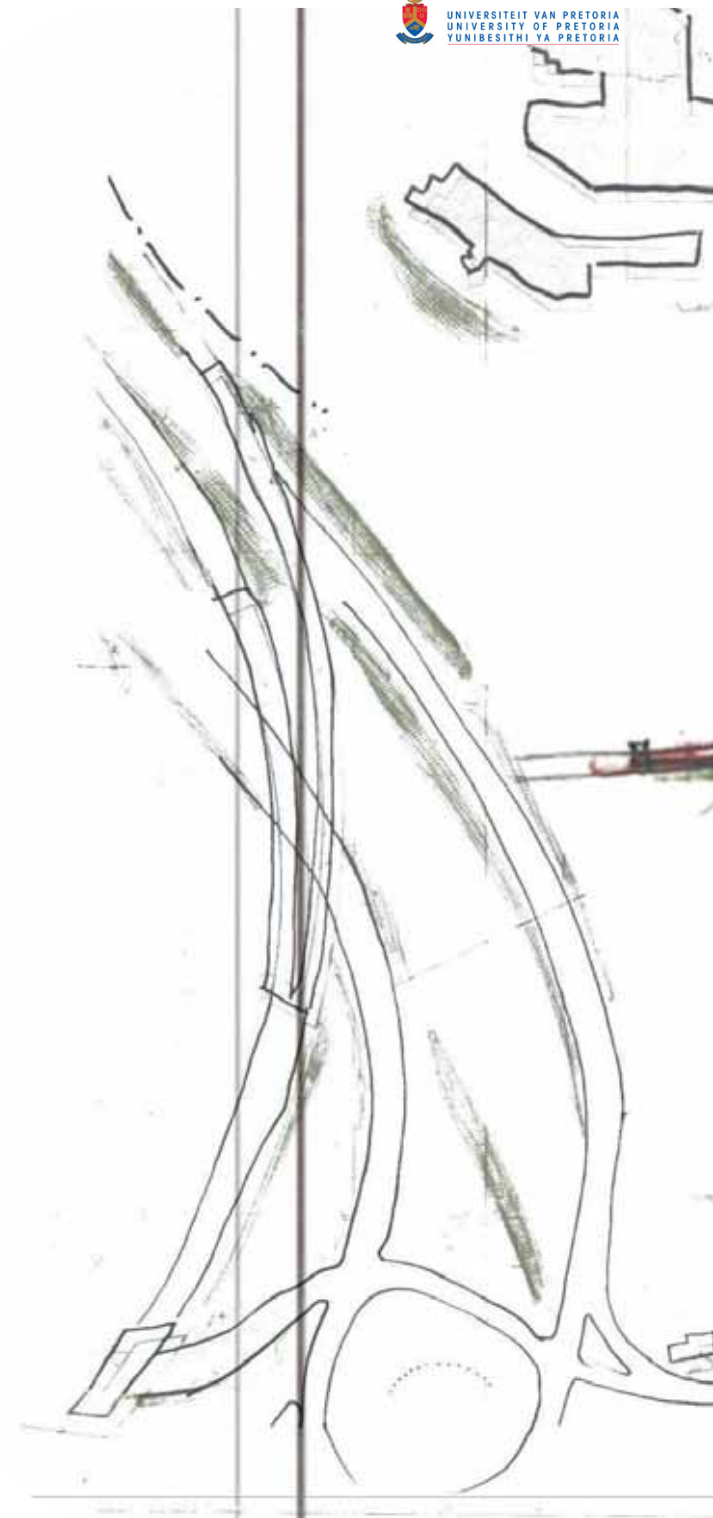


In Figure 151 the campus was divided into zones of activity and the connection between these zones were considered. An attempt was made here to simplify the master plan.



Design development 4

FIGURE 151 – Design development 4, Author, 2008



Circulation, habitat creation and vistas to the surrounding monuments and the land art feature were considered in Figure 152.

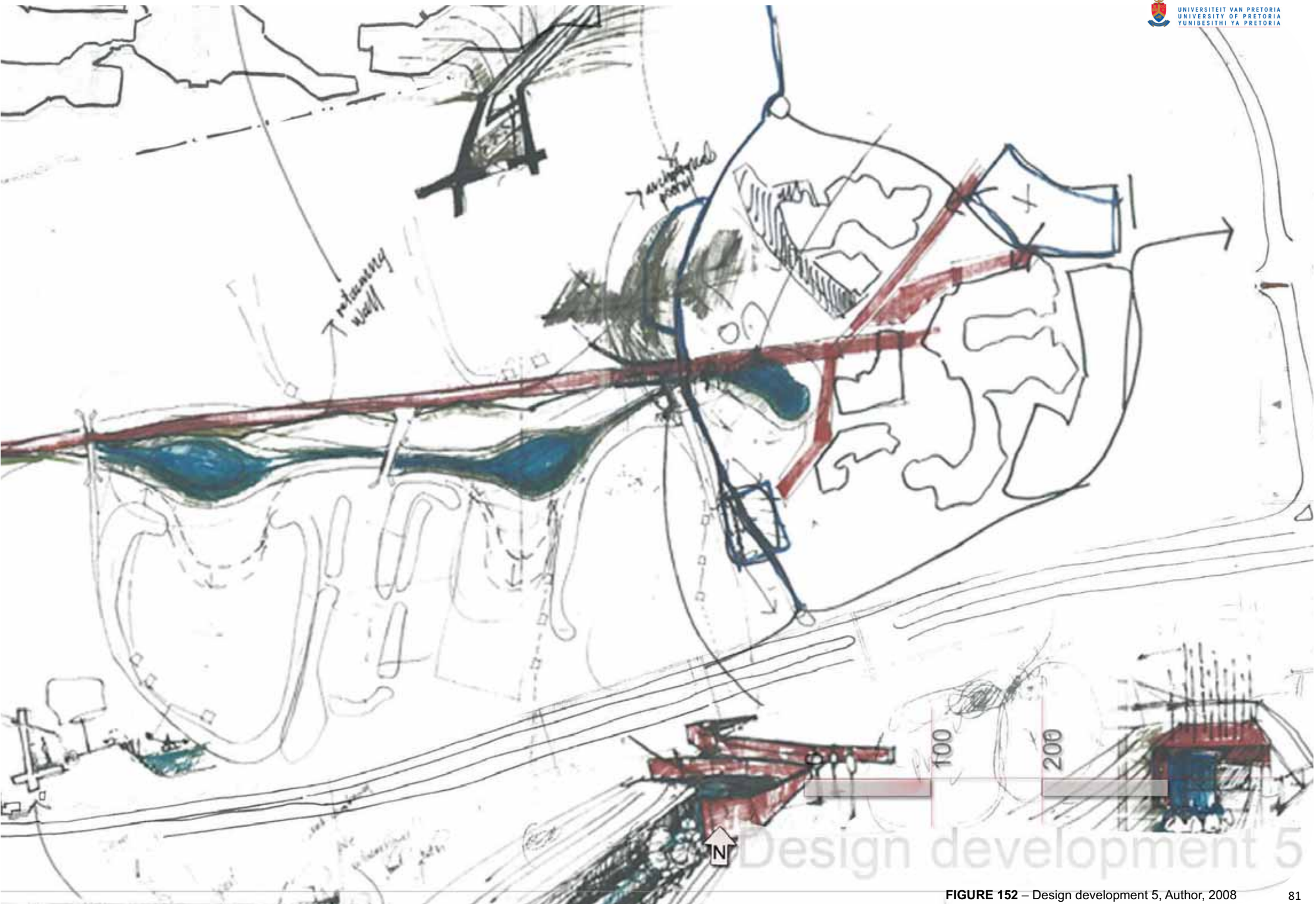
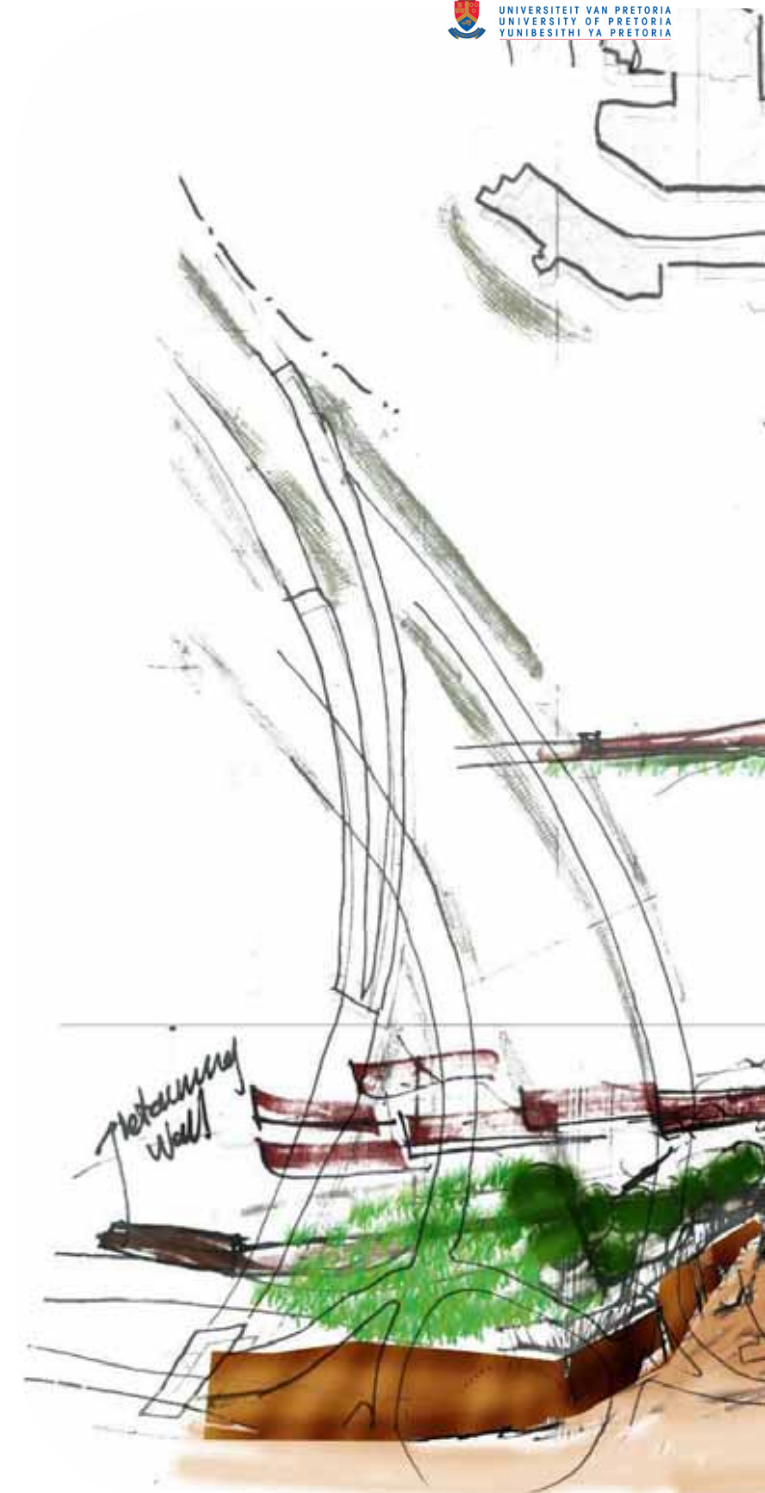


FIGURE 152 – Design development 5, Author, 2008



Habitat creation, pedestrian walkways and interactive dam edges were introduced. Retaining walls and brick towers along the land art line were tested in Figure 153.

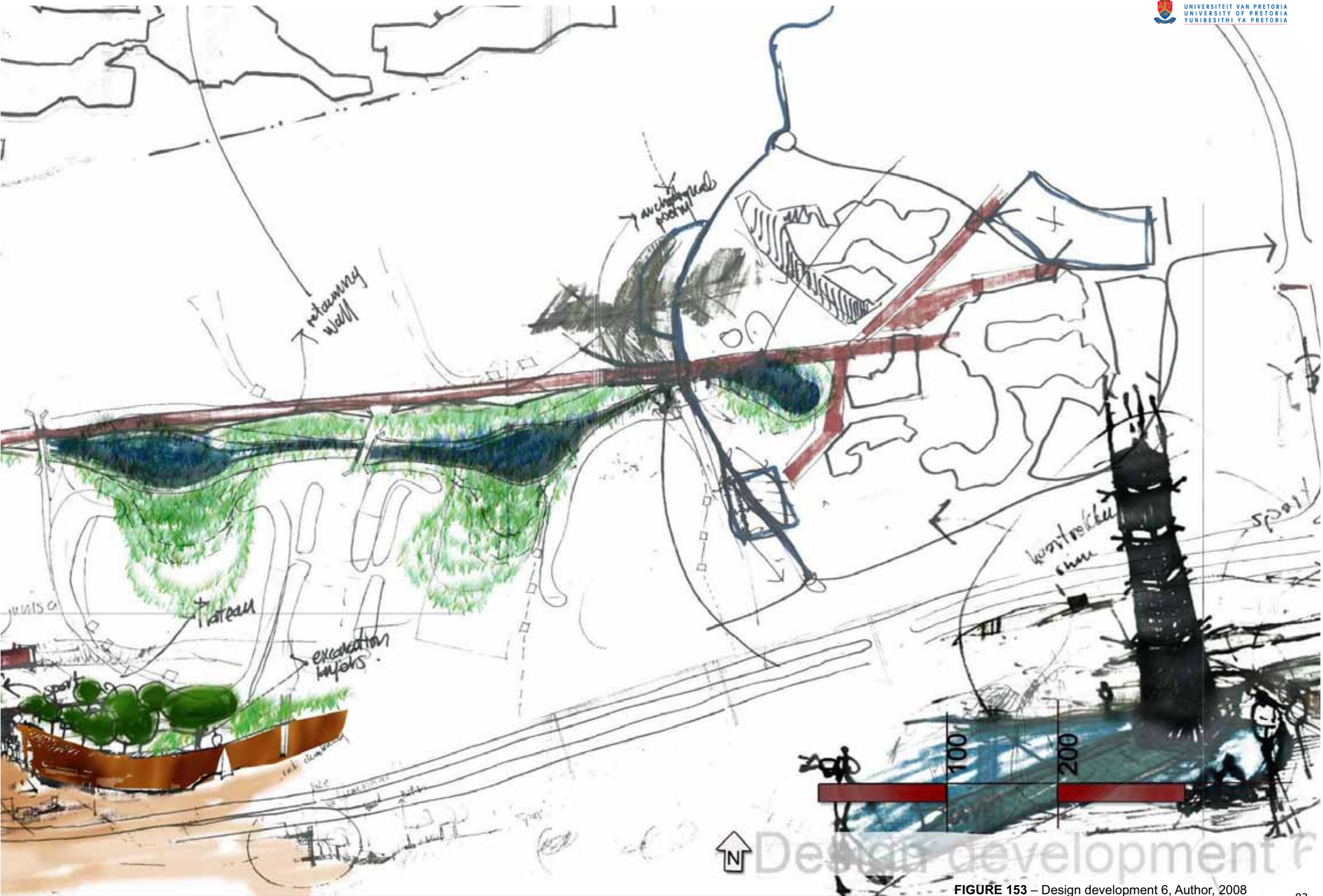


FIGURE 153 – Design development 6, Author, 2008



The size of the dams changed according to the storm water calculations (Figure 154). This influenced the circulation and layout around the dams. Water quality enhancement methods had to be implemented.

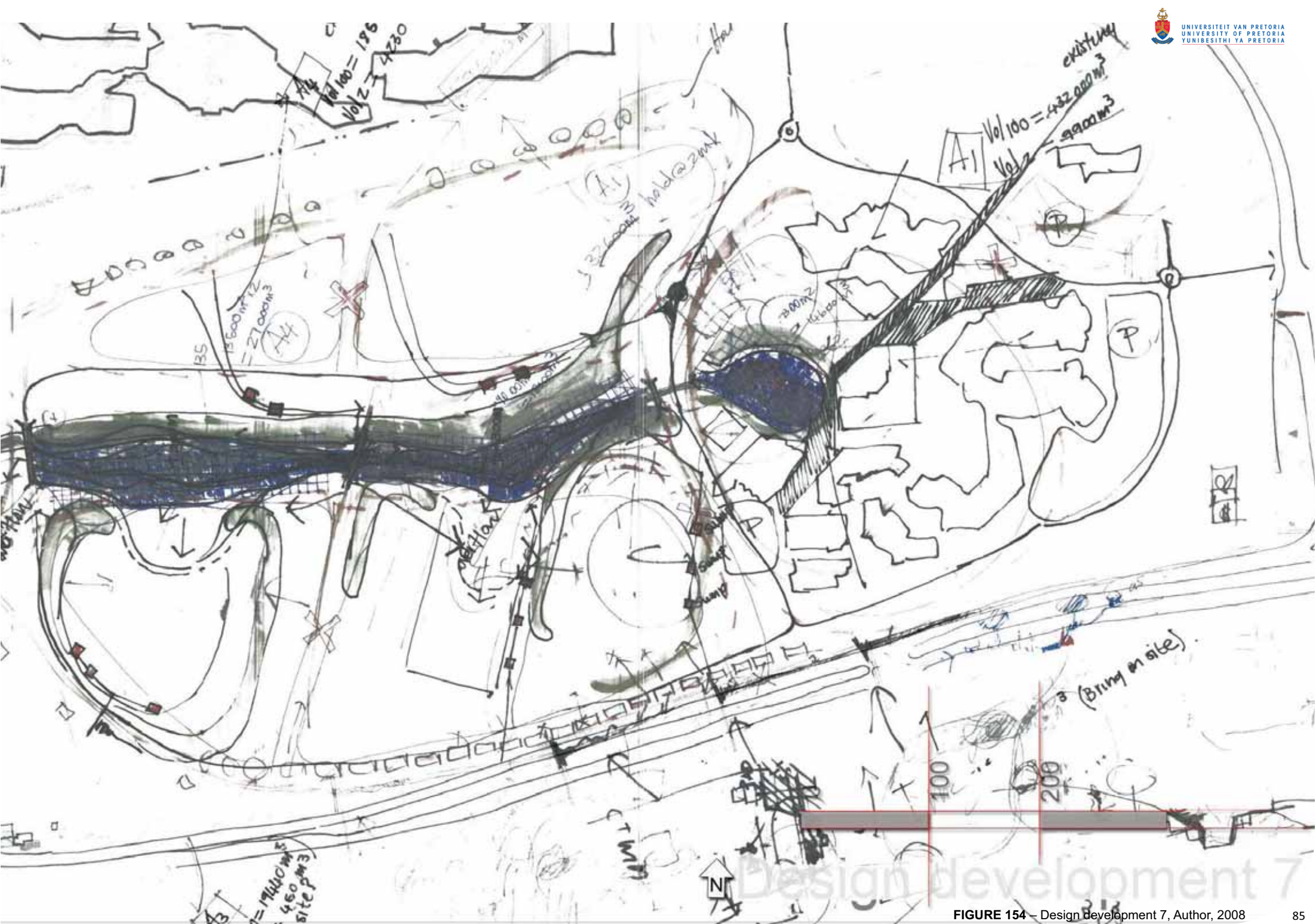


FIGURE 154 – Design development 7, Author, 2008

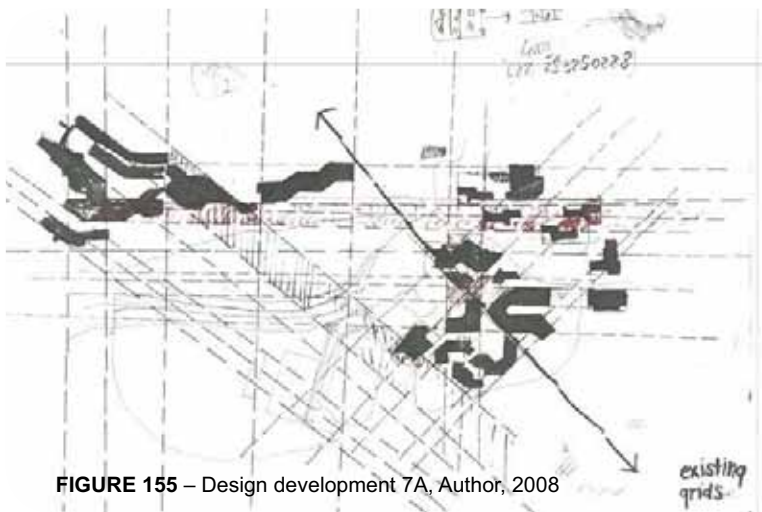


FIGURE 155 – Design development 7A, Author, 2008

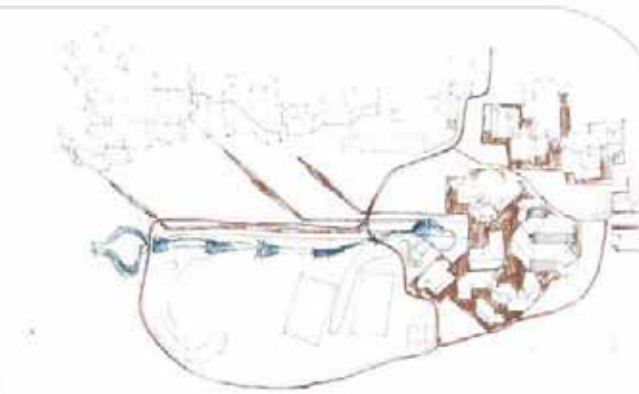


FIGURE 156 – Design development 7B, Author, 2008



In Figure 157 the 90 and 45 degree grid from the master plan of Unisa and the grid from Groenkloof campus were projected onto the site. This was done to stitch the proposed development onto the existing structures. Terraces that reflect this grid were introduced.

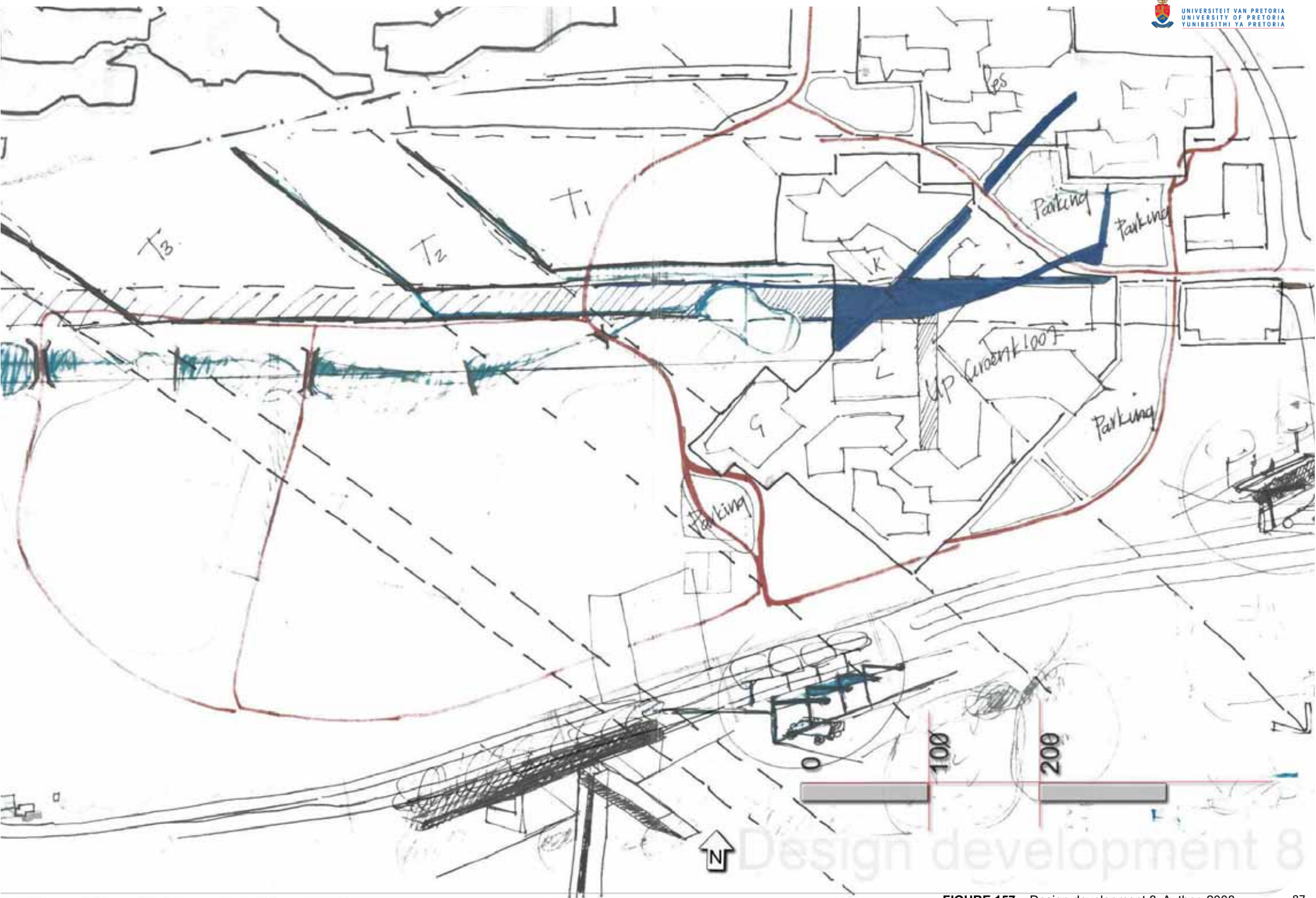


FIGURE 157 – Design development 8, Author, 2008

Groenkloof campus was divided into user zones. These zones are the residential zone, the main campus zone and the sport campus zone. These zones are connected by the stormwater system and framed by ring roads.

Residential zone:

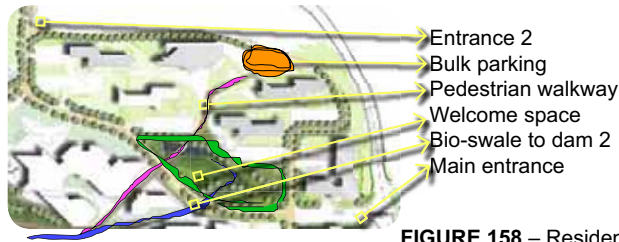


FIGURE 158 – Residential zone, Author, 2008

This zone is located in the north-eastern and highest portion of Groenkloof campus. Existing roads were linked to create a ring road around this zone. The ring road acts as a “watershed” that channels stormwater to the first collection dam of the proposed “green spine” of Groenkloof campus. The dam is located at the main entrance to create the welcome space that announces the arrival on Groenkloof campus. A red brick landscape element with the Groenkloof campus emblem is the focal point of this space.

The welcome space is the first impression that visitors gets of the campus. The expectation of the rest of the facilities on this campus should be created here. Previously this space was an oversized social space for the residences. The collection dam has interactive edges with gathering pockets for the social events of the residences.

Parking for students not residing in the residences has not been formally provided for. These students park in an informal fashion on the terrace designed as a shooting range on the north boundary of the campus. Students filter through the campus and the only notably strong pedestrian route is the pathway linking the residences to the main campus. A multi-story parking facility is proposed in the residential zone on a site currently used for parking. This intervention sets in place a main pedestrian route (path between residences and main campus). The cafeteria, library and lecture halls together act as one pole and the parking facility as the other. In between the circulation route is created. The existing path is widened and crosses the pond in the welcome space by a pedestrian bridge providing for a pleasant pedestrian experience.

The dam size depended on the amount of water needed in summer for irrigation, evaporative losses and aesthetic qualities. The brick beacon with Groenkloof emblem on it is located in the reflective pond. This pond overflows to a pipe that daylight on the other side of the road into a bio-swale. This swale directs water through the campus to the existing dam (dam 2).

Main campus zone:

All the academic buildings are located on the main campus. This zone is located between the residential and sports campus. The new pedestrian route leads to the “campus heart”. The bio-swale fed by the overflow of dam 1 is not next to the main walkway due to the dam size and shape. Post-graduate students park at

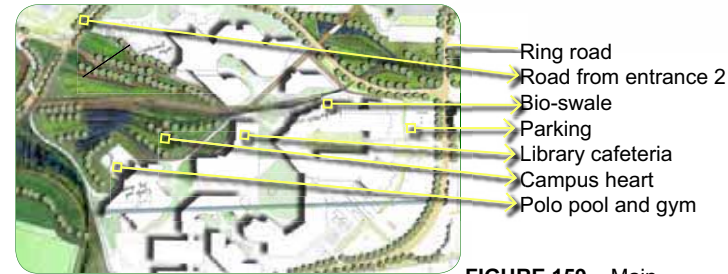


FIGURE 159 – Main campus zone,

the existing parking lot located at the eastern edge of the main campus. Pedestrians are encouraged to walk from here along the bio-swale path to the “campus heart” as this route is shorter. The bio-swale will only be filled with water during and after rain-storms. This unpredictable feature will most surely attract attention.

The existing dam was altered to a water feature stage with stepped spectator amphitheatre seating. The edges of the dam were reshaped to less steep slopes. This space had to be able to cater for everyday campus life and in the event of large gatherings. The existing polo pool was screened off by trees and a spectator seating berm was introduced along the western edge of the pool. Dam 2 has to maintain the gardens of the main campus zone in summer. Existing roads were linked to create a ring road around the main campus. The existing service entrance (north of the main entrance on Leyds street) was converted into entrance two. This entrance is allocated to the users of the HPC. The “campus heart” acts as the welcome space for visitors entering the site from entrance two. The HPC is located in close proximity to the cafeteria and HPC School. The development of this HPC can be spread over several years as existing housing and cafeterias could be used to service athletes in the first few phases. The location of the HPC defines the western edge of the “campus heart”. The pedestrian links between the residential zone, main campus zone and the sports campus zone have a higher importance than the ring roads.

Sport campus zone:



FIGURE 160 – Sport campus zone, Author, 2008

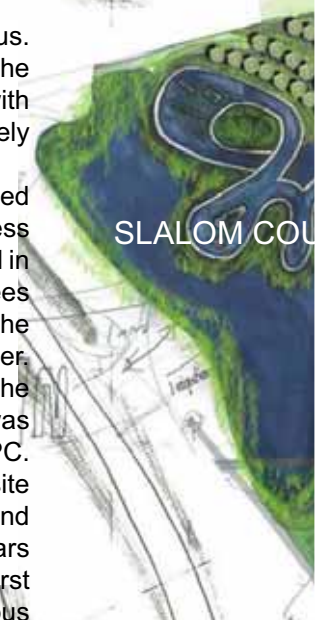




FIGURE 161 – Design development 9, Author, 2008

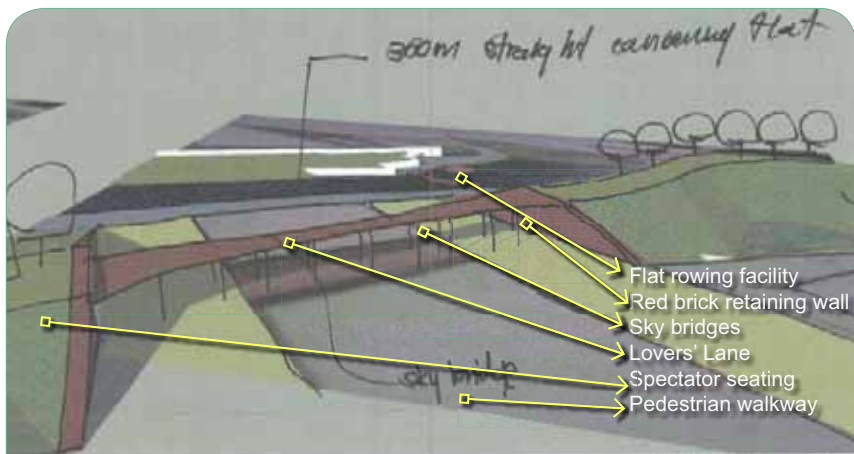


FIGURE 162 – Sky bridge, Author, 2008

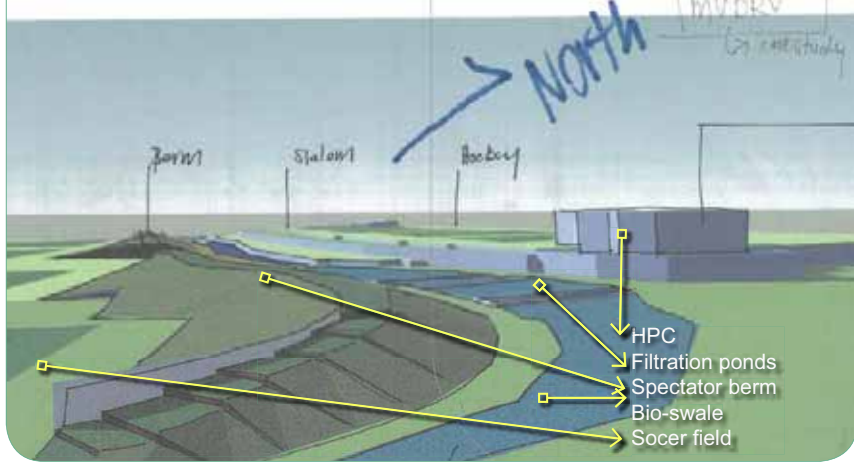


FIGURE 163 – Spectator berm, Author, 2008

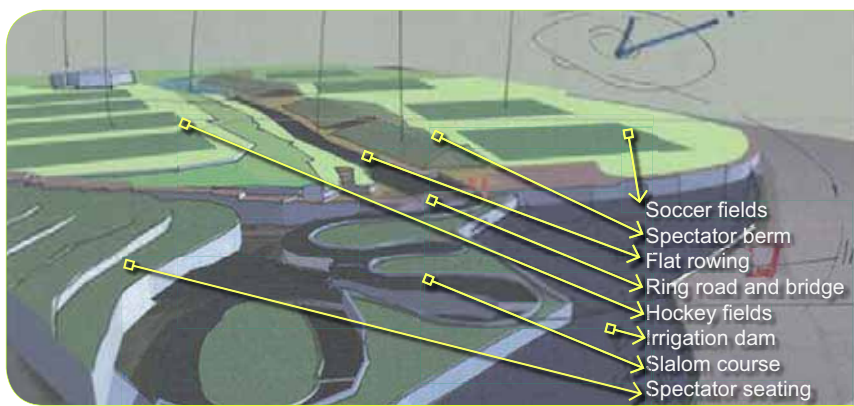


FIGURE 164 – Slalom course and irrigation dam, Author, 2008

This zone is the largest of the three zones and is located to the west of the site. A new road (on the top terrace) and vehicle bridge (connecting the upper and lower terrace) were introduced to complete the ring around the sports campus.

The HPC caters for hockey, soccer and rowing sports allowed by the stormwater volumes. Four hockey fields were placed on the top terrace due to the smaller size of this terrace. Four soccer fields were placed on the lower and larger terrace.

The existing athletics field (on the lower terrace) with spectator stand is slightly tilted to the east. The spectator stand would be costly to move and soccer field layout was adapted to the angle of the stand. This angle prevented the soccer fields from being positioned north-south. Three soccer fields could be fitted in. A flat rowing facility is located in the drainage line between the upper and lower terrace. The slalom course is located at the western end of the site.

Stormwater from the existing stormwater channel is rerouted onto Groenkloof campus. The stormwater is channelled by a bio-swale to the filtration ponds. The bio-swale is located east of the existing spectator stand. A wetland system is not used because not enough space is available for the size of the wetland needed to filter the volume of water available from the stormwater channel. The filtration ponds are planted dams at different heights that transfer water from one dam to the next.

The filtration ponds and the bio-swale are planted with wetland plants that attract birds. A bird hide is placed in the last pond of the filtration dams.

The flat water rowing facility is a 300m long with an 18m wide concrete channel. The course has slight angle changes every 100m. A spectator berm is located to the south of this facility. This berm has a walkway on the top and the sloped grass edges are spectator seating for the flat rowing facility and the soccer.

The berm is sliced in two by the walkways in between soccer fields 2, 3 and 4. These cuts in the berm are emphasized by the red brick retaining walls of the berms. Sky bridges connect the berms. The walk way on top of the berm is called the Lovers' Lane. The Lovers' Lane can be accessed at the eastern and western edge of the berm.

Two retaining walls create 3 terraces north of the flat rowing facility. These retaining walls are 4m high and finished off with red brick to commemorate the brick fields. The scale of these retaining walls continues to the scale of Unisa on to Groenkloof campus. The stepped landscape created by the retaining walls acts as a plinth for Unisa. The terraces are linear tree parks with spectator platforms, walk ways, veld grass, history story boards on the retaining walls and shade trees. The Lovers' Lane, the walkways around the filtration ponds and the 3 linear terraced parks were planned for those parkusers not interested in the

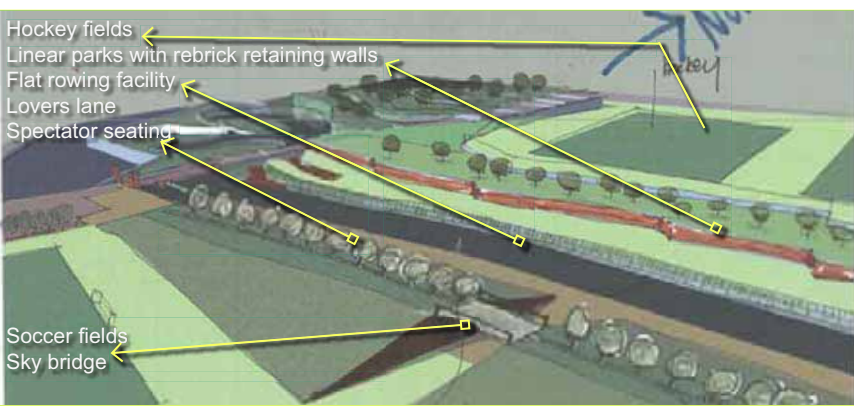


FIGURE 165 – Spectator berm and flat rowing facility, Author, 2008

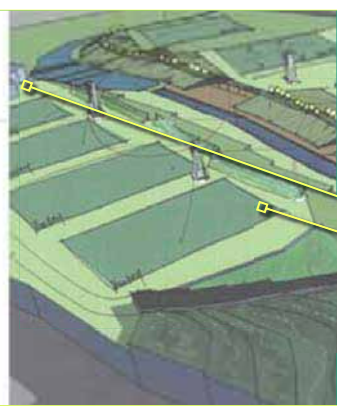


FIGURE 166 – Bi

The level difference between George Storrar Drive and Groenkloof campus is shown in section a.

sports events. The slalom course and the flat rowing facility are connected. A slide down an "astro turf" slope transfers athletes from the flat rowing facility in to the safety pond of the slalom course. The course starts underneath the bridge and ends in a collection pond.

4

FIGURE 168 – Section A, Author, 2008

The HPC, bird hide in the filtration pond, existing berm and soccer field can be seen in section b.

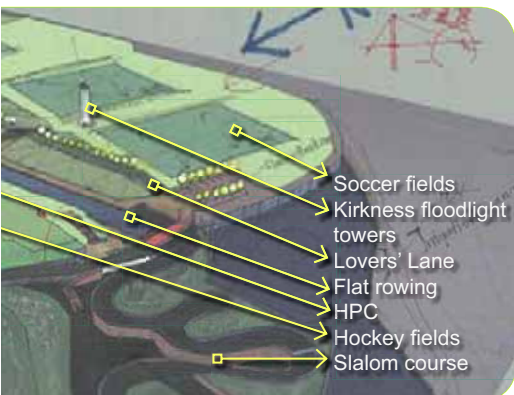
The location of the collection pond is near the flat rowing facility so that athletes can easily get to the starting point again.

FIGURE 169 – Section B, Author, 2008

Shaded spectator seating was provided to the north of the slalom course. The irrigation dam is located at the lowest point of the site. This dam has to store as much water as possible to maintain the sports campus in summer and the whole campus in winter.

The upper terrace, flat rowing channel, spectator berm and soccer field can be seen in section c.

FIGURE 170 – Section C, Author, 2008



perspective view of proposed Groenkloof HPC, Author, 2008

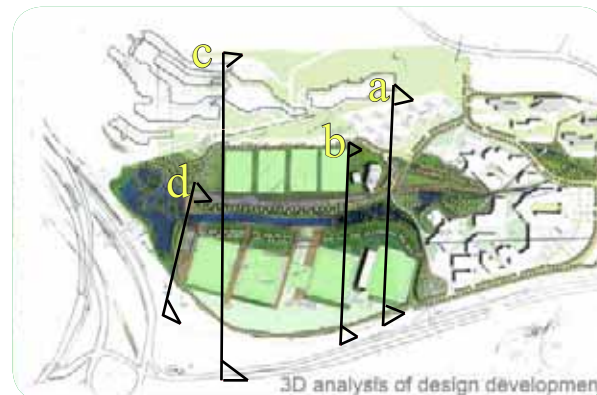


FIGURE 167 – Groenkloof map with section lines, Author, 2008

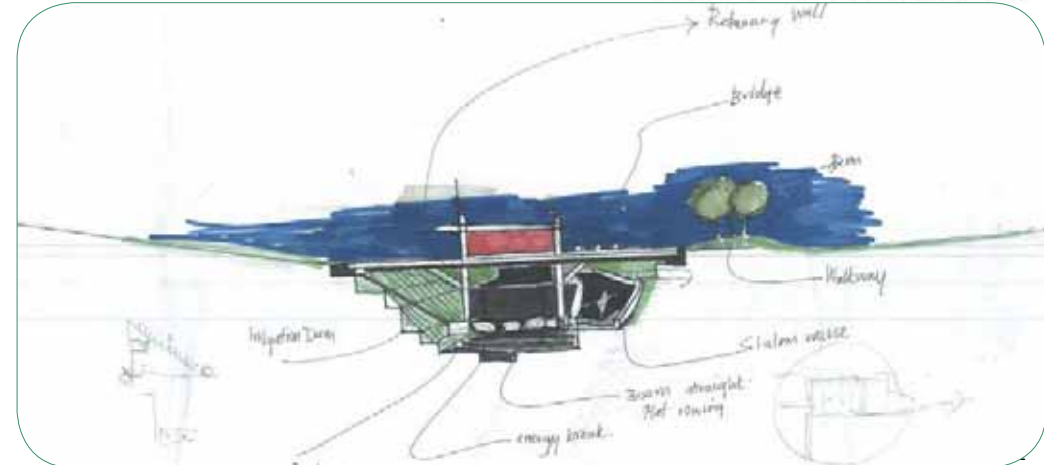




FIGURE 172 – HPC plan on L.C de Villiers, KWP, 2005



FIGURE 173 – HPC location on L.C de Villiers, University of Pretoria Geography department, assembled by Author, 2008

4.2 Concept applied on Groenkloof campus

4.2.1 HPC (High Performance Centre) as catalyst

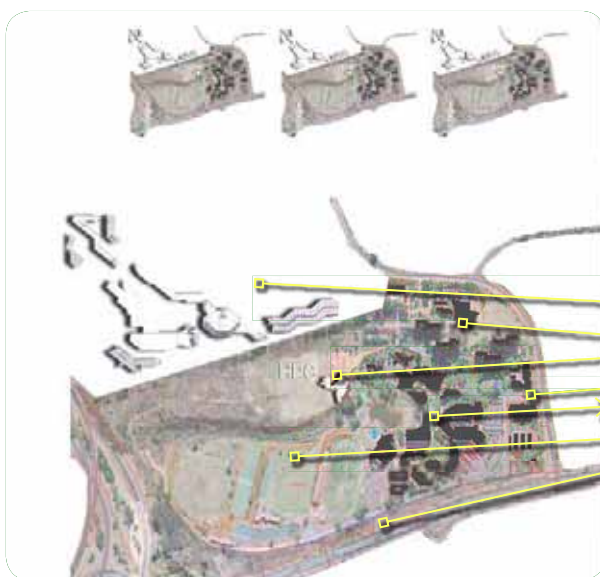


FIGURE 174 – Groenkloof campus with HPC, Author, 2008

4.2.1.1 HPC (L.C de Villiers)

The University has the most comprehensive multi-sport complex in South Africa. Facilities at the L.C de Villiers complex, the Groenkloof campus and other campuses include rugby and athletics stadiums, cricket ovals, soccer and softball fields, hockey fields, tennis courts, netball, basketball and squash courts and swimming pools. The Indoor Sport Centre accommodates all the indoor sports. The University recently opened the *High Performance Centre* (HPC), which adds a new dimension to the provision of support to high performance sportsmen and women” (University of Pretoria strategic plan, 24 September 2002). Expanding the HPC to Groenkloof campus will increase the contribution of the University of Pretoria in shaping South Africa’s high performance sportsmen and women.

4.2.1.2 UP future development plan

“The strategy enables students to become well-rounded, creative persons; responsible, productive citizens and future leaders by encouraging them to participate in and excel in sport, cultural activities, and the arts” (University of Pretoria strategic plan, 24 September 2002).

The proposed development will provide a sport facility with cultural relevance and platforms for community involvement.

4.2.1.3 HPC proposal for Groenkloof campus (KWP)

KWP and Don Alberts are the architects of the HPC concept on L.C de Villiers sports campus. According to Bester (2008), a proposal for an HPC on Groenkloof campus has been developed. This project is an academic exercise and has development potential.

4.2.1.4 Groenkloof campus and proposed HPC

Groenkloof is a beautiful campus with a rich history and is situated in a cultural corridor. This campus is however a large under-utilized site. The high speed roads surrounding Groenkloof campus isolate the site, also isolating the intervention. A catalyst on Groenkloof campus that provides new activities for several users was needed. If the expansion plans of the HPC were not known, this proposal would have been a regional park with red brick follies and stormwater dams. As a catalyst the HPC allows specialized sport facilities to be developed on Groenkloof campus. The HPC would be an investment for the University of Pretoria and the original HPC concept.

As a landscape architectural student the development of the whole site was important. The campus had to work like a living organism. Circulation, maintenance, stormwater, parking, entertainment and sports fields had to be networked. The placement of the HPC on the campus had to enhance the existing setting and allow HPC to be the “headquarters “of the “sports campus.

The HPC was placed on the top terrace near the western edge of the “campus heart”. The height of the terrace gave importance to the building while the western edge of the “campus heart” was defined.

4.2.2 Green spine as storm water management

The hydrological analysis highlighted the stormwater potential. Currently rain-water drains into the existing dam on Groenkloof campus. This dam overflows into an eroded drainage ditch that becomes a wetland further down the site. The existing sport fields on the lower terrace drain excess water into the wetland. A stormwater management plan (spine) that connects the residential, main campus and sports field is proposed.

4.2.2.1 Stormwater framework

The concept for the stormwater plan is to “maintain on a small scale and contribute on a larger scale”. Onsite and rerouted stormwater (Klapperkop and Groenkloof) are combined with recreational activities and sports facilities. The campus was divided into stormwater collection zones. The ring roads around the residential, main and sports campus are the boundaries of the collection areas.

The residential campus:

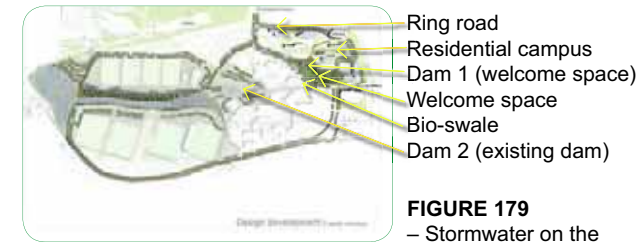


FIGURE 179
– Stormwater on the residential campus, Author, 2008

The stormwater on the residential campus is collected by bio-swales and channeled to a collection dam (Dam 1) at the lowest part of the residential campus. This dam is a feature of the “welcome space” and maintains the gardens of the residential campus in summer. The overflow of this dam is drained into a bio-swale that meanders through the main campus to the existing dam (dam 2).

The Main campus:

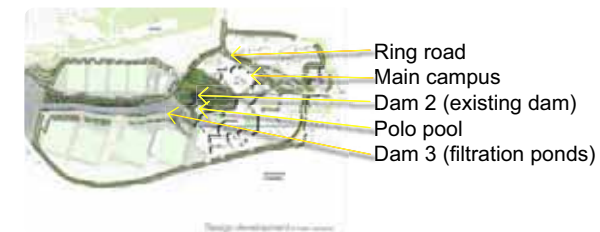


FIGURE 180 – Stormwater on the main campus, Author, 2008

Runoff from the main campus is channeled to Dam 2. This dam should maintain the gardens of the main campus in summer and be filled with water throughout the year. A new dam wall north of the polo pool expands the existing dam. Dam 2 overflows into the filtration pond (Dam 3).

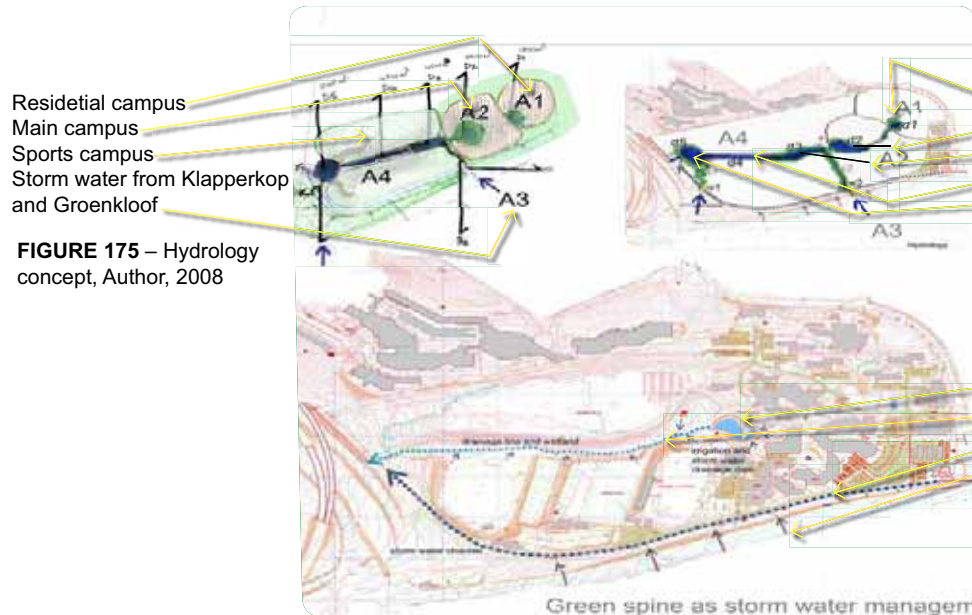


FIGURE 175 – Hydrology concept, Author, 2008

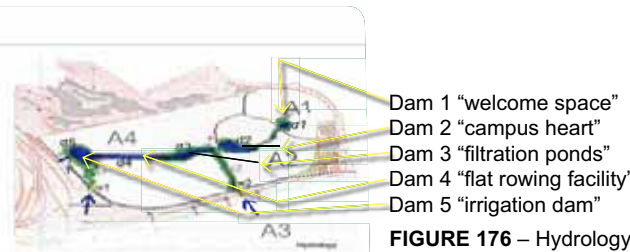


FIGURE 176 – Hydrology concept on Groenkloof campus, Author,

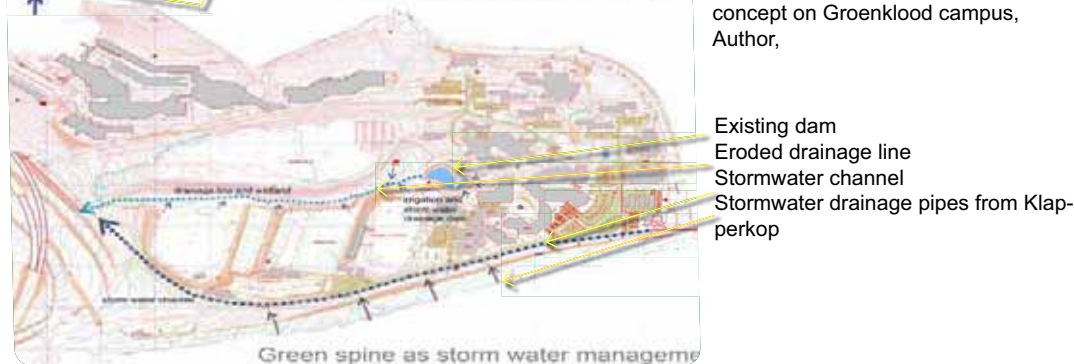


FIGURE 177 – Hydrology diagram of Groenkloof campus, Author, 2008

The sports campus:

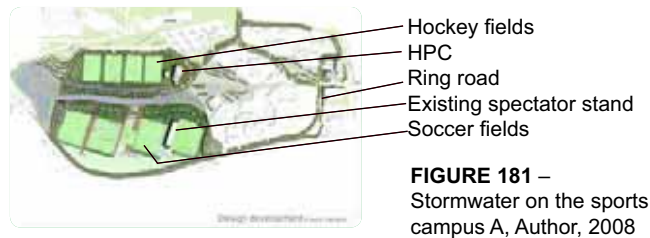


FIGURE 181 – Stormwater on the sports campus A, Author, 2008



FIGURE 182 – Stormwater on the sports campus B, Author, 2008

The existing stormwater channel will be widened and a weir with a collection pipe at the base of the channel will be installed. Water will be rerouted by the pipe onto the campus. The rerouted water will run through a silt pond and an oil trap before being channeled by a bio-swale to the filtration ponds. Some bio-remediation measures were implemented to enhance the quality of the water. The filtration ponds should manipulate the flow of the water by weirs. Non-aligned weirs would direct water to meander through the filtration ponds. This would minimize stagnant water spots that lead to unpleasant odors. The last filtration pond overflows in to the flat rowing facility (Dam 4).

The water level of the 300m straight rowing channel has to be maintained at the same level throughout the year. Dam 4 functions as a channel that links the filtration ponds and the irrigation dam. Water that flows into the rowing facility is deposited into the irrigation dam (Dam 5) at the western edge of the site. The flat rowing channel has planted edges to filter the water. The gabions that anchor the plants also absorb the wave energy caused by rowing.

The irrigation dam (Dam 5) has the largest capacity. This dam is planned to maintain the sports campus in summer and the whole campus in winter. The slalom course pumps water from the irrigation dam when in use and the water is drained back into this dam when the facility is not in use.

The irrigation dam will have fluctuating water levels.

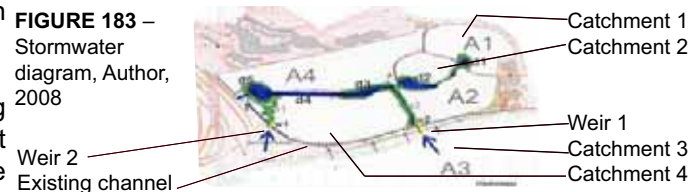
A second adjustable weir has been implemented in the existing stormwater channel, south of the irrigation dam. This weir collects water not rerouted at the first weir onto Groenkloof campus. An adjustable weir is proposed to control the volume of water rerouted onto the site. Water rerouted from this weir is piped into a bio-remediation channel before it is deposited in to the irrigation dam. The irrigation dam overflows in to a piped system that drains water in to the Apies River.

The size of the inlet to the Apies River depends on the volume of excess water that cannot be retained onsite in extreme flood conditions. This calculation was not done as this falls out of the scope of the thesis and study field.

4.2.2.2 Stormwater calculations

Stormwater calculations were done to get realistic sizes and volumes for the dams and water sports facilities. All calculations are basic and should be confirmed by hydrological engineers. The catchment of the onsite and offsite storm water was divided in to 4 catchment areas.

FIGURE 183 – Stormwater diagram, Author, 2008



Catchment 1 is the residential campus, catchment 2 is the main campus, catchment 3 is half of Klapperkop and a portion of Groenkloof residential area, catchment 4 is the other half of Klapperkop and the triangle outside Groenkloof campus east of the Fountains circle (Figure 183).

The areas, slope and surface type (c) were determined for each of the catchments. Rain data acquired from a study of rainfall volumes (done over 30 years) were used to tabulate monthly average

rain fall volumes. These figures were used averages for each month of the year. A Microsoft Excel spreadsheet was developed that multiplies the average rain-fall of that particular month with the area of the catchment. The surface type (c) and the slope of the catchment are used to determine the percentage of water that infiltrates. This infiltration volume is subtracted from the overall runoff volume.

The water volumes left over after infiltration has been subtracted is the bulk water volume that could theoretically be harvested from that catchment.

This stormwater plan is a linked system where one dam overflows into the next dam (see spread sheet). The next step in the calculation was to choose a size for Dam 1 (residential campus). Dam 1's volume and shape were influenced by the function of the dam. The area of the gardens on the residential campus that needed to be irrigated (40mm/week) and the aesthetic function of the dam determined the area and volume of the dam. The calculated area of Dam 1 is 1800m².

With the areas of Dam1 set, weekly evaporation volumes could be subtracted from the water in the dam . The irrigation volumes needed to satisfy the residential campus were 1252m³/month. The dam had to be at least 3 times the size of the volume of water needed for irrigation. The space available for the dam allowed the volume of the dam to be 3600m³. The size of the dam was changed a few times to make sure that the dam is filled to capacity throughout the year. The dry months (May, June, July, and August) made this especially challenging. With the size of Dam 1 set, the overflow volumes to Dam 2 (on the main campus) were known.

The area and volume of Dam 2 were determined with the same method as for Dam 1, with the overflow of Dam 1 added. Dam 2 is 3500m² and has a volume of 10500m³.

Dam 3 (filtration dams) is filled up by rerouted storm water (Klapperkop and Groenkloof residential area) and the overflow from Dam 2. The dam volume was determined by the runoff from half of Klapperkop and Groenkloof residential area. Evaporation and infiltration volumes were subtracted from the bio-swale and filtration dam. Dam 3 is a filtration pond and no volumes for irrigation were subtracted from this dam. Dam 3 has an area of 4500m² and has a volume of 18000m³.

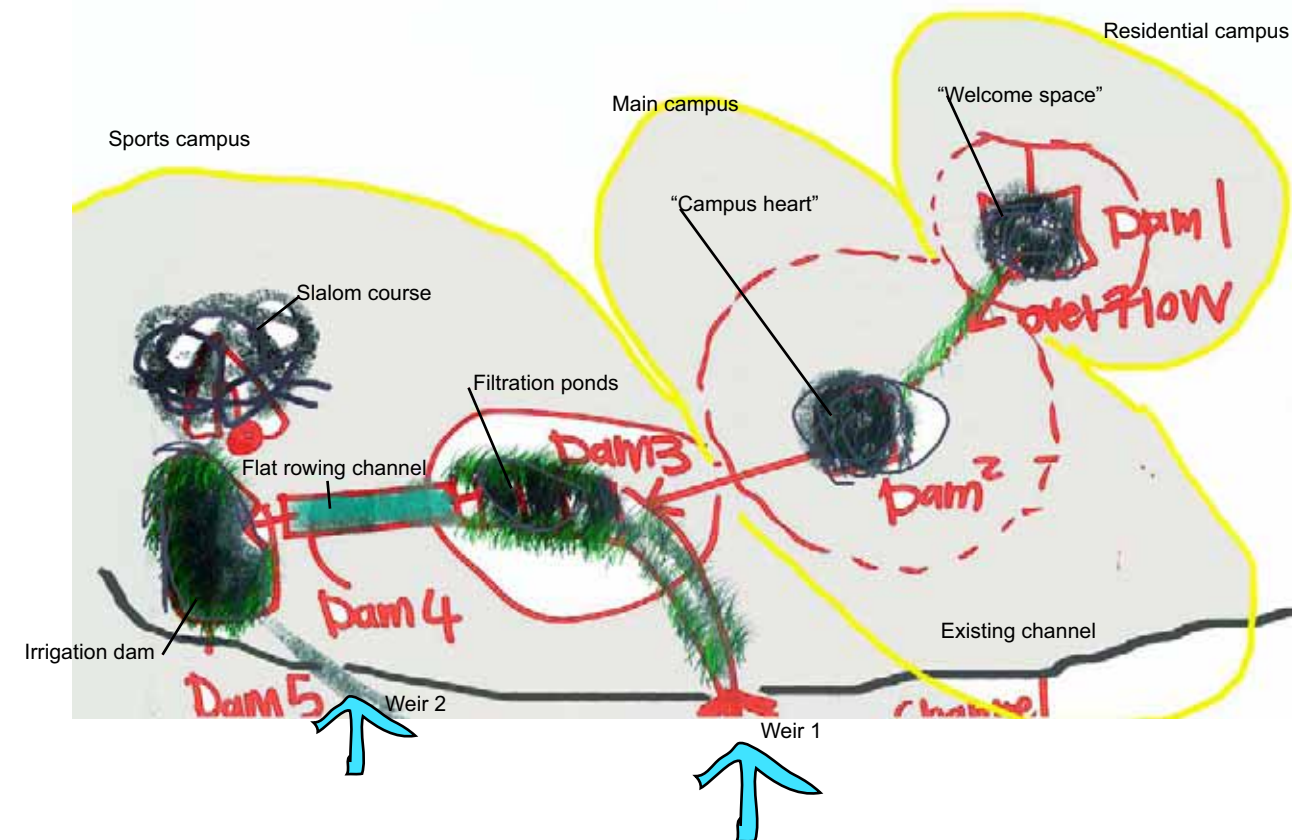
The flat rowing facility (Dam 4) was the least complicated. This channel had to be as long as possible. Stormwater volumes allowed a channel of 300m long and

18m wide. Only evaporation losses were subtracted from this channel. The rowing channel (Dam 4) has an area of 5400m² and a volume of 24000m³.

The irrigation dam (Dam 5) was the most challenging. This dam had to maintain half the site in summer and the whole site in winter. The slalom course is also dependant on the irrigation dam. The irrigation dam is filled up by the overflow of Dam 4 and runoff from catchment 4.

The irrigation dam has an area of 8000m² and a volume of 88000m³ (The slalom course has an area of 3000m² and a volume of 5800m³). The choice to implement synthetic fields for all the hockey and soccer fields greatly reduced the volumes of water needed to maintain the sportsfields. This decision allowed the irrigation dam size to be reduced considerably.

Water is discharged into the Apies River every month except for July and August.



4.2.2.3 Water quality

All measures were taken to bio-remediate the storm water before contact water sport facilities were introduced.

4.2.2.4 Stormwater management plan and sport activities

The 300m straight and the slalom course were interwoven with the stormwater management plan.

4.2.3 Material selection from relevant historical context

Groenkloof campus has a rich history. It was the brick works, Jacaranda plantation and the landfill period of this site that had the most influence on the material choice.

4.2.3.1 Kirkness chimneys

The Kirkness brick towers are reinvented in the scheme. Flood light brick towers are located along all the hockey and soccer fields. The pump room and lookout tower at the slalom course is a brick tower. Smaller brick beacons are scattered all over the campus and used as history canvasses, ablution blocks, refreshment shops and landscape elements.

4.2.3.2 Red brick

The red clay brick is obviously the material that would commemorate the clay brick from the Kirkness brick fields. Brick details with modern concrete shape work will be combined to resolve the details of the proposed scheme.

4.2.3.3 Jacaranda plantation grid

Although the Jacaranda is an invasive species, this tree is proposed for the Lovers' Lane on top of the spectator berm on the southern side of the flat rowing facility.

4.2.3.4 Larger context response

The two landscape retaining walls extends the scale of Unisa onto Groenkloof campus. These landscape walls will form a base for Unisa.

FIGURE 178 –
Stormwater
diagram, Author,
2008



The slalom course was revised after consultation with the white-river rafting athletes. The flat rowing athletes suggested that the facility should be straight (Figure 184).

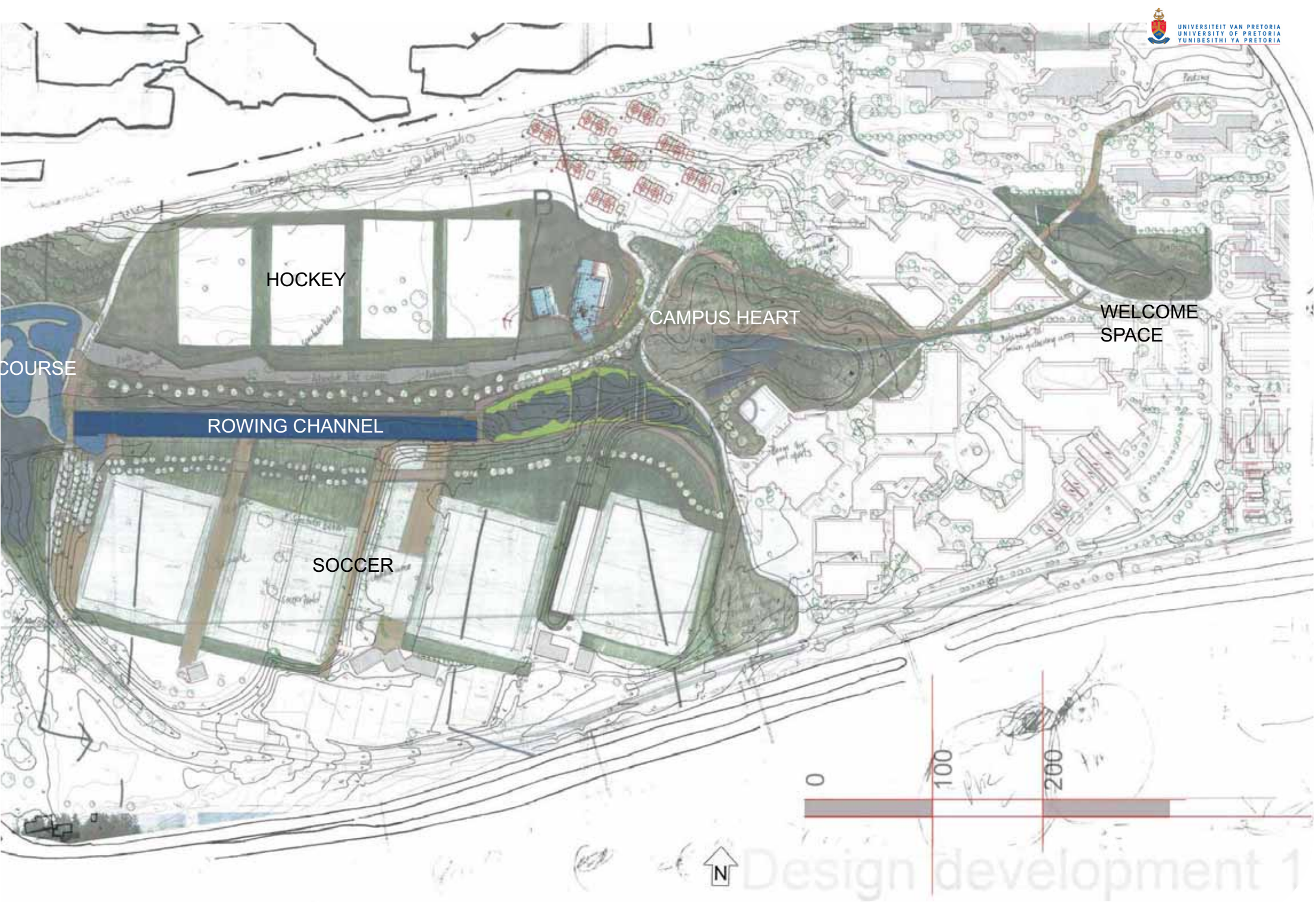


FIGURE 184 – Design development 10, Author, 2008

The slalom course was revised and the irrigation dam needed a safety dam. Parking and walkways were added. Housing for the HPC was implemented. Brick floodlight towers were placed around the sports fields and facilities. Tennis and basket ball courts previously demolished were retained and worked into the scheme (Figure 185).



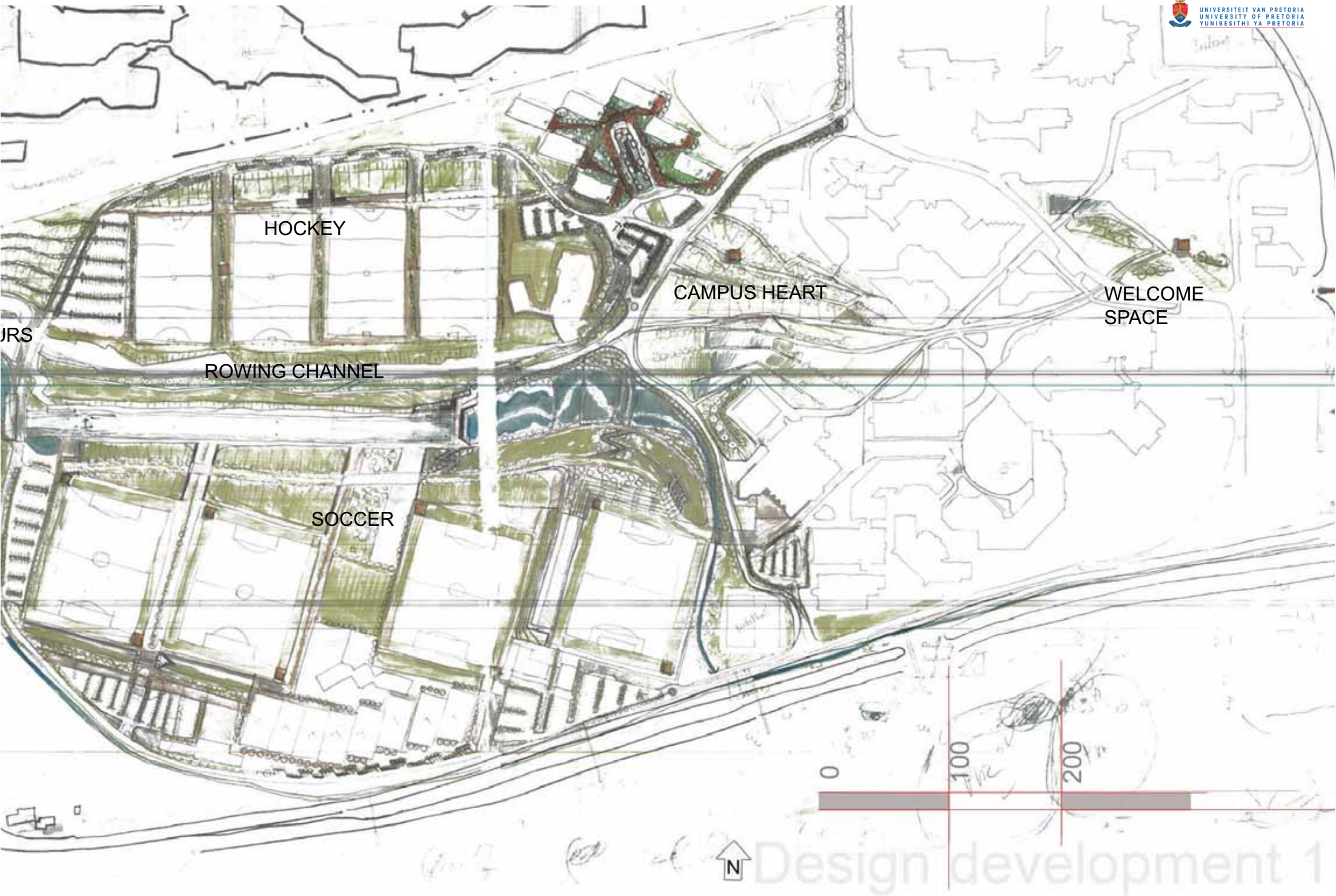


FIGURE 185 – Design development 11, Author, 2008

The “campus heart” has been reworked. The existing dam is made larger and an embankment placed north of the polo pool to retain the water. The stormwater is run through a silt pond and oil trap before it flows into the bio-swale. the slalom course is moved out of the drainage line and placed north of the irrigation dam. The flat rowing facility and the slalom course is connected by a walkway underneath the vehicle bridge. Another weir is placed in the existing stormwater weir to reroute water not captures at weir 1. The stormwater from this collection point is bio remediated through a bio-swale before it flows into the irrigation dam. A screen berm was implemented to screen the highway from park goers. The screen berm is located along the western boundary of Groenkloof campus. This berm ensures that the development on Groenkloof campus does not detrimentally impacts the southern gateway of Pretoria by unnecessary light pollution (Figure 186).

4.3 Environmental, heritage, social and sport framework

The environmental, heritage, social and sport guidelines (set up in Chapter 3) are implemented in the scheme in the following chapters.





FIGURE 186 – Design development 12, Author, 2008

Chapter 5



Groenkloof HPC

5 Environment

5.1 Stormwater

5.2 Ecology

5.3 Integration with sports, social and heritage aspects

5.4 Details

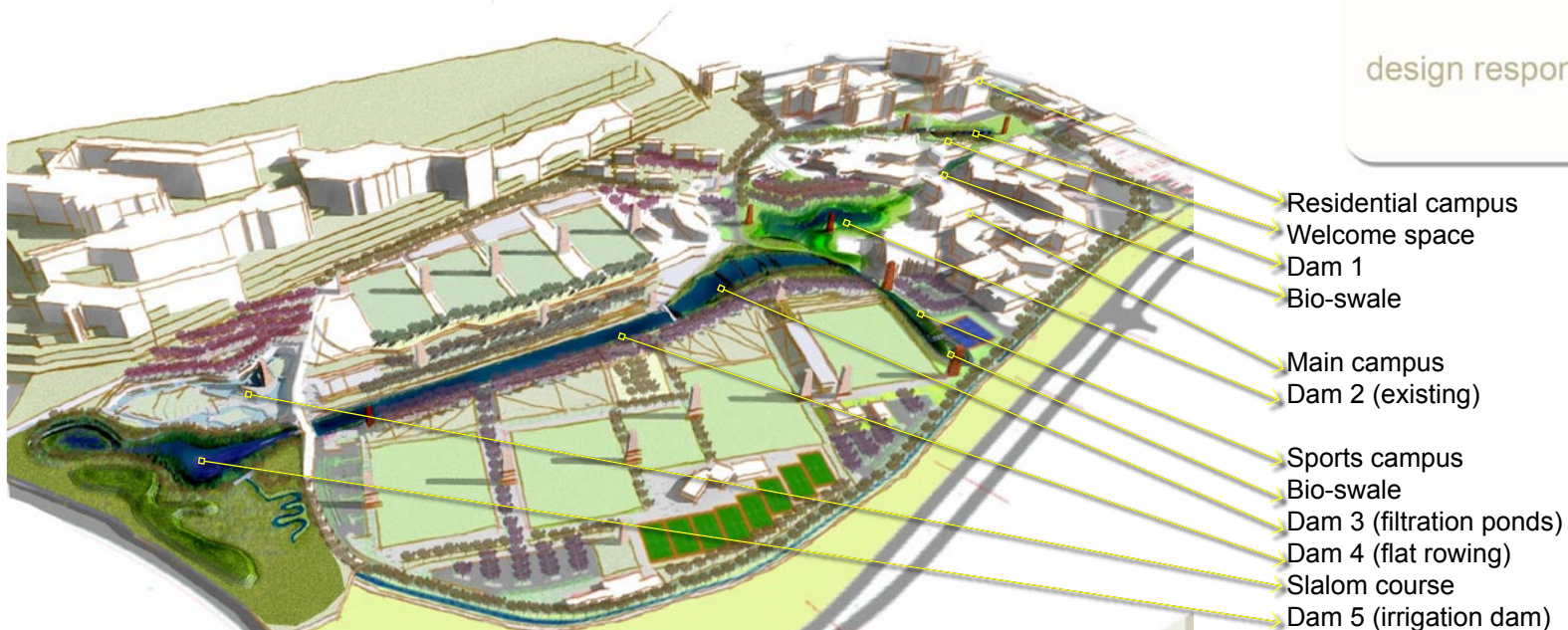


FIGURE 187- Bird's-eye view of HPC Groenkloof (the dams are highlighted), Author, 2008

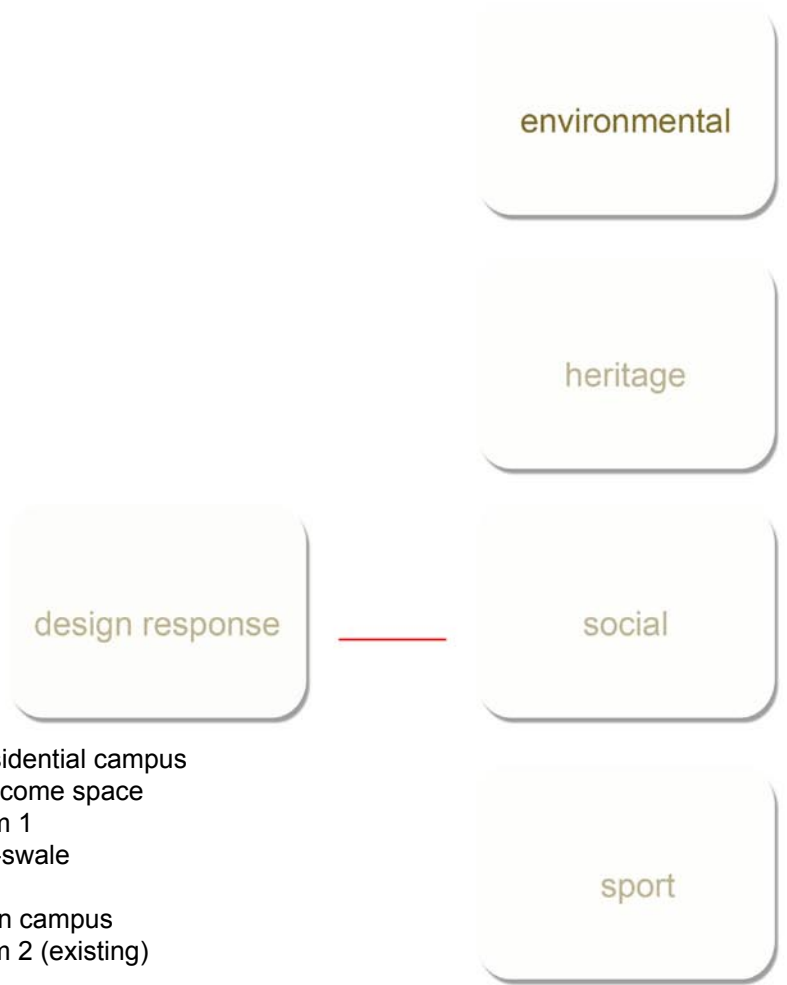


FIGURE 188 – Environmental framework diagram, Author, 2008

5 ENVIRONMENTAL FRAMEWORK

5.1 Stormwater

As discussed in Chapter 4 (4.2.2) Groenkloof campus was sub-divided into stormwater collection zones. These are the residential, main and sports campus zones. The stormwater management plan enables each collection zone to maintain that area's irrigation needs in the summer.

Provision for winter irrigation was made by water reserves collected in the irrigation dam (dam 5).

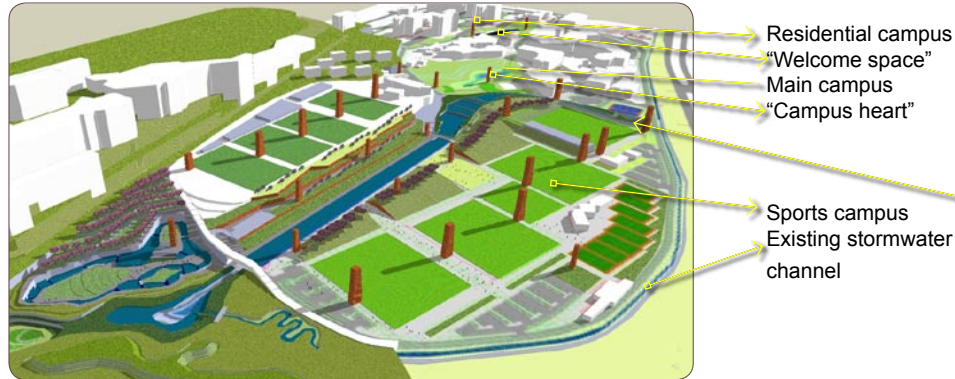


FIGURE 189-Birdseye view of HPC Groenkloof, Author, 2008

The “welcome space” (residential campus):

This place is the first green space of the campus seen by motorists entering the site from the main entrance (Leyds Street). A Groenkloof emblem on a red brick folly in a reflection pond announces the arrival on this campus. Dam 1 is located in the “welcome space”. This dam collects stormwater to maintain the gardens of this zone in summer and functions as an aesthetic focal point in the “welcome space”. A bio-swale connects Dam 1 and Dam 2 (main campus). The overflows from Dam 1 is channeled through the main campus to Dam 2.

The “campus heart”:

Dam 2 (the existing dam) is expanded to dam enough water to maintain the landscape of the main campus in summer. Dam 2 overflows into Dam 3 (filtration ponds). Calculations (4.2.2.2) confirmed that enough stormwater was available to accommodate the scheme. Stormwater channeled on the southern boundary was rerouted onto Groenkloof campus.

The stormwater channel was modified to enable water transfer onto Groenkloof campus. The concrete edges were “softened” by widening the channel

and allowing plant growth on the edges.

Weirs dam up water in the channel and the sump at the base of the channel enables stormwater transfer to Groenkloof campus.

Measures that enhance the quality of the stormwater include the following: Firstly a silt pond allows sedimentation in the run-off to settle. This pond is lined with concrete for easy maintenance. Next, grease and oil are collected by an oil trap. Compartments in the oil trap separate the oil from the water.

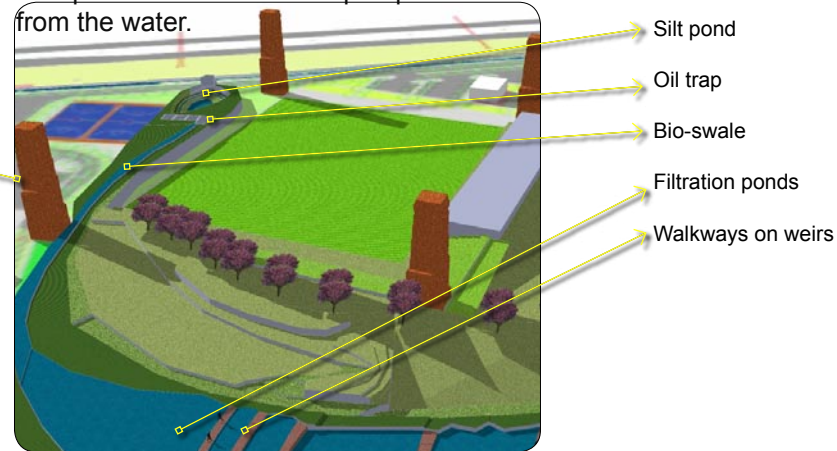


FIGURE 190 - Bird's-eye view of silt pond, oil trap, bioswale and filtration ponds Author, 2008

Water from the oil trap flows into a planted shallow channel (bio-swale). The plants in the bio-swale function as bio-filters and direct water to the filtration ponds. The ponds filter water through several dams lined with plants (bio-filters). The weirs of the filtration ponds are pedestrian walkways with waiting areas and viewing platforms along them. The edge design of these ponds discourages pedestrians from getting too close to the water in order to protect bird habitats.

Ground water:

The underground landfill that could contaminate ground water is monitored. Groundwater is monitored by water samples taken from monitoring boreholes. Specialist

consultants should assess the site and provide recommendations and guidelines.

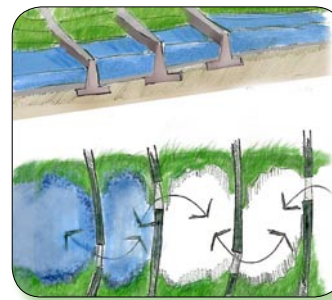


FIGURE 193 - Filtration ponds and waterflow manipulated by weirs

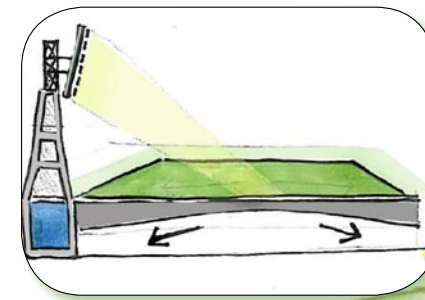


FIGURE 192 - Water storage at base of tower



FIGURE 194 - Slalom course

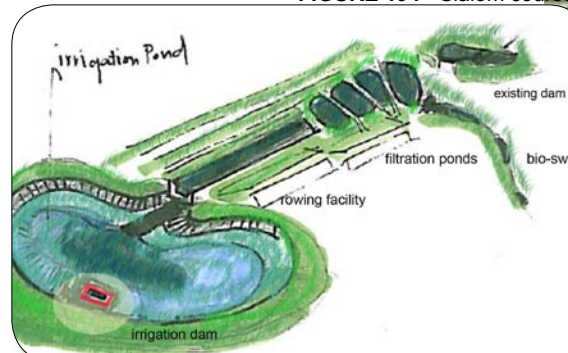


FIGURE 195 - Bio-swale, filtration pond, rowing facility and irrigation dam

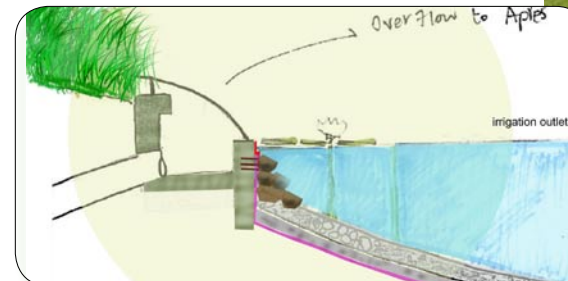


FIGURE 196 - Overflow of irrigation dam

Figure 191: Environmental design guidelines setup in Chapter 3, as implemented on Groenkloof campus.

5.2 Ecology

All exotic plant species were removed and replaced by indigenous plants.

The sportsfields are synthetic. Synthetic sportsfields are more ecologically friendly as less maintenance and water are needed than lawn (Theron, G.2008)

Plant selection in this scheme attracts birds, insect, frogs, lizards and small mammals. These species include:

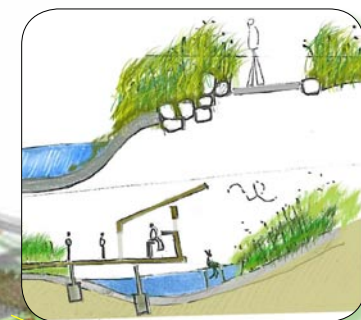
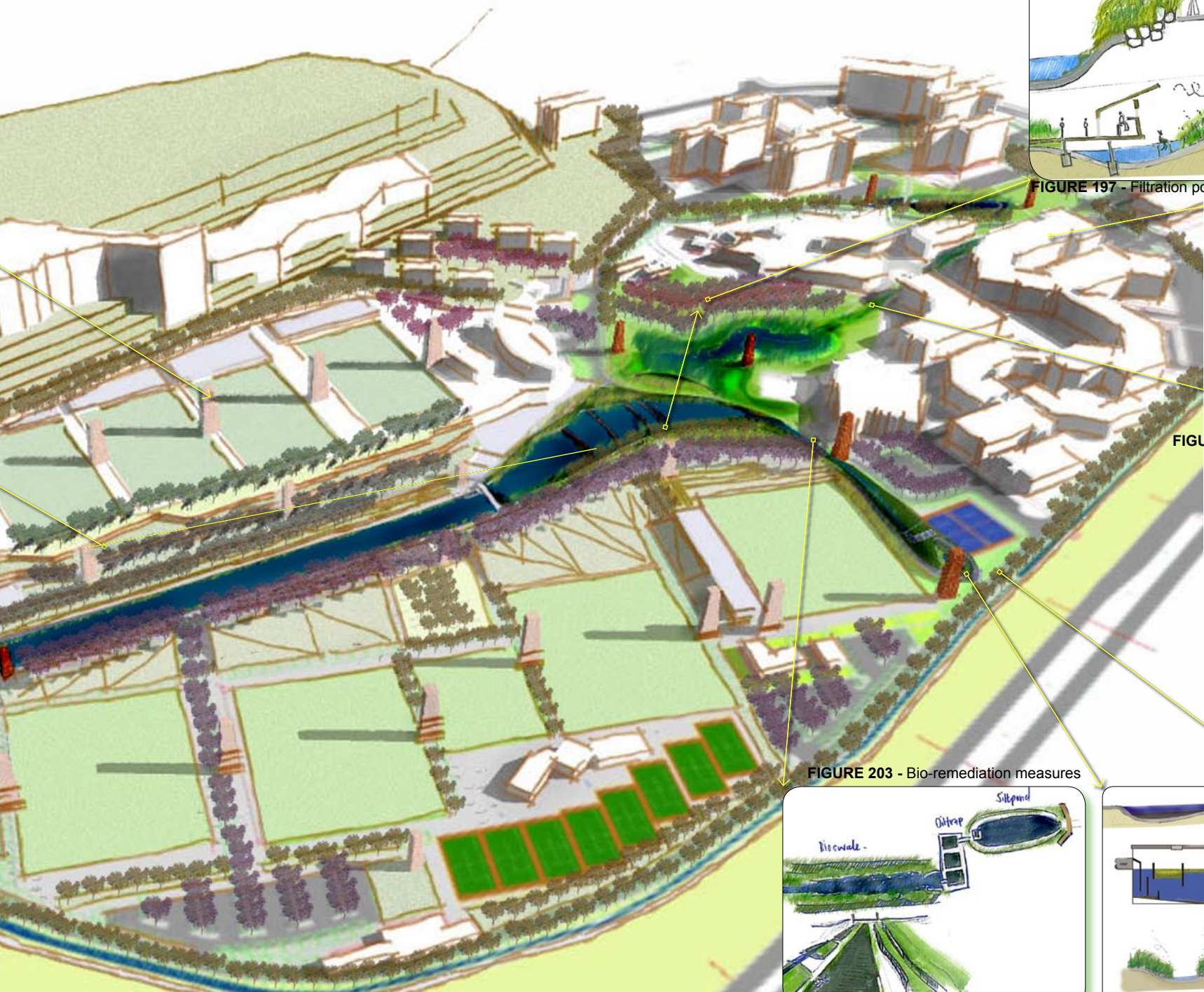


FIGURE 197 - Filtration pond edges

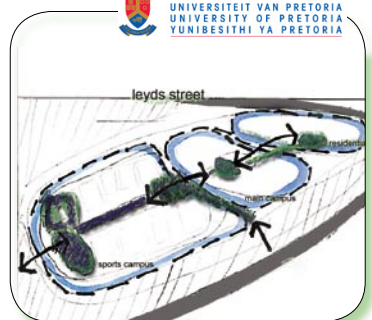


FIGURE 198 - Campus zones

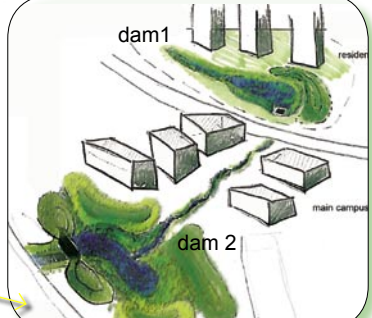


FIGURE 199 - Bio-swale connecting Dam 1 and Dam 2



FIGURE 200 - Bio-swale through campus

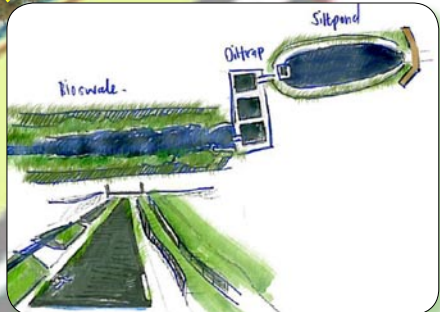


FIGURE 202 - Silt pond, oil trap, bio-swale

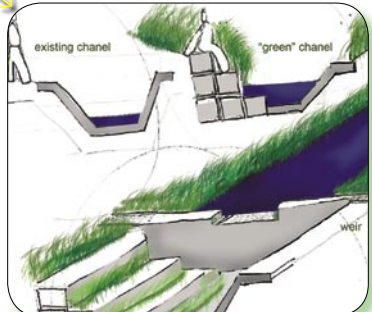
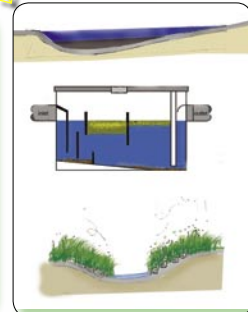


FIGURE 201 - Channel adjustment

FIGURE 191 - Stormwater spine highlighted in bird's-eye view of HPC Groenloof, Author, 2008

FIGURE 203 - Bio-remediation measures

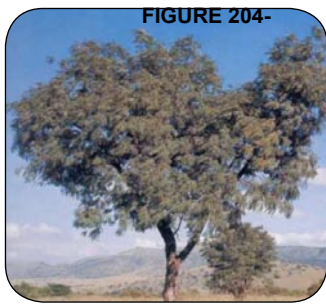


FIGURE 204-

List of trees:

Acacia caffra

Species from the *Acacia* group will be planted in groups in areas bordering the retention areas.



FIGURE 209-

Rhus pyroides

The *Rhus* sp. will be planted in groups in the areas bordering the filtration ponds.



FIGURE 213-

Cyperus papyrus - papyrus
Papyrus will be used in areas in and adjacent to the filtration ponds.

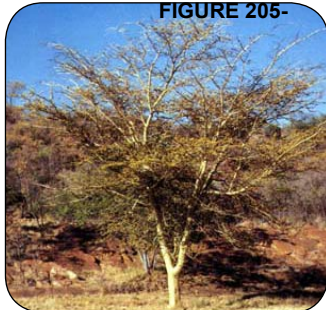


FIGURE 205-

Acacia xanthophloea

– Fever Tree

Species from the *Acacia* group will be used in boulevards or planted in groups in areas bordering the retention areas.



FIGURE 210-

Erythrina lysistemon – Coral Tree

The Coral tree is an ideal focal feature tree.



FIGURE 214-

Kniphofia praecox – Red hot poker
The Red hot poker can be used long the edges of the wetland or stormwater attenuation areas to add colour and to attract birds.

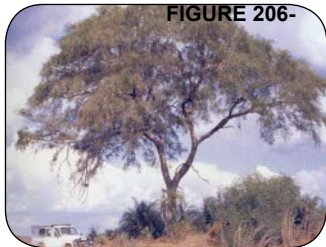


FIGURE 206-

Acacia sieberiana var. woodii

This species will be used in focal points.

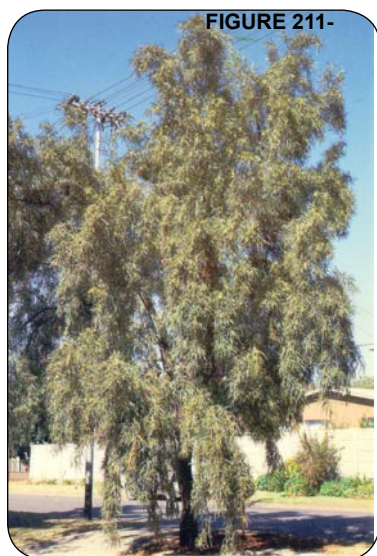


FIGURE 211-

Rhus leptodictya

The *Rhus* sp. will be planted in groups in the areas around the filtration ponds.



FIGURE 215-

Typha latifolia -Bullrush
Bull rushes will be used in areas in and adjacent to the filtration ponds.



FIGURE 207-

Combretum erythrophyllum

– River bush willow

White Stinkwood and River bush willows will be used for shade in the lawn and seating areas.



FIGURE 212-

List of Herbaceous perennials:

Juncus krausii

Bull rushes will be used in areas in and adjacent to the filtration ponds.



FIGURE 216-

Stenotaphrum secundatum
– Buffalo grass
Buffalo grass will be used in the lawn areas.



FIGURE 208-

Celtis africana

– White stinkwood

White Stinkwood and River bush willows will be used for shade in the lawn and seating areas.



FIGURE 217-

Phragmites australe
– Common reed
Phragmites australe will be used in areas in and adjacent to the filtration ponds.

List of veld grasses :



Eragrostis curvula – love grass

A 1:1:1 mixture of *Melinis repens*, *Eragrostis curvula* and *Digitaria eriantha* veld grasses.



Digitaria eriantha

A 1:1:1 mixture of *Melinis repens*, *Eragrostis curvula* and *Digitaria eriantha* veld grasses.



Melinis repens

A 1:1:1 mixture of *Melinis repens*, *Eragrostis curvula* and *Digitaria eriantha* veld grasses.

All images from Bothma, J (2007), Proposed planting strategy for Project M

The stormwater dams and bio-swales on Groenkloof campus enhance the ecology as nesting, resting, feeding and breeding spaces for birds and mammals are provided.

A nursery with compost plants and a worm farm was implemented on site to maintain the landscape of the campus.

5.3 Integration with sport, social and heritage:

Stormwater filtered by a silt pond, oil trap, bio-swale and filtration ponds (Dam 3) fills up the flat rowing facility (Dam 4). The flat rowing channel overflows into the irrigation dam (Dam 5).

Dam 5 is the largest of the dams and maintains the sports campus in summer and the whole campus in winter. The overflow of Dam 5 into the Apies River was retained and upgraded.

5.4 Details

Bio-swale

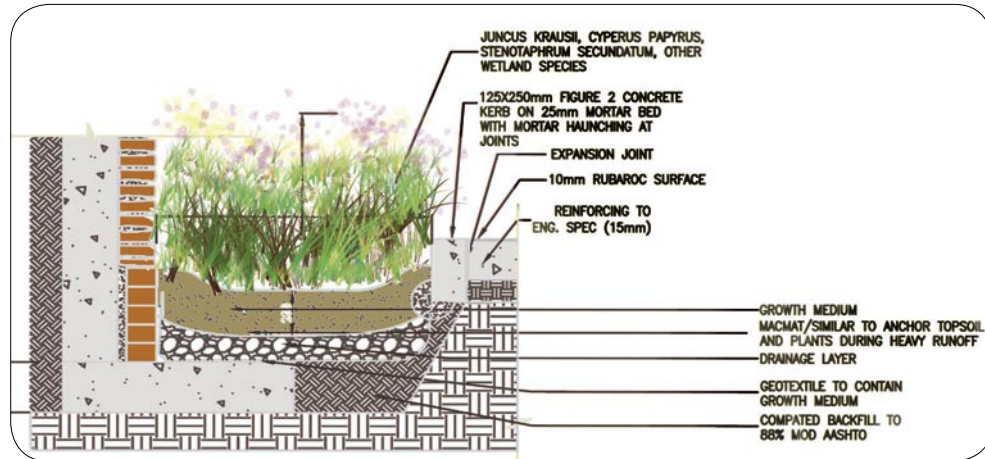


FIGURE 221 - Bio-swale section, Author, 2008

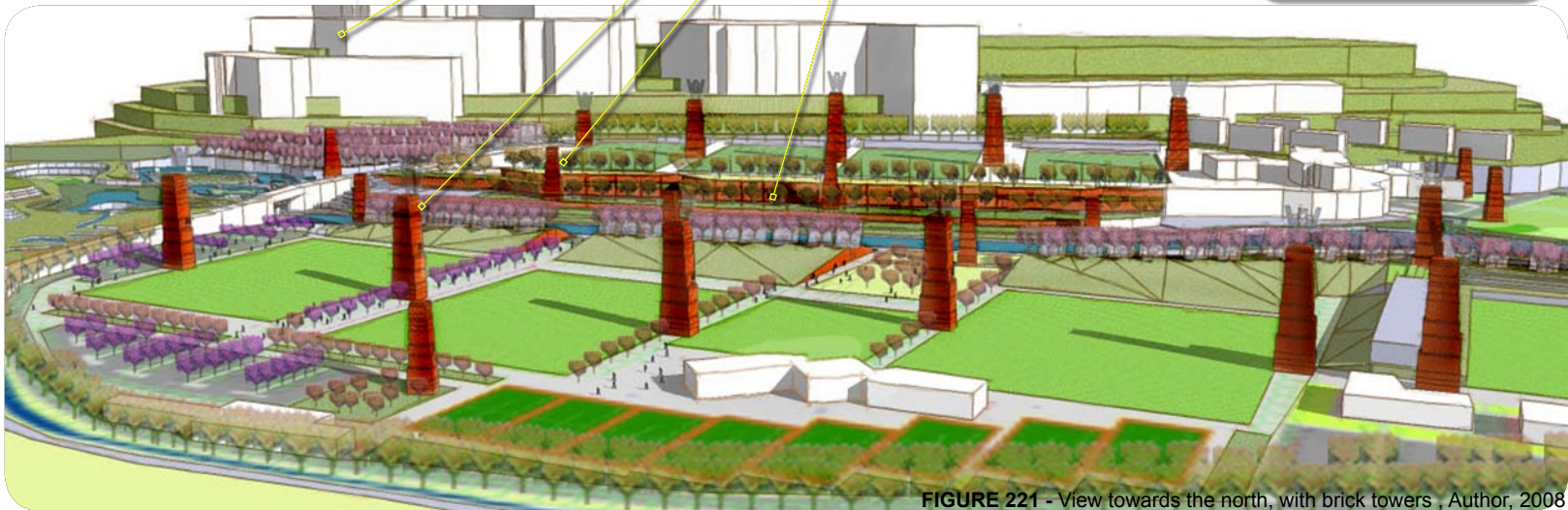
Chapter 6



6 Heritage

6.1 Levels of scale

6.2 Kirkness chimneys



Unisa
Red brick flood light towers
Red brick beacon
Retaining walls and linear parks

design response

environmental

heritage

social

sport

Heritage framework

FIGURE 221 - View towards the north, with brick towers , Author, 2008

6 HERITAGE FRAMEWORK

6.1 Levels of scale

Response to context:

The slope between the upper and lower sportsfields are terraced by red brick retaining walls. These walls are 4m high to match the large scale of Unisa. The Kirkness brickfields are commemorated by the use of red clay bricks. Lit up at night, the retaining walls enhance the strong architectural lines of Unisa.

Views towards Freedom Park and the Voortrekker monument are emphasized by the walkways and gathering spaces in the linear parks directed towards these monuments.

6.2 Reinvented Kirkness chimneys:

Red brick flood light towers (27.5m) are located around sports facilities for lighting and aesthetic purposes. Lower brick towers are located at entrances and gathering spaces to function as orientation beacons, history canvases and landscape features. The bases of the brick towers are used as refreshment shops and ablution facilities for the spectators and park users. The history of Groenkloof campus is depicted on the sides of the brick towers.

6.3 Details

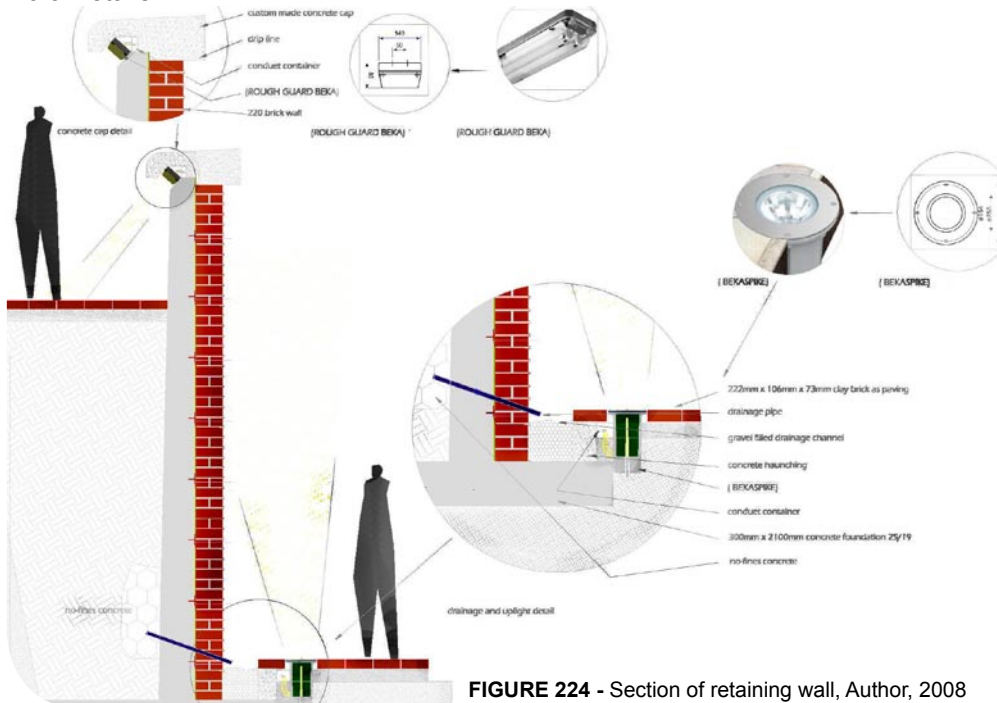


FIGURE 224 - Section of retaining wall, Author, 2008

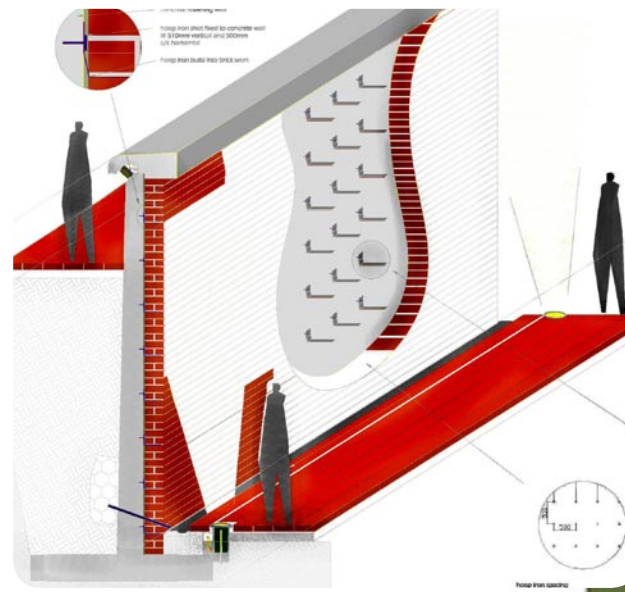


FIGURE 223 - Section-perspective of retaining wall, Author, 2008



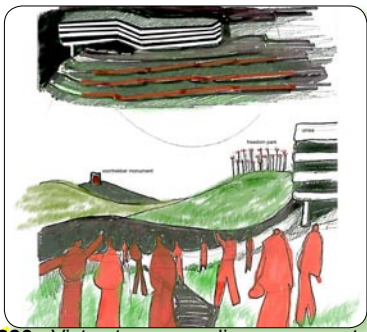


FIGURE 226 - Vistas to surrounding monuments

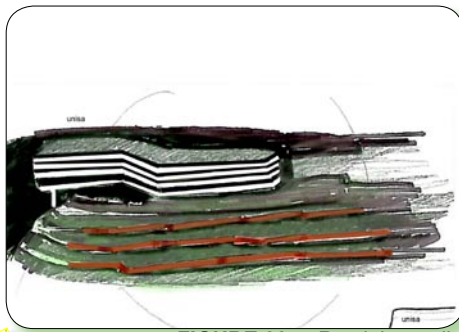


FIGURE 227 - Retaining walls

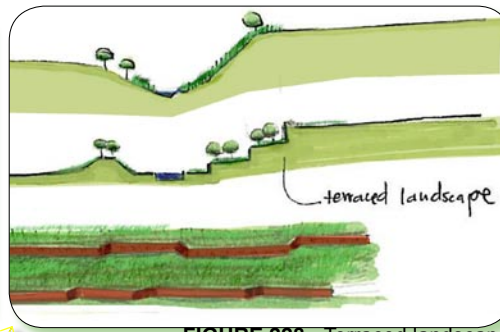


FIGURE 228 - Terraced landscape

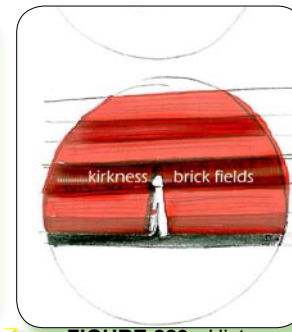


FIGURE 229 - History text on retaining wall

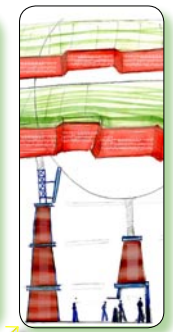


FIGURE 230 - Retaining walls and brick towers

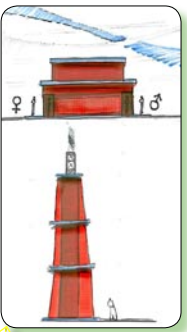


FIGURE 231 - Brick tower and abluion

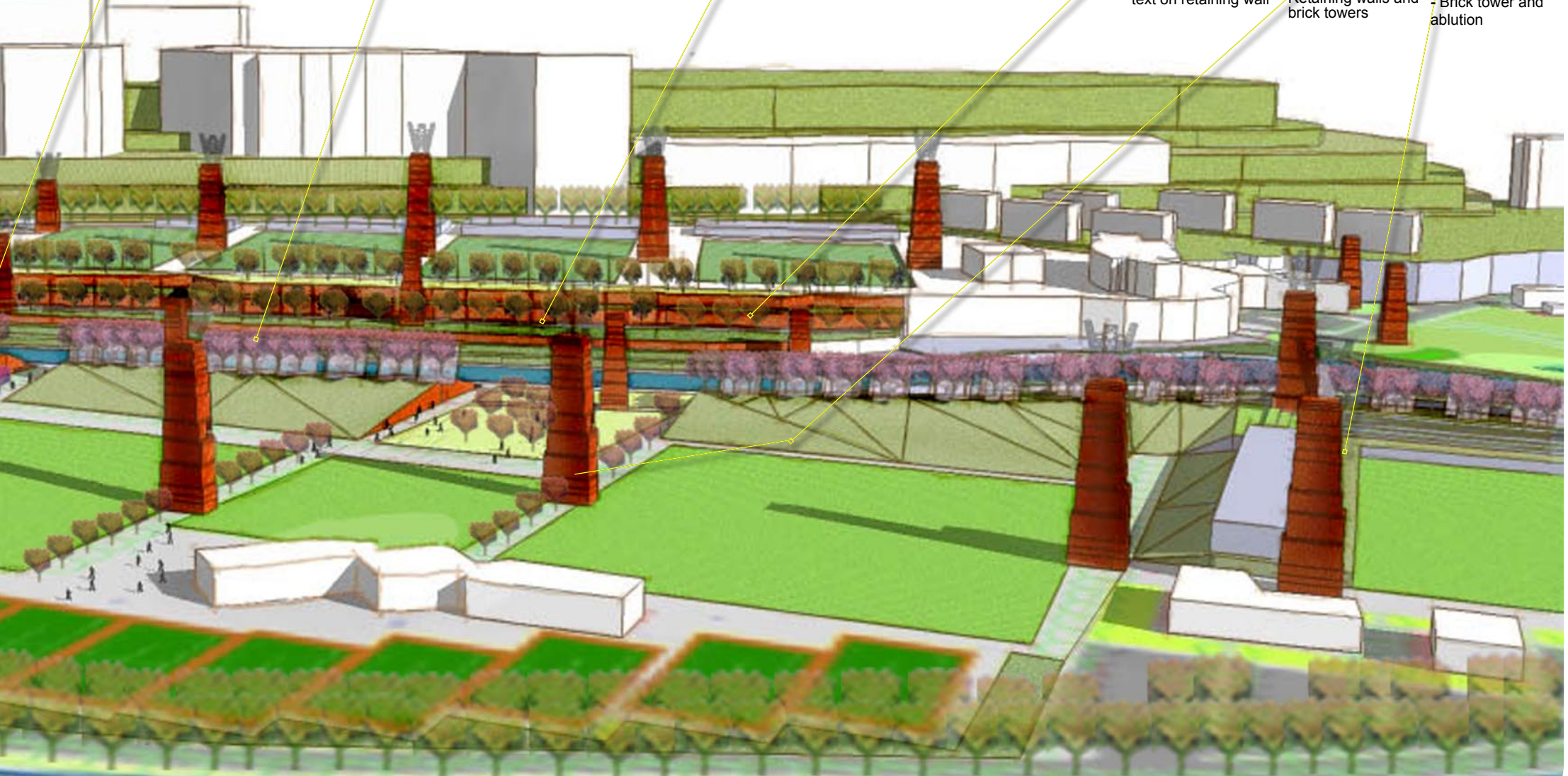


FIGURE 225 - View towards the north, with brick towers

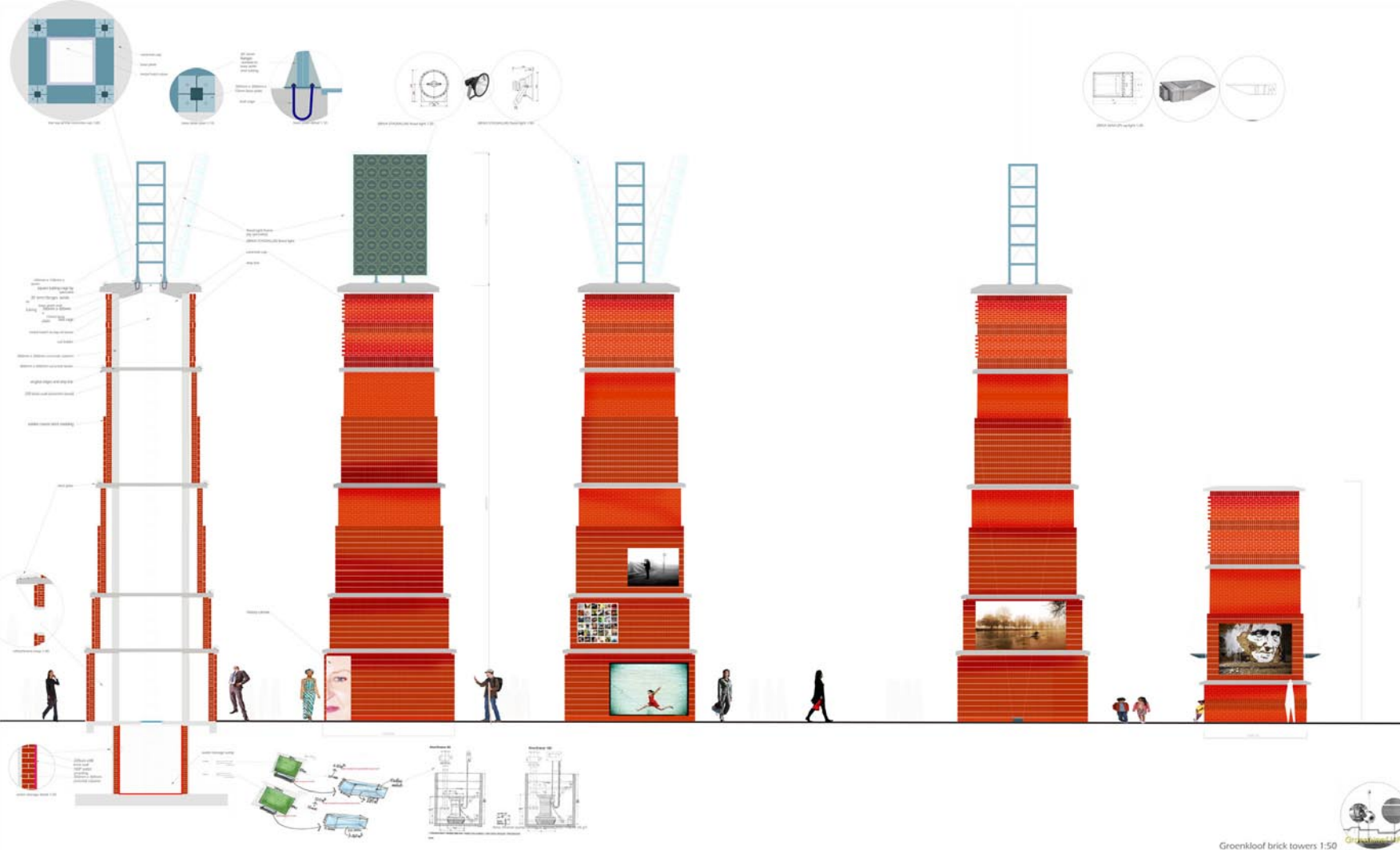


FIGURE 232 - Brick towers, Author, 2008



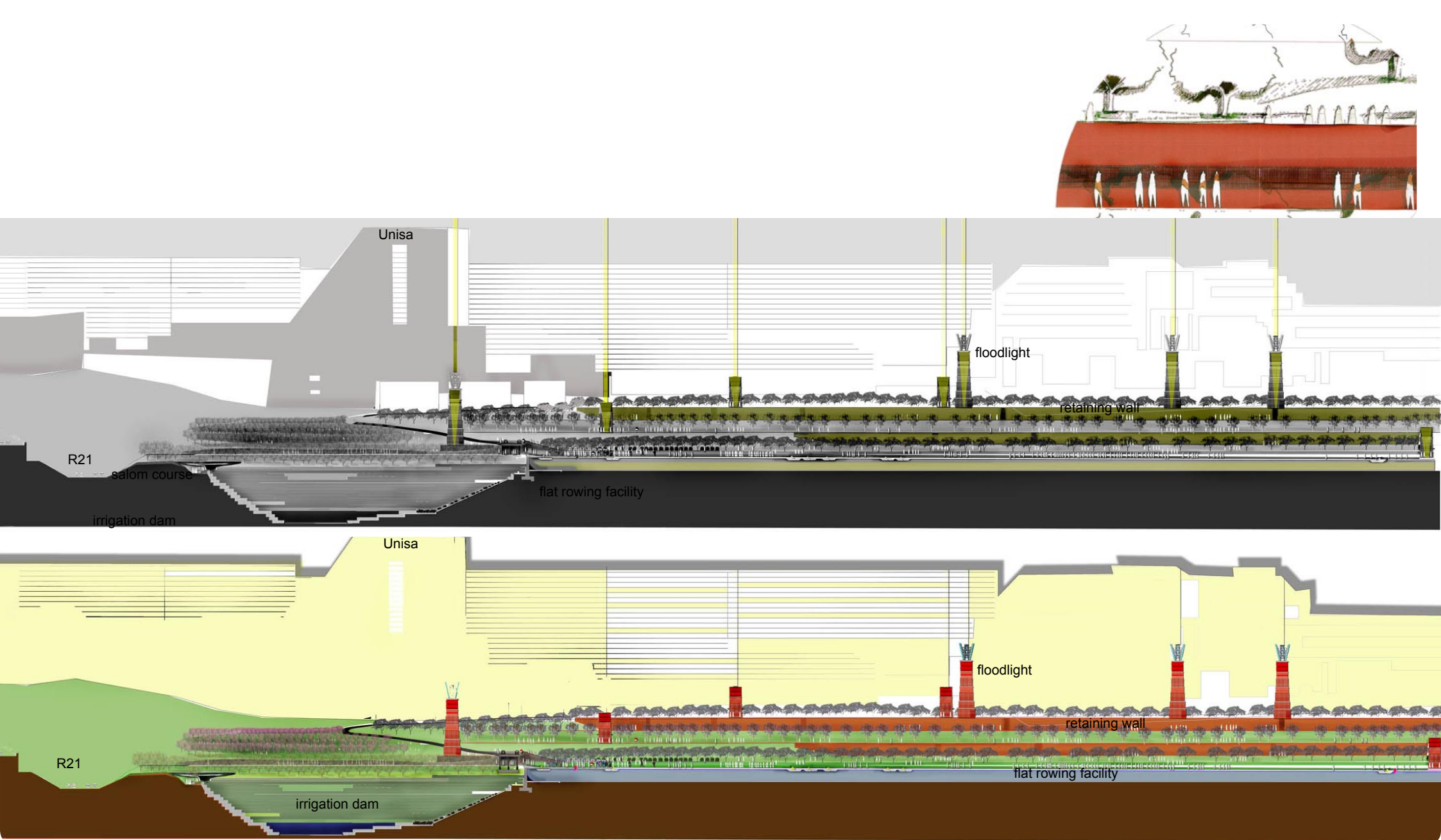


FIGURE 234 – Section a through rowing facility and irrigation dam with Unisa and brick towers in the background and night sch

Chapter /



7 Social
7.1 Providing for all visitors



design response

environmental

heritage

social

sport

- Slalom spectator seating
- Retaining walls
- Linear parks
- Soccer spectator seating
- Walkways on weirs
- Lovers' Lane
- Extended spectator stand

FIGURE 235 – View towards the west, Author, 2008

7 SOCIAL FRAMEWORK

7.1 Providing for all visitors:

Athletes:

The existing clubhouses were incorporated into the development plan of Groenkloof campus.

The synthetic hockey and soccer facilities (that should be developed by specialists) are of international standards. The reinvented Kirkness brick flood light towers make the operation of an 24 hour sport facility possible.

The HPC is located near the existing cafeteria, library, residences and HPC School. The close proximity of the various facilities promotes integration and cooperation between students, professional sportsmen, women and younger pupils.

Families:

The linear parks with history walkways, picnic slopes and shady spots accommodate families visiting the sports park.

Physically challenged:

All history texts are translated into braille to accommodate the visually impaired.

Spectators:

Refreshment shops and ablution facilities are easily recognized and accessible. All spectator seating has shade trees. More parking has been provided for visitors and spectators along the ring road of the sports campus. The ring road around the sport campus and second entrance along Leyds Street enables large traffic volumes to flow through the campus.



FIGURE 236 – Walking in Lovers' Lane, Author, 2008

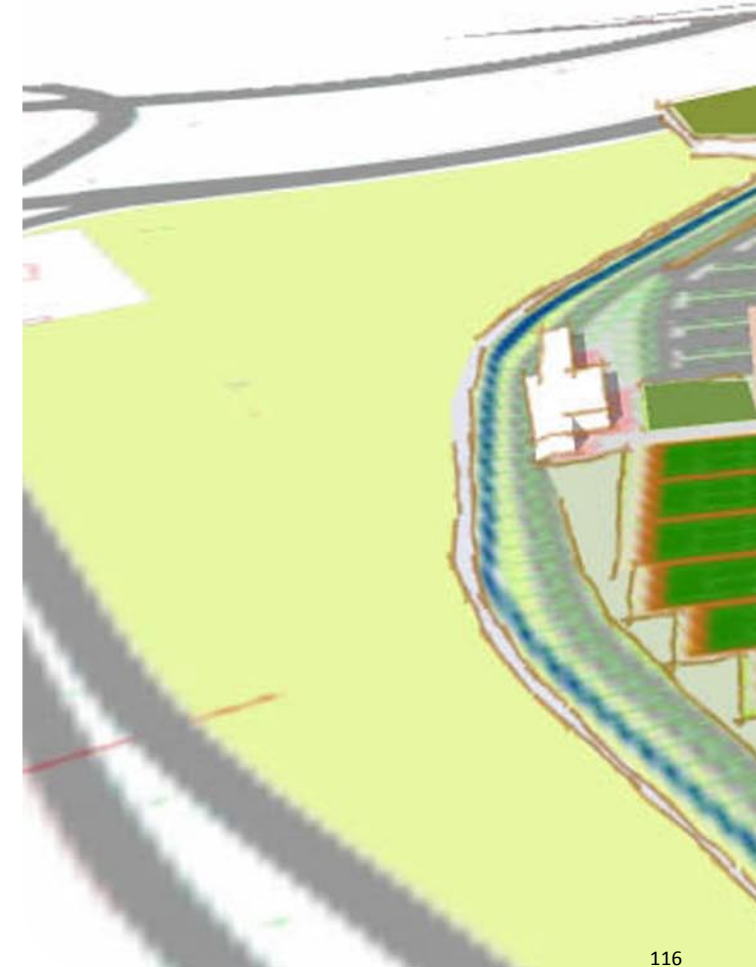


Figure 237 shows the social design guidelines setup in Chapter 3, implemented on Groenkloof campus.

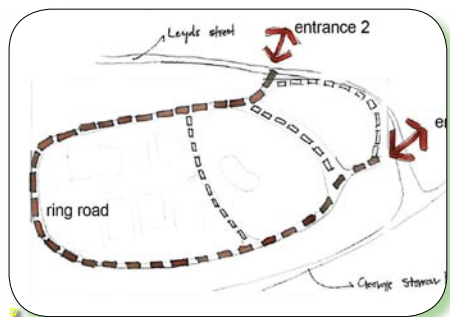


FIGURE 238 - Ring roads with new entrance



FIGURE 239 - Spectator seating

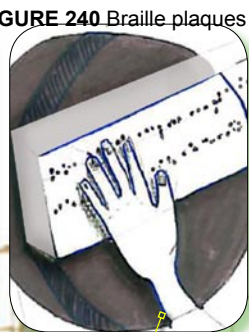


FIGURE 240 Braille plaques



FIGURE 241 - Walkway on berm

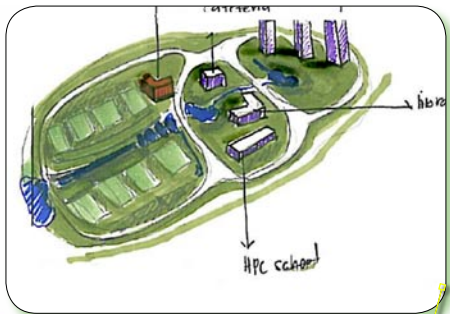


FIGURE 242 - HPC location

FIGURE 238 –242 Guideline sketches, Author, 2008

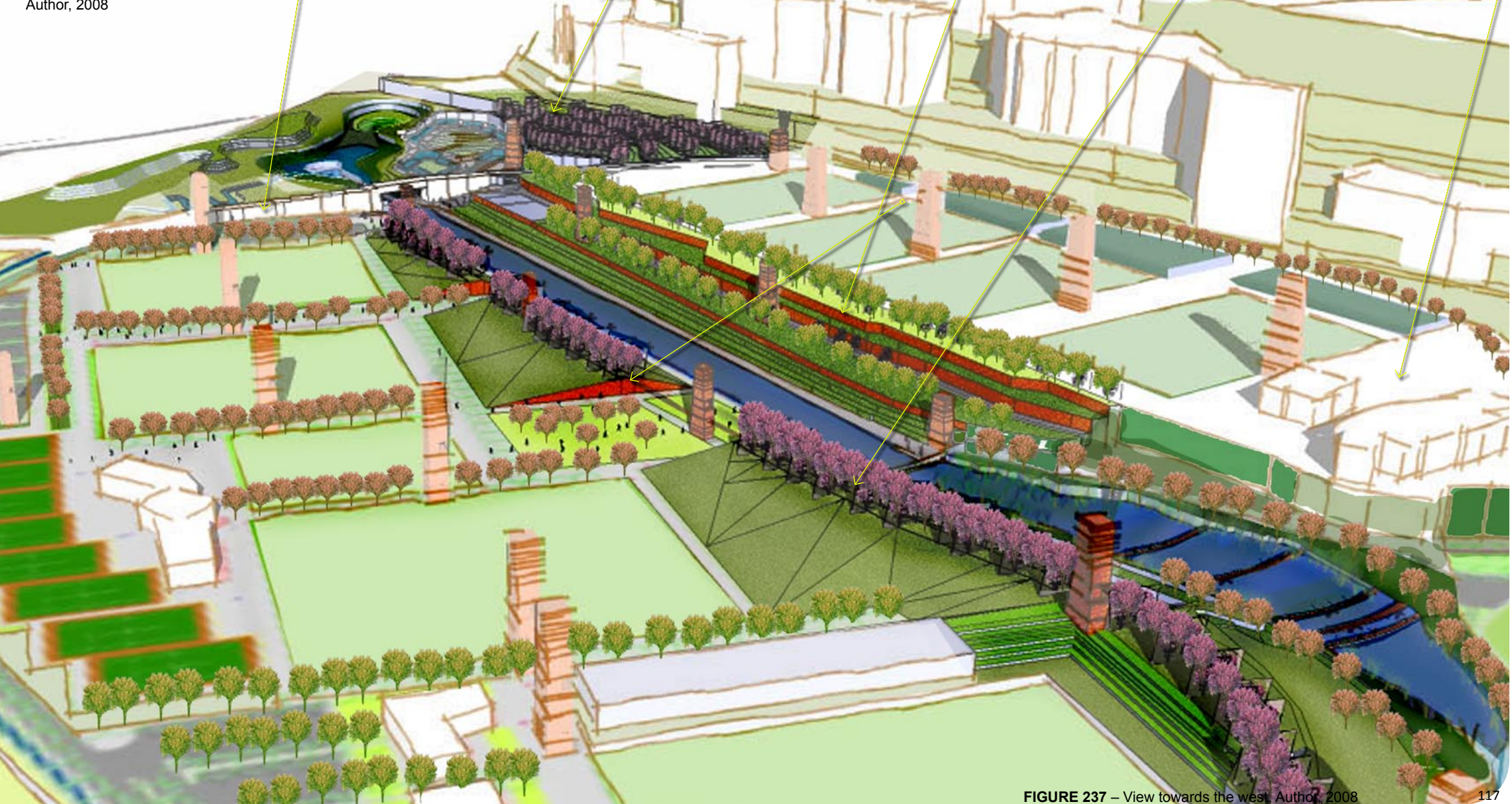


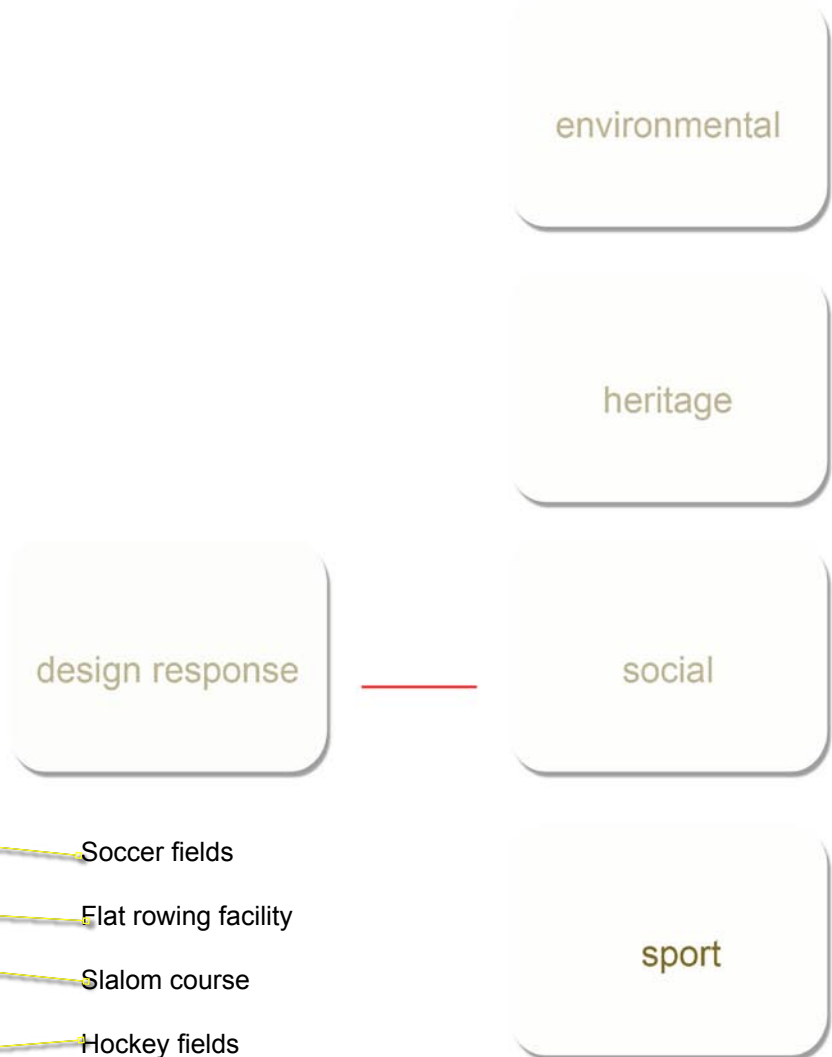
FIGURE 237 – View towards the west, Author, 2008

Chapter 8



8 Sport

- 8.1 Case study
- 8.2 Hockey
- 8.3 Soccer
- 8.4 Water sport



- Soccer fields
- Flat rowing facility
- Slalom course
- Hockey fields

Sport framework

FIGURE 243 View from Unisa onto Groenkloof HPC, Author, 2008

8.1 Case studies

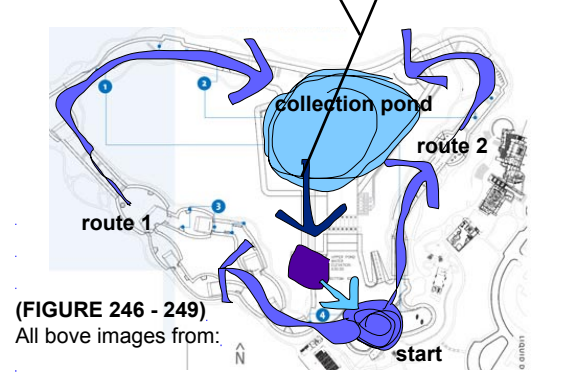


Project M ,Golder Africa Associates 2007
 This world class soccer facility being developed in South Africa is an initiative to promote and develop soccer. All the sportsfields at Project M will be synthetic fields. The master plan of Project M (Figure 244) shows that fields are placed within the 32m line from the wetland. According to Theron (2008), synthetic fields are more environmentally friendly than lawn. Astro (synthetic lawn) turf has higher implementation costs, with less maintenance and water needed over the long run.



Project M pamphlet, Golder Associates, 2007

The National Whitewater Center, (N.C.)
 CLIENT **Jeff Wise, Executive Director, U.S. National Whitewater Center**
 DESIGN PROJECT MANAGEMENT **Liquid Design**
 ARCHITECT OF RECORD **Michael Williams, Liquid Design**
 LANDSCAPE ARCHITECTURE AND CIVIL ENGINEERING **ColeJenest & Stone**
 WHITEWATER DESIGNER **Scott Shipley, S2O Design/REP Building**
 COST **\$37 million**



(FIGURE 246 - 249) All above images from:

www.architectmagazine.com/industry-news-print
 A slalom course is a large channel with obstacles that simulate rapids. The National Whitewater Center has a slalom course that never ends. The course has two routes that start in the same pond and spills into a collection pond at the lowest point in the course (Figure 249). A conveyor system hauls kayaks, canoes and other boats back to the start pond, where the course continues. These course designers used boulders for the obstacles in the course.

Obstacle Obstacle System

UNIVERSITEIT VAN PRETORIA
 UNIVERSITY OF PRETORIA
 YUNIBESITHI YA PRETORIA

“S2O has created a conveyor system, for bringing boaters back up to the top pool and four separate moveable obstacle systems to accommodate a variety of differing whitewater design needs. These obstacle systems include:

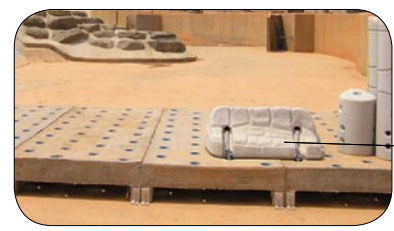
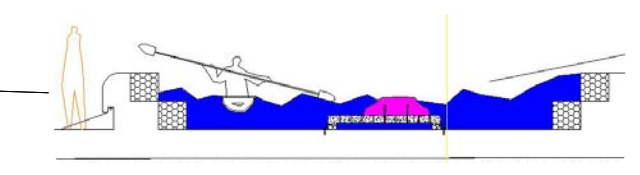


FIGURE 250 - http://www.s2odesign.net/images-obstacles_dry_jpg_files/scobstacleb.ht

FIGURE 251
 A section of a slalom course with peg board system, Author 2008



The Wave-Maker--a constriction obstacle that can be either automatically adjusted through computer controls, or simply adjusted when the flows are turned off. This obstacle helps to constrict the flows making steep V type reaction waves that are favored by surfers. If put below drops these obstacles make fantastic pillow and guarded eddy features favored by slalom boaters.

The Head Gate-- This pneumatically adjustable head gate doubles as a design feature. The head gates allow for a completely adjustable bottom plate with constrictors on each side, all moved at the flip of a switch. The obstacles serve double duty by also serving to shut off flows to the selected areas when fully shut. At the USNWC, these head gates save tens of thousands of dollars a year in wasted energy and water.

The Peg-Board System-- This system allows the owner to completely reconfigure the layout of all of the eddies and constrictions. Typically used for slalom courses, this system allows the owner to set a harder course one day, and an easier one the next. The system also allows for cheap and effective tailwater and headwater control over a variety of wave-shaping features. These features allow the owner to keep up with the state-of-the-art for boating long after the course has been designed and built.” www.s2odesign.net/scobstacleb.html

- Rough edge design
- Not pedestrian friendly
- Looks like a river
- Spectator stands are close to water
- This course is not adaptable



FIGURE 251-Perth Whitewater stadium , Australia ,Findeis, M. 2007



FIGURE 253 - 254Parc Olimpic del Segre, Spain,Findeis, M. 2007



Interactive edges
Large obstacles and rapids
This course is not adaptable

Walkways in and around the course
Access to the water
Spectators sit on grassed slopes

This course is adaptable
No trees



FIGURE 255The Helliniko Olympic Centre in Greece ,Findeis, M. 2007

Slalom courses around the world were analyzed to better understand this facility. Some courses have “natural” rocky edges (figure 253 & 254) others have stepped concrete edges (figure 255). Boulders are used as obstacles in courses that simulate rivers (figure 250). Adjustable obstacle systems enables course layouts to be changed. The slalom course is emptied out and the obstacles (peg board system by S2O design) moved around to preferred rapid location.

This is a specialized design area and a team of specialists are needed to develop a slalom course. As a landscape architectural student the circulation in and around the course, the edges of the course, spectator seating and how a slalom facility functions on a master plan level will be investigated.



FIGURE 256 - Marathon world champion (South African), Findeis, M. 2007

8 SPORT FRAMEWORK

8.2 Hockey

Synthetic hockey fields need to be kept wet throughout play-time. Water is stored in the base of the floodlight towers next to the fields. The drainage of the synthetic fields is done by specialists. Seating for hockey spectators is provided for next to the hockey fields. Safety nets protect pedestrians, spectators and motorcars from flying hockey balls.

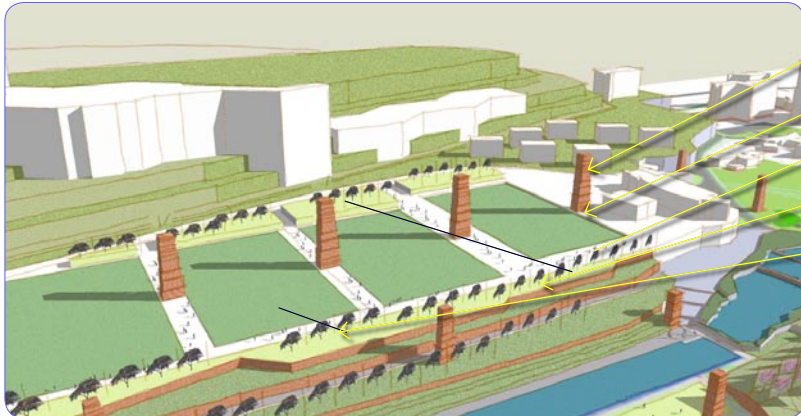


FIGURE 257-Hockey fields, Author, 2008

- Brick tower floodlights
- Water storage
- Upper hockey terrace
- Spectator seating
- Hockey fields

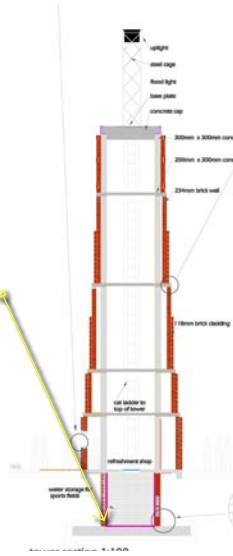


FIGURE 259-Brick tower section, Author, 2008

8.3 Soccer

Synthetic soccer fields must be moist but not drenched when played on. Water storage facilities are located in the base of the floodlight tower. Water is pumped from the storage basin onto the field. Soccer spectators sit on the spectator berm next to the soccer fields. The spectator berm is shaped with the soil cut from the rowing channel and other dams. This berm will provide seating for rowing and soccer spectators. The existing spectator stand seating is extended into the existing berm.

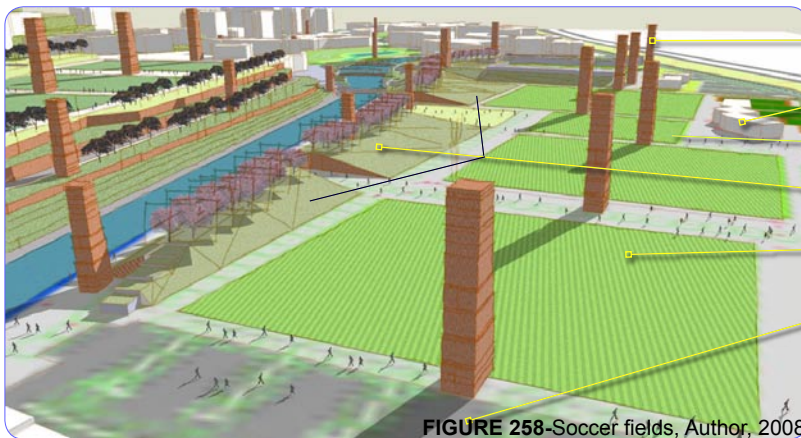


FIGURE 258-Soccer fields, Author, 2008

- Brick tower floodlights
- Existing building
- Dribble area
- Spectator seating
- Soccer fields
- Parking

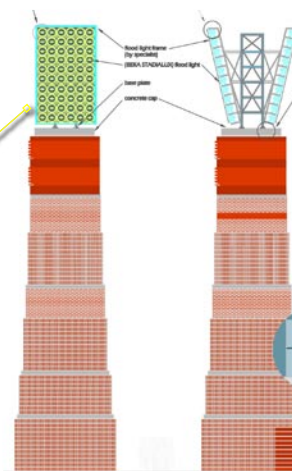


FIGURE 260-Brick floodlights, Author, 2008

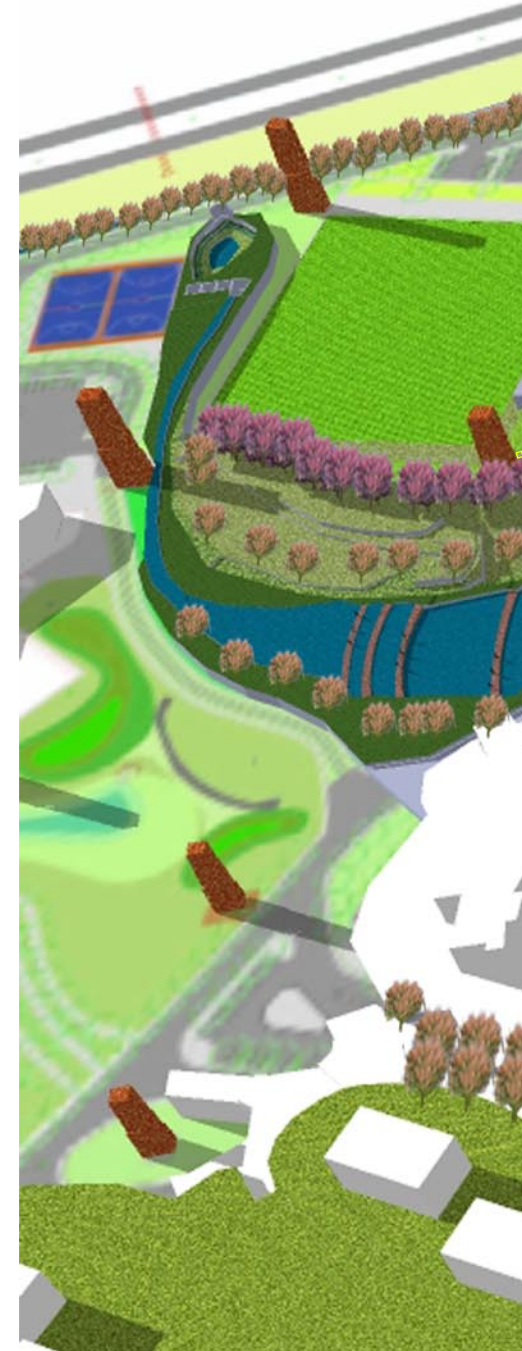




FIGURE 262-Spectator seating,

FIGURE 263-Spectators at soccer field

FIGURE 265-Hockey safety nets

FIGURE 264-Drainage and spectator seating

FIGURE 261 shows the sport design guidelines setup in Chapter 3, implemented on Groenkloof campus.

FIGURE 261-View from Unisa onto Groenkloof HPC, Author, 2008

8.3 Water sport

Rowing

The flat water rowing facility is 300m long and 18m wide. The edges of the rowing straight absorb wave energy to minimize water turbulences in the channel. Access into the rowing facility is provided at both ends of the channel by jetties. Parking is located in close proximity to the rowing facility. Spectators are accommodated for on the spectator berm and linear parks on either side of the rowing channel. A walkway underneath the vehicle bridge connects the flat rowing facility to the slalom course. Athletes easily move from the rowing facility to the slalom course without crossing a road.

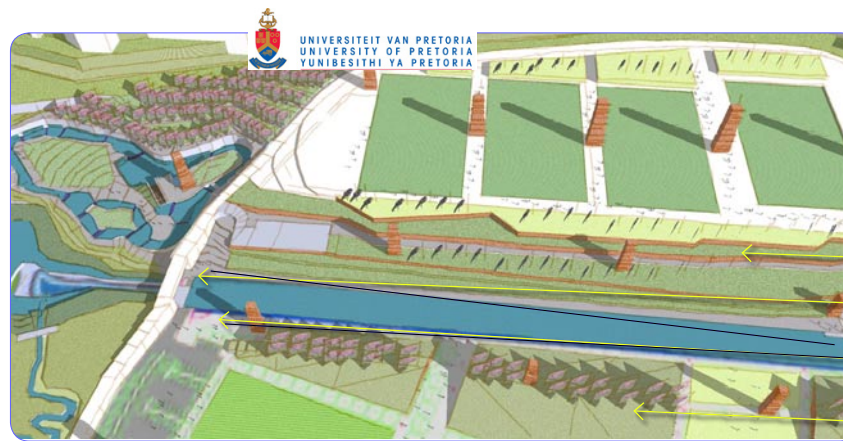


FIGURE 266-Flat rowing channel and slalom course, Author, 2008

Slalom course

The slalom course is not in the stormwater drainage way due to possible damage of this course during a flood. This facility is constantly maintained and can be emptied at any time. Water is pumped from the irrigation dam to maintain the slalom course. This course caters for advanced slalom athletes and beginners. The challenging leg of the course is the route to the right and the less challenging leg is the course to the left of the starting point. Spectators, coaches and life guards are able to move in and around the slalom course. A lookout tower (red brick) houses the equipment store and pump room for the slalom course. The pump can be run on several speeds to make the flow speed of the course water adjustable.

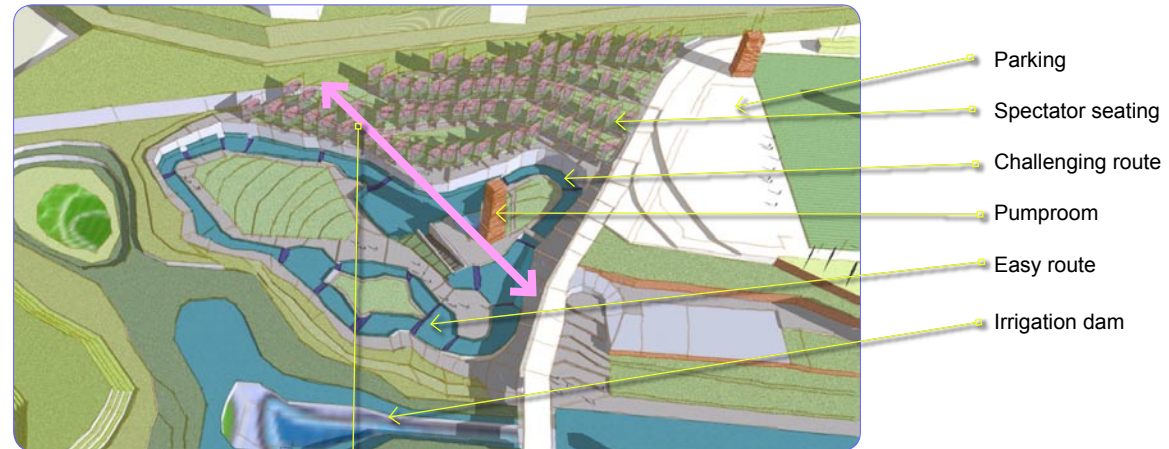


FIGURE 267-Slalom course, Author, 2008

The peg-board system is used as obstacles in the course. **“The Peg-Board System”** –“This system allows the owner to completely reconfigure the layout of all of the eddies and constrictions. Typically used for slalom courses, this system allows the owner to set a harder course one day, and an easier one the next. The system also allows for cheap and effective tailwater and headwater control over a variety of wave shaping features. These features allow the owner to keep up with the state-of-the-art for boating long after the course has been designed and built” (S2Odesign:2008).

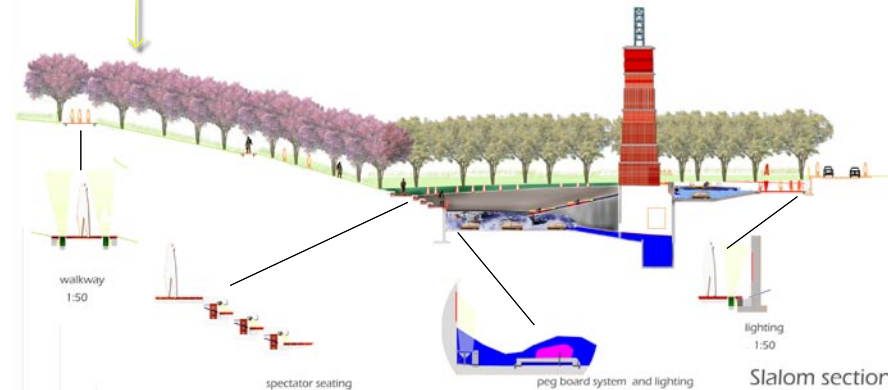


Figure 268 shows the sport design guidelines setup in Chapter 3, implemented on Groenkloof campus.

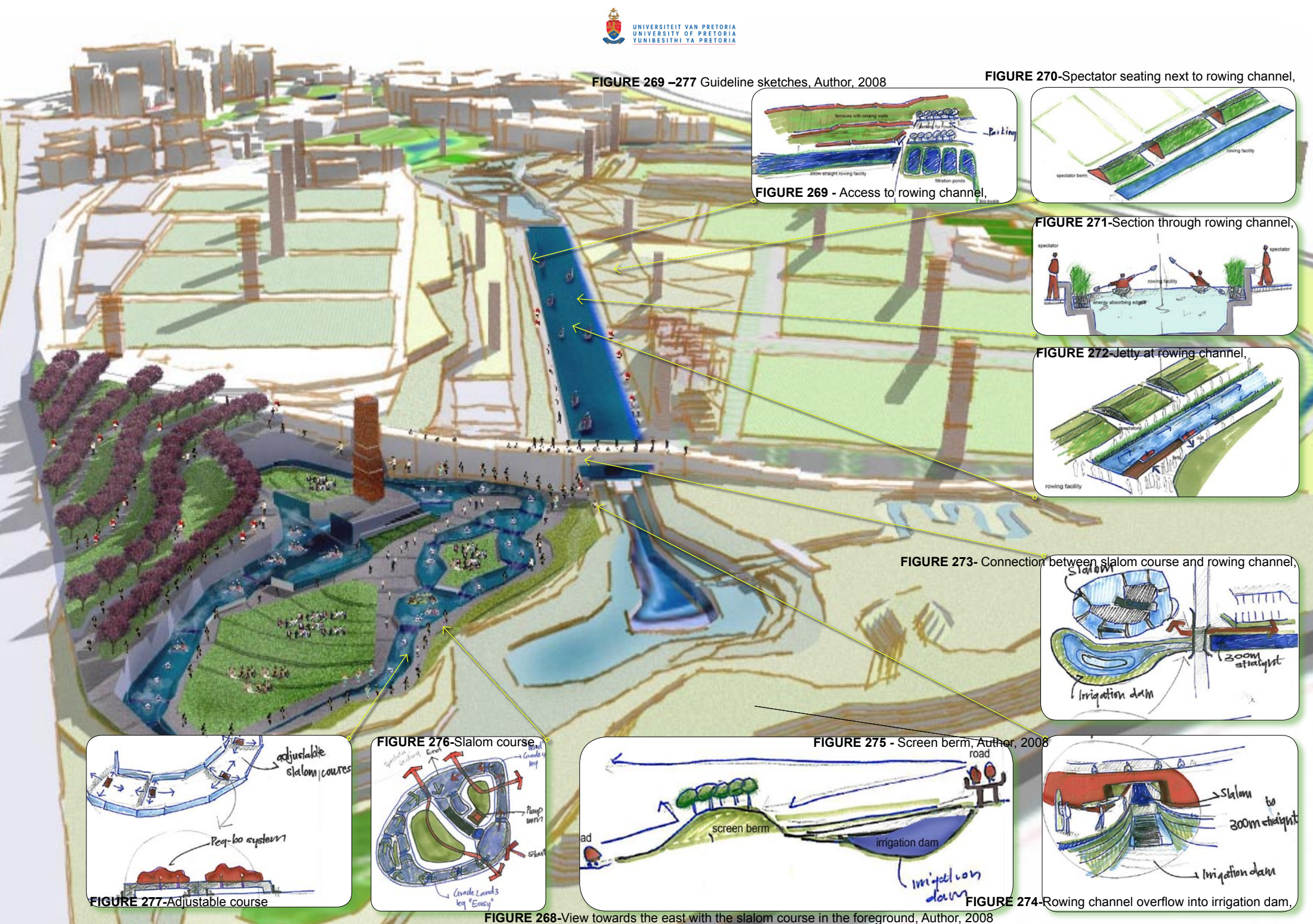


FIGURE 269 -277 Guideline sketches, Author, 2008

FIGURE 270-Spectator seating next to rowing channel,

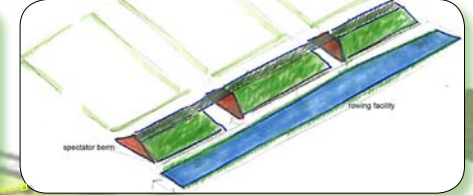


FIGURE 269 - Access to rowing channel,

FIGURE 271-Section through rowing channel,

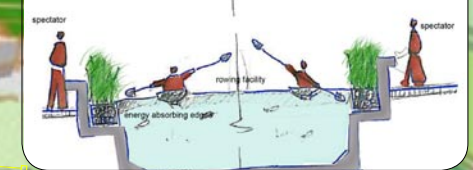


FIGURE 272-Jetty at rowing channel,



FIGURE 273- Connection between slalom course and rowing channel,

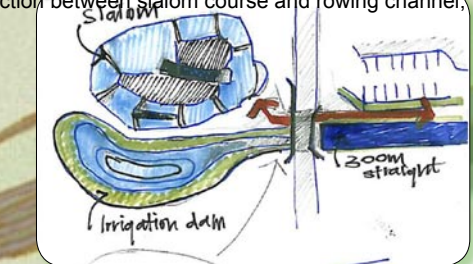


FIGURE 275 - Screen berm, Author, 2008

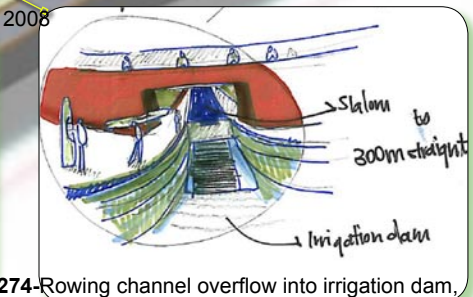
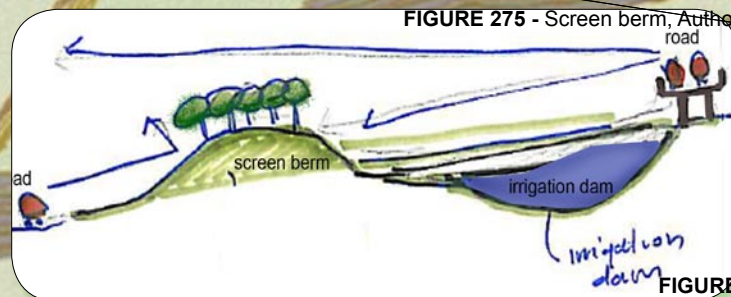


FIGURE 274-Rowing channel overflow into irrigation dam,

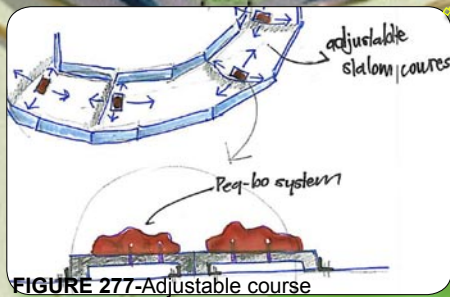


FIGURE 277-Adjustable course

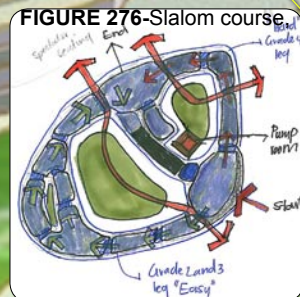


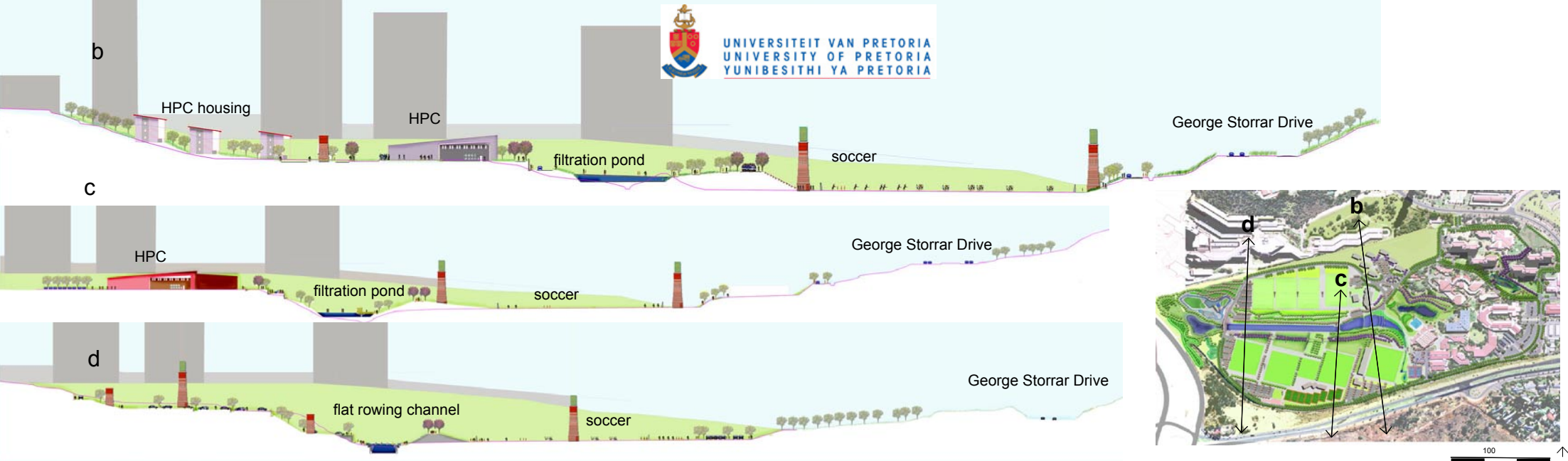
FIGURE 276-Slalom course

FIGURE 268-View towards the east with the slalom course in the foreground, Author, 2008



Chapter 9

Conclusion and references



9 CONCLUSIONS

9.1 Conclusions

Hypothesis made in Chapter 1:

a. The hypothesis was made that Groenkloof campus could be better utilized if an HPC is introduced.

An HPC has been set up on Groenkloof campus. Sports facilities of international standards have been implemented. The Groenkloof campus is a sports park that trains, educates, entertains and relaxes visitors from all walks of life. The campus is better utilized with the HPC as catalyst.

b. It was hypothesized that stormwater could be used in recreation and to maintain and satisfy the proposed scheme.

The stormwater management plan maintains the gardens of the campus, supplies water to the watersport facilities and aesthetically enhances the campus.

c. It was hypothesized that a material selection inspired by relevant history could commemorate cultural significance. Although the Jacaranda plantation and the landfill era were interesting history layers, the Kirkness brickfields influenced the material

choice the most. The Kirkness chimneys were reinvented in this scheme to commemorate the memory of place and the origin of the bricks used in architectural treasures in the 1900's.

The brief set up in Chapter 2 were shaped into a project by implementing the guidelines set up in Chapter 3. Chapter 4 of this thesis showed the many attempts and hurdles presented by this scheme. Did this scheme answer the brief?

- Incorporate a HPC on Groenkloof campus that caters for soccer, hockey and canoeing facilities.

The proposed Groenkloof HPC has sportsfields and watersport facilities that provide for soccer, hockey, rowing and slalom athletes.

- This project should be a regional and a sports park able to function day and night.

Sports fields and facilities, spectator seating, walking routes, stormwater management and habitat creation have been integrated to create a public/sports park environment. The Kirkness brickfield chimneys' inspired red brick floodlight/orientation beacons/ refreshment shops/ablution and history canvas towers. These structures commemorate cultural significance and allows for a 24 hour sports park.

- Circulation and parking should be dealt with on a master plan level.

Several ring roads with parking were introduced to better the vehicle and pedestrian circulation. An additional entrance at the existing service entrance further reduces the traffic volume of the main entrance of Groenkloof campus. Large sports events can now be held at Groenkloof campus.

- Incorporate a stormwater management plan for Groenkloof campus.

On-site and off-site stormwater were incorporated in the management plan / design. Bio-remediation measures were implemented to enhance the water quality of the stormwater. Stormwater is not only used as an aesthetic enhancement but also aids in habitat creation, irrigation, recreation and sports activities. The stormwater became one of the central features of the Groenkloof campus developmental proposal.

- A historically relevant material selection should be assembled for detail design.

Red brick towers commemorate the Kirkness brickfields. Clay brick have been used in paving, retaining walls and edge details.

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