chapter 4

Concept to site

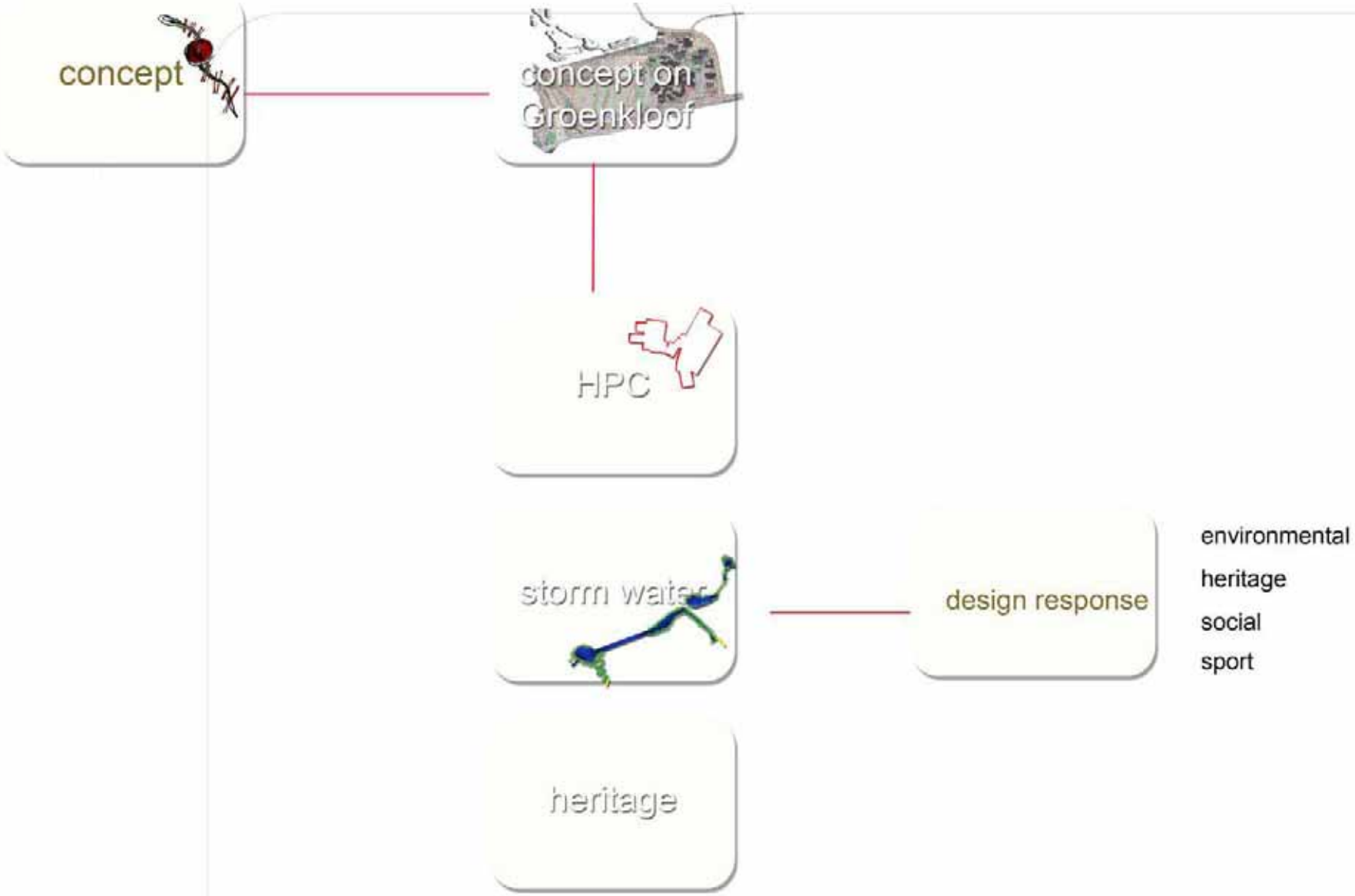
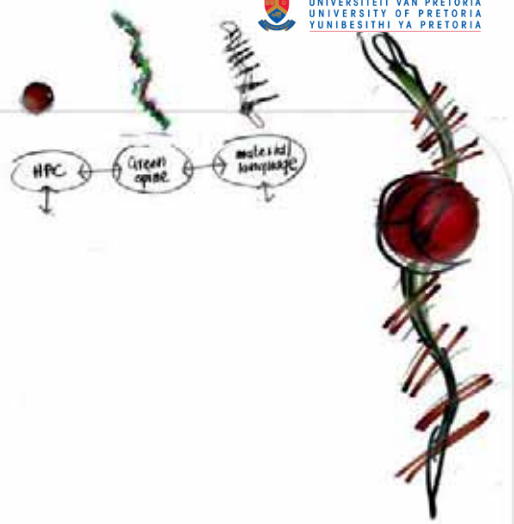


FIGURE 141 -Concept to site diagram, Author, 2008



4.1 Concept diagram

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Concept to site

FIGURE 142 - Concept, Author, 2008

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.

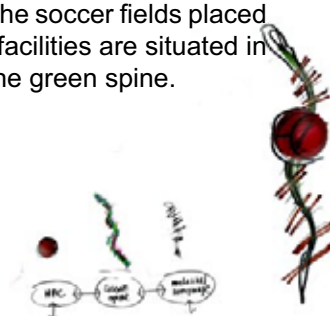


FIGURE 147 - Concept, Author, 2008

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.

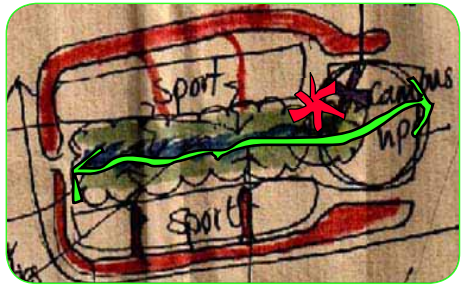


FIGURE 143 -Catalyst on Groenkloof campus, Author, 2008

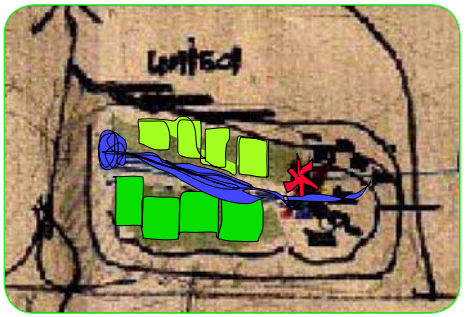


FIGURE 144 – Stormwater spine on Groenkloof campus, Author, 2008

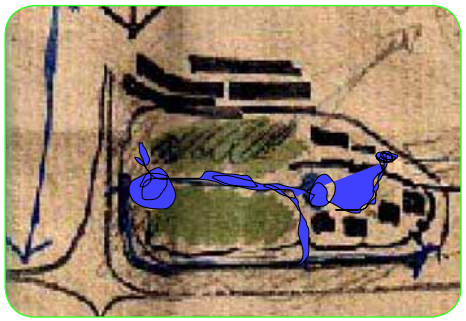


FIGURE 145 –Dams in the green spine, Author, 2008

FIGURE 146 -Monuments around Groenkloof, Author, 2008

FIGURE 148 – Design development 1, Author, 2008

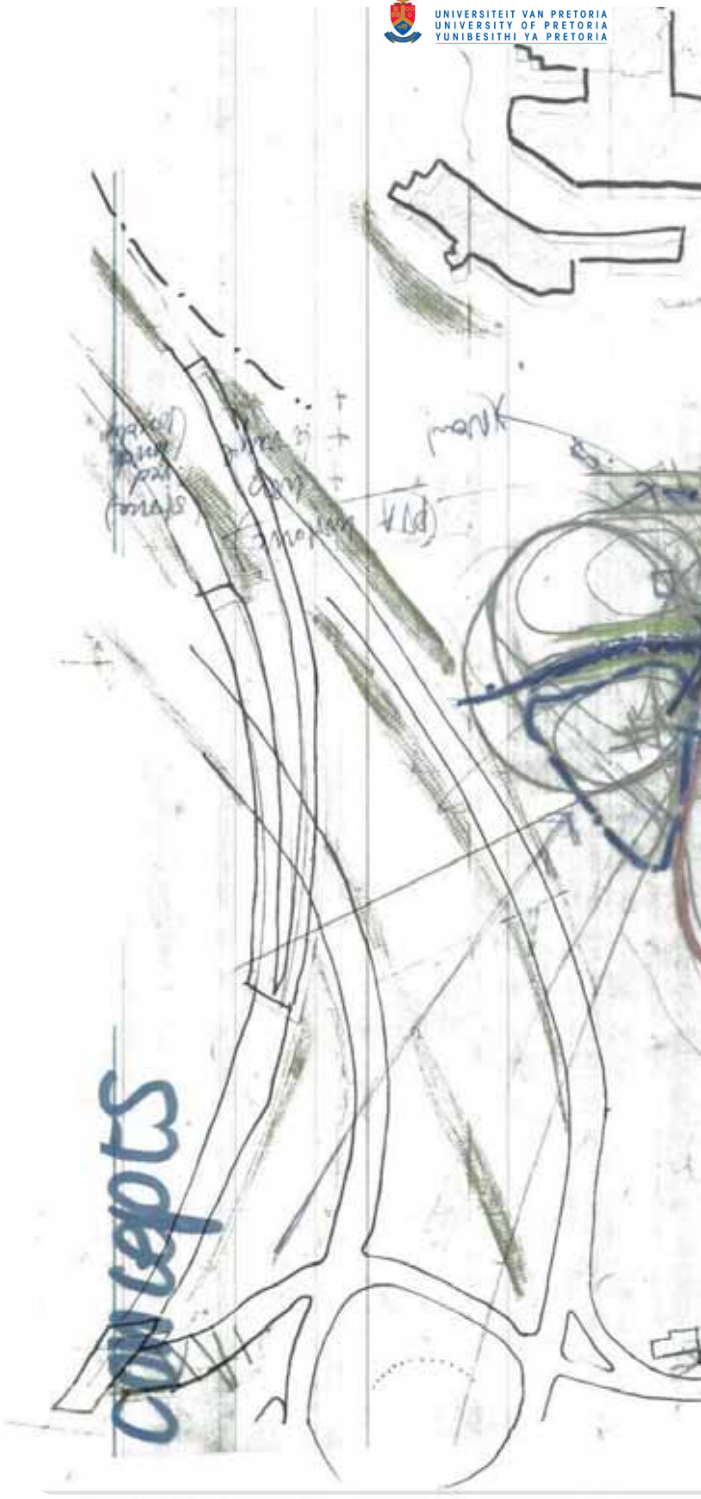


Figure 148 was the first concept site layout. The existing facilities, slope and open spaces were drawn. In Figure 149 large volumes of stormwater are dammed onsite, pedestrian circulation is considered, the HPC was placed onsite and a new entrance implemented.

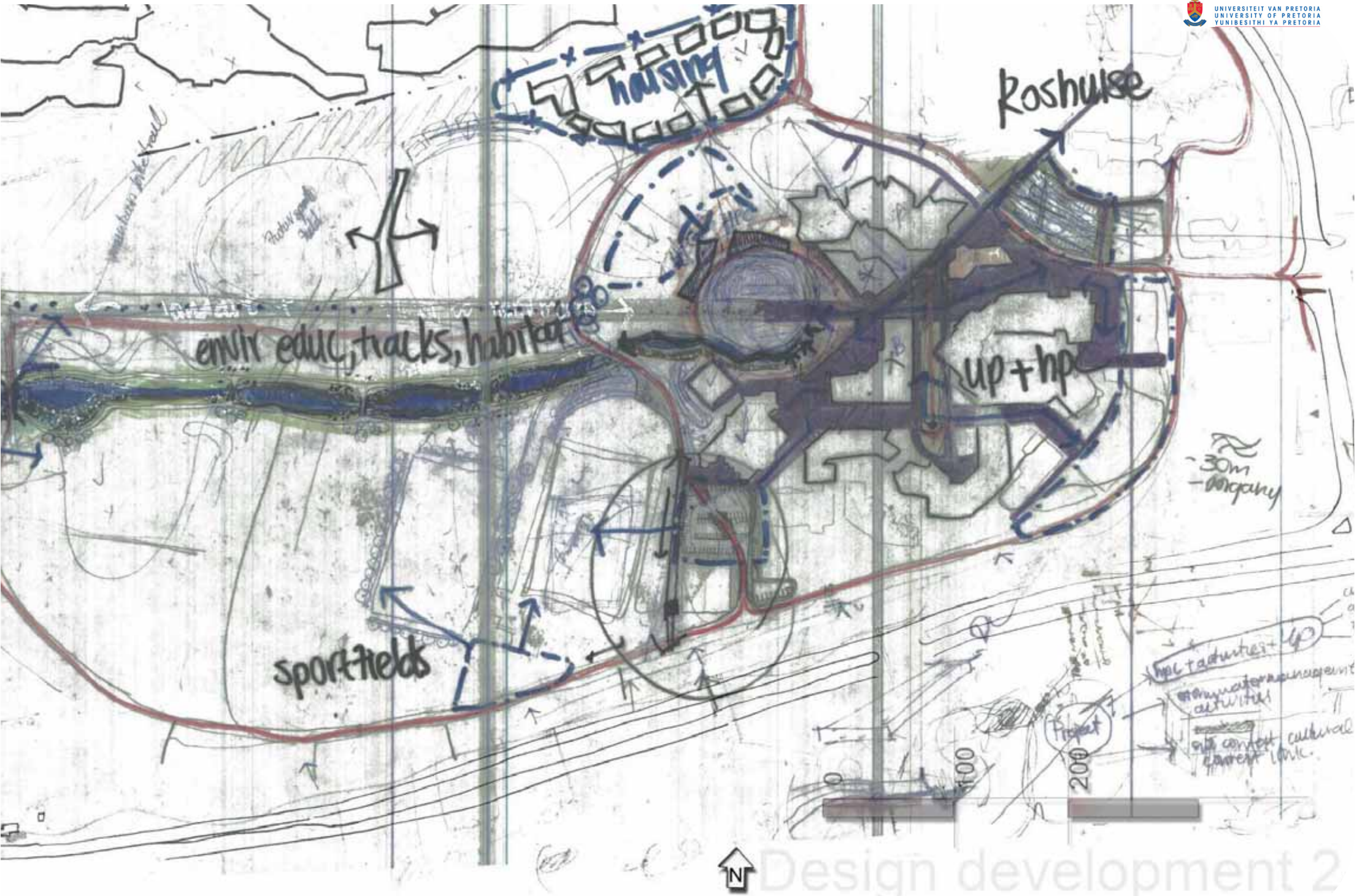


FIGURE 149 – Design development 2, Author, 2008

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.

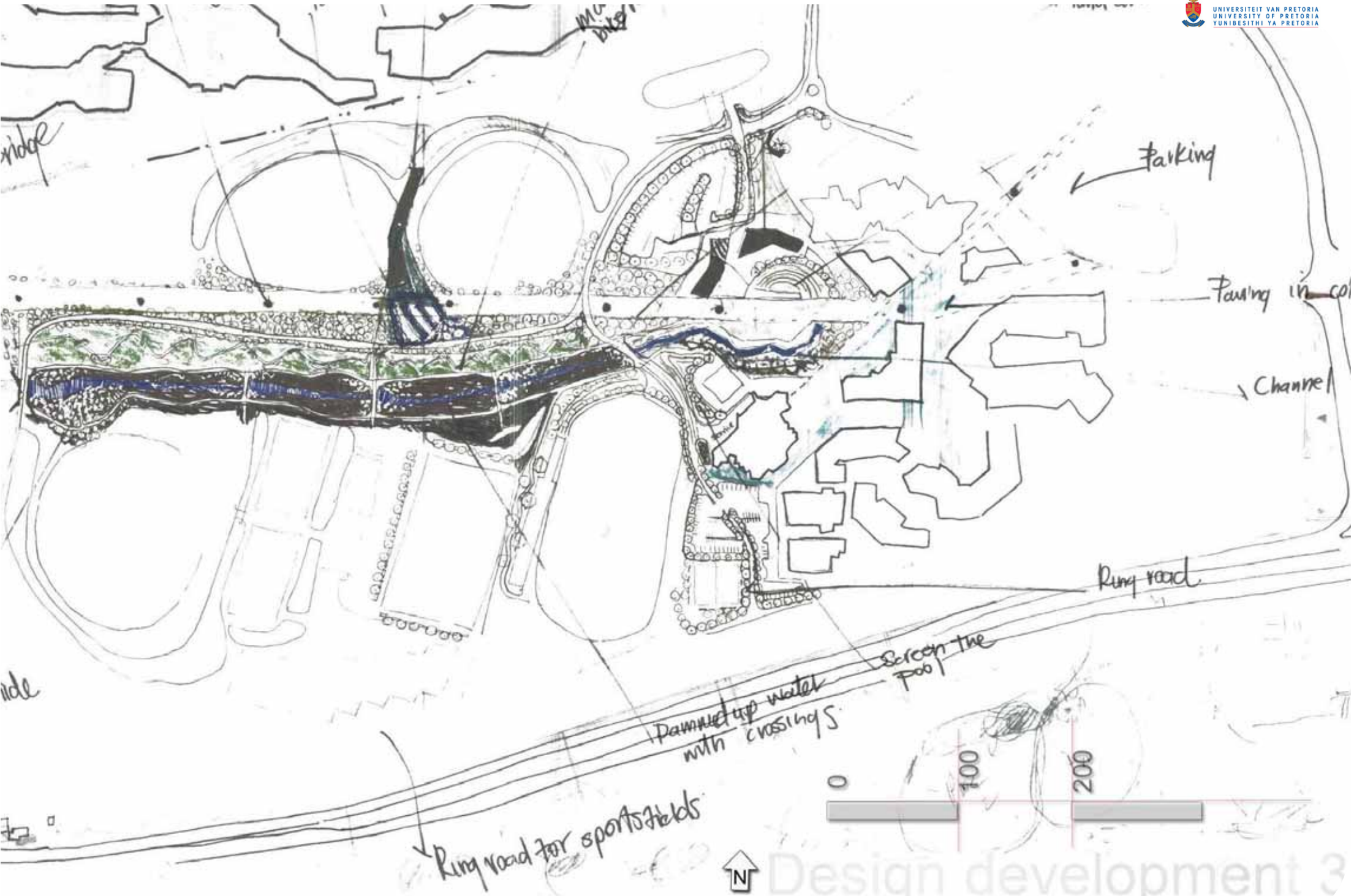


FIGURE 150 – Design development 3, Author, 2008

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.

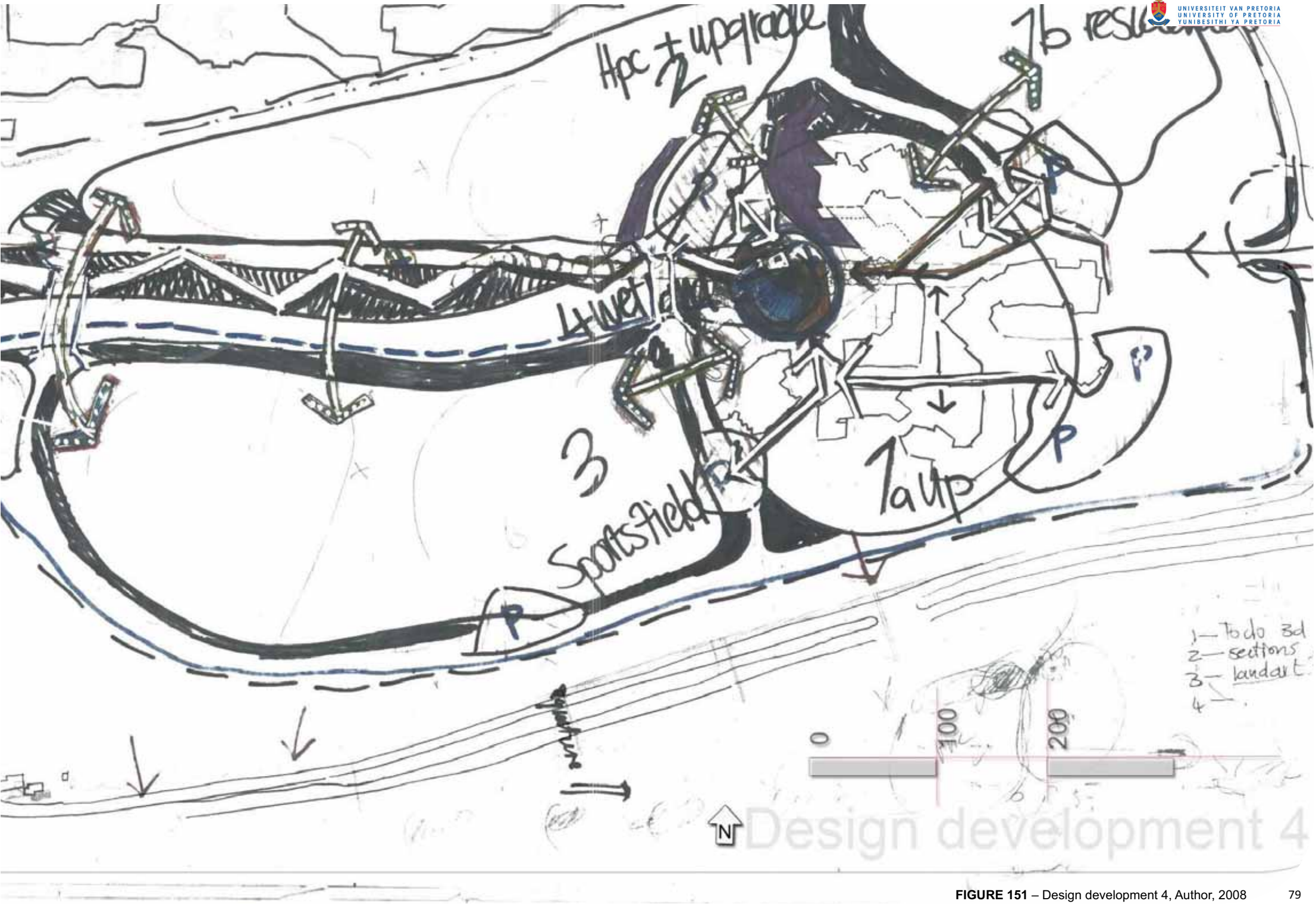
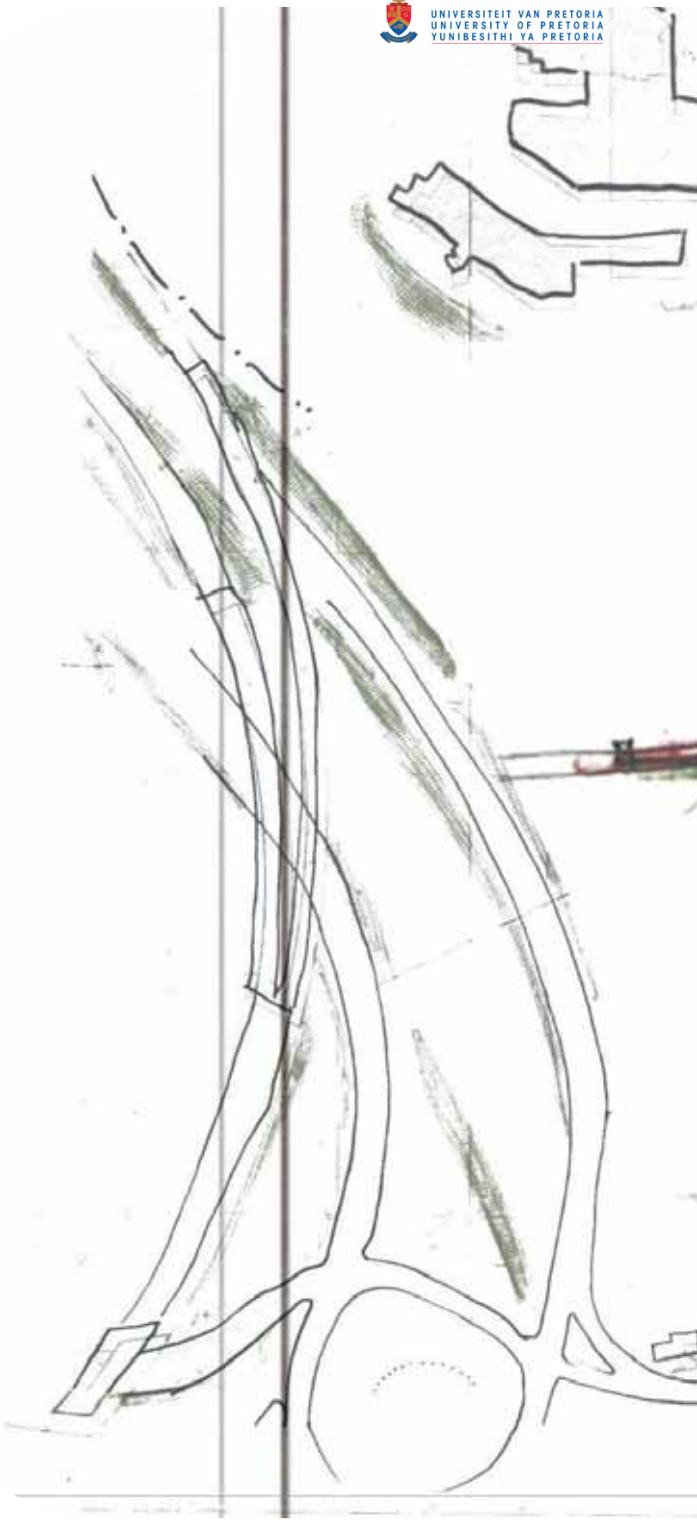


FIGURE 151 – Design development 4, Author, 2008



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

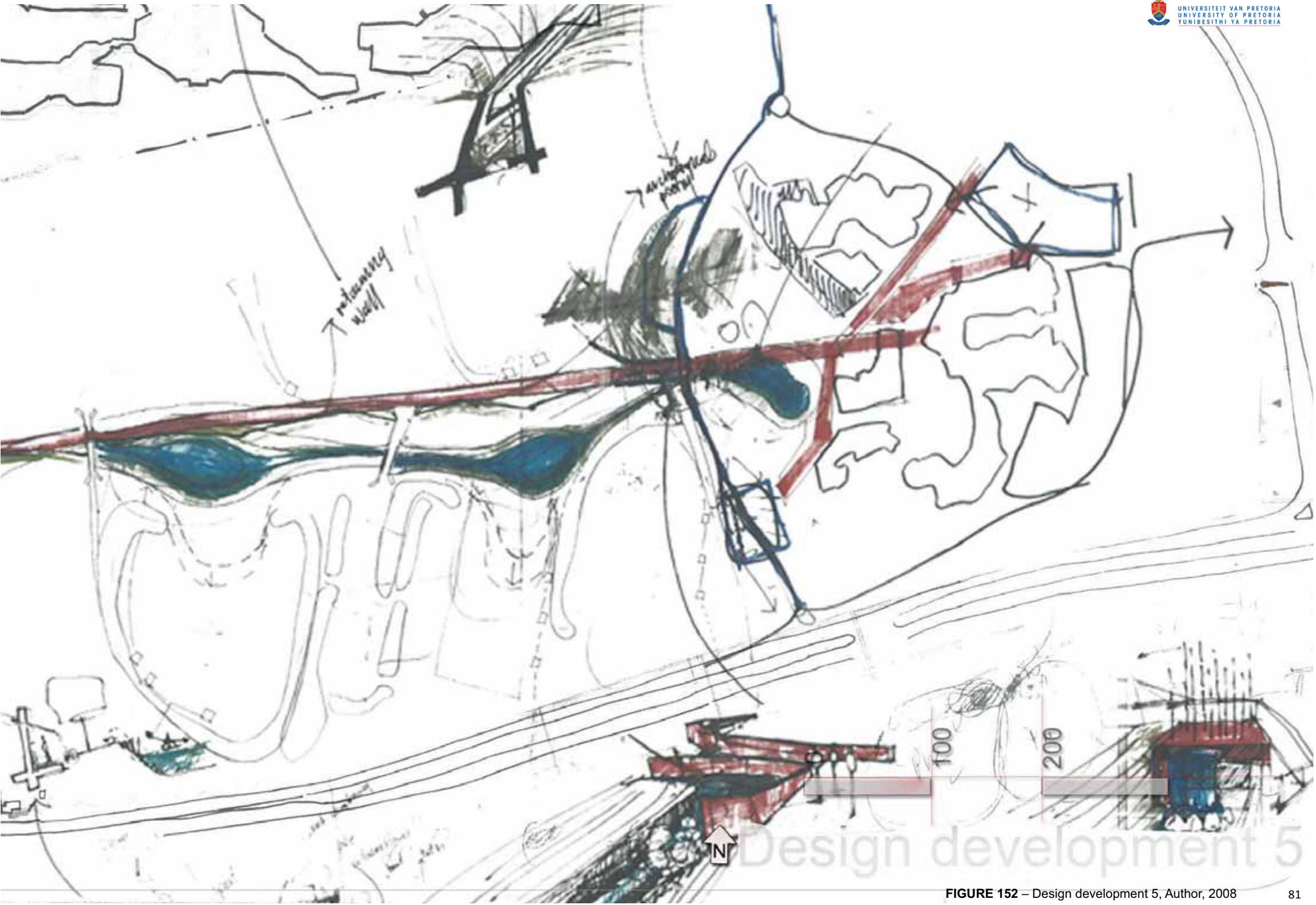
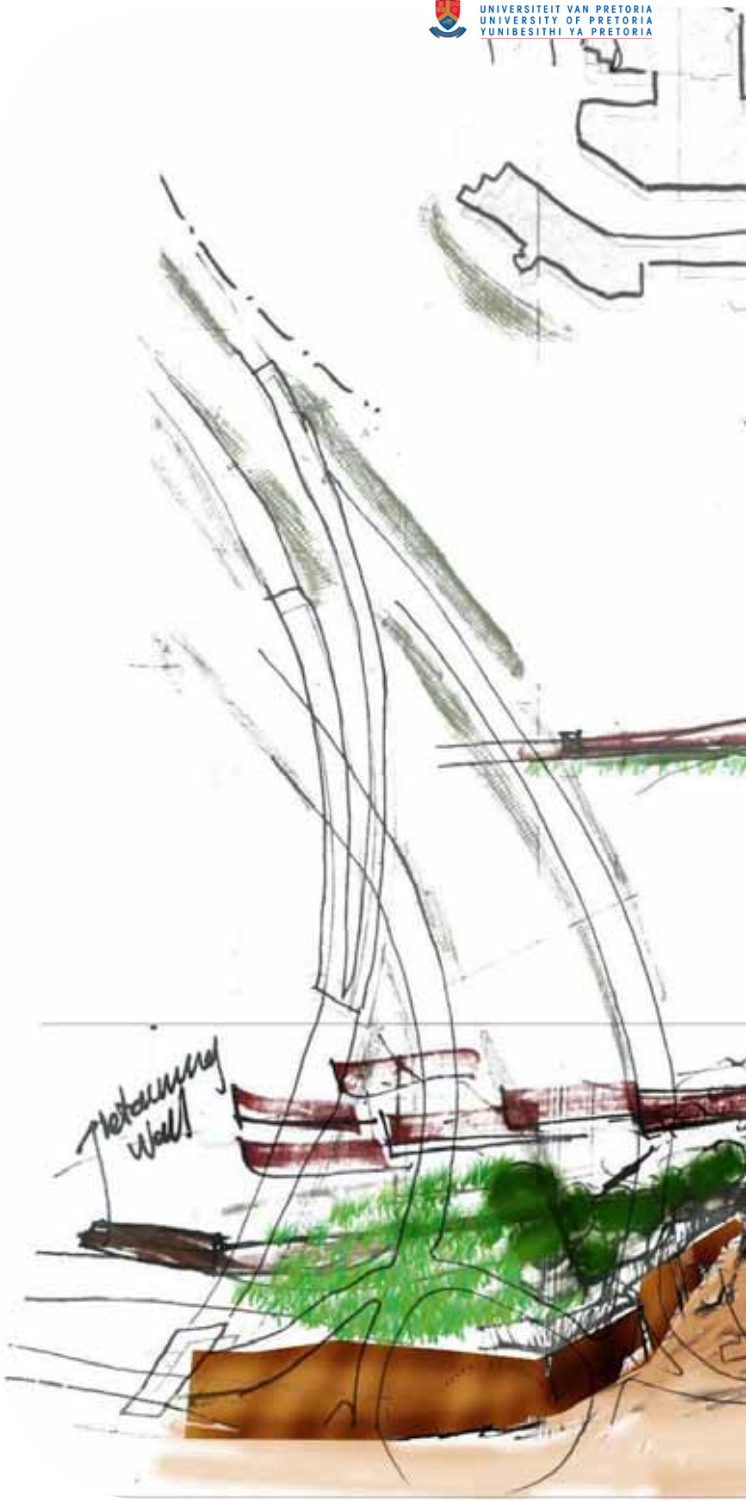


FIGURE 152 – Design development 5, Author, 2008



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.

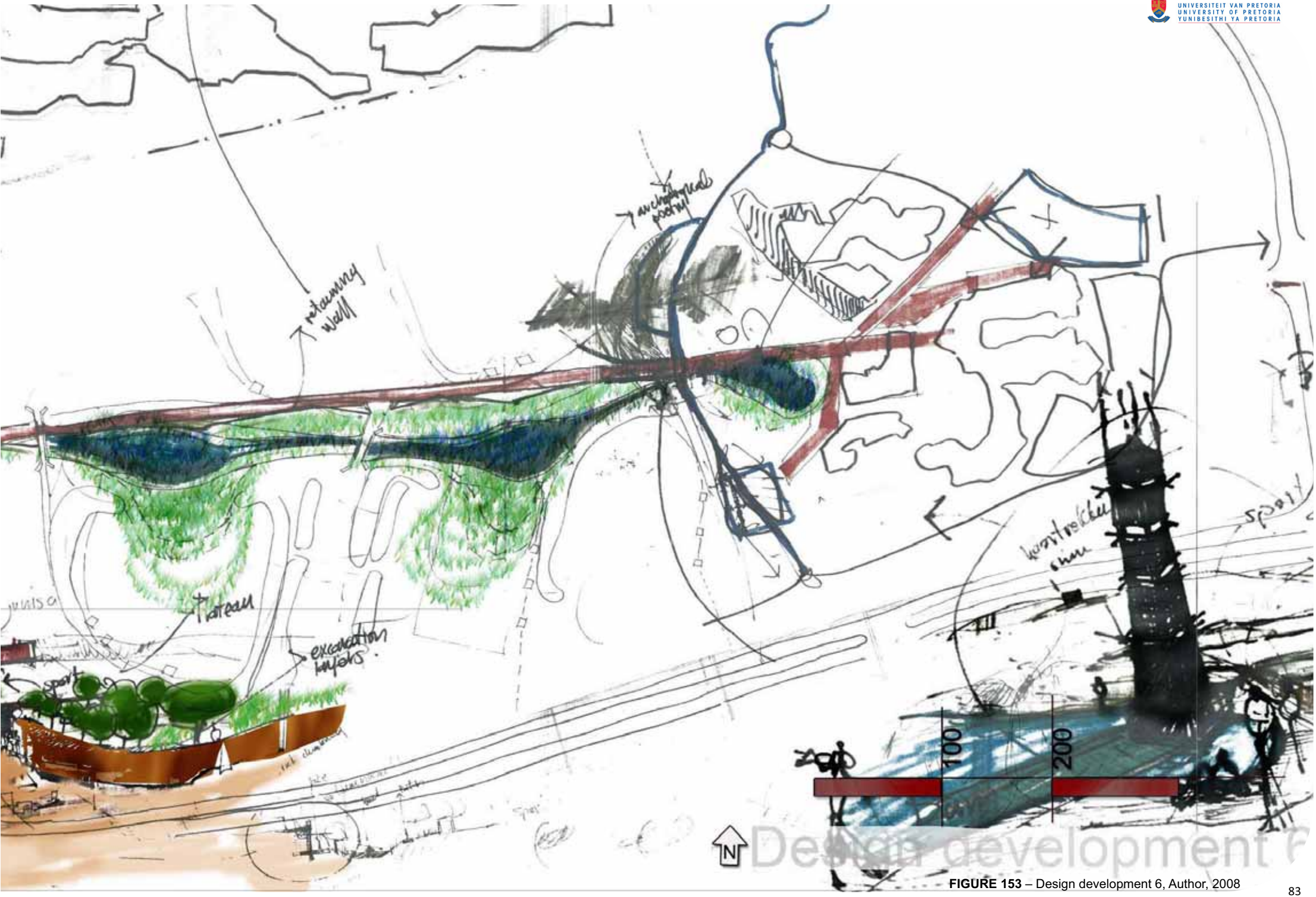
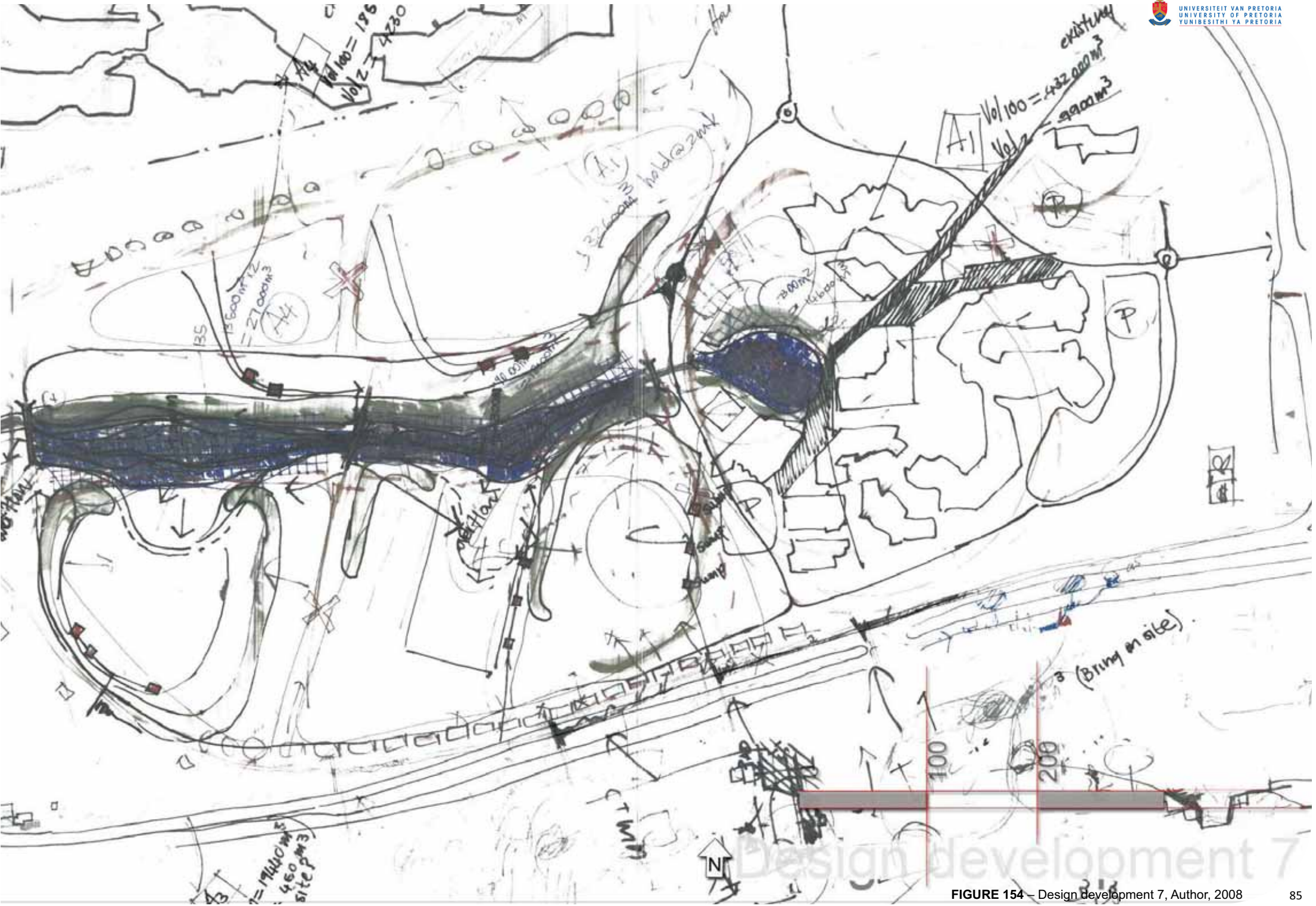


FIGURE 153 – Design development 6, Author, 2008

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.



Design development 7

FIGURE 154 – Design development 7, Author, 2008

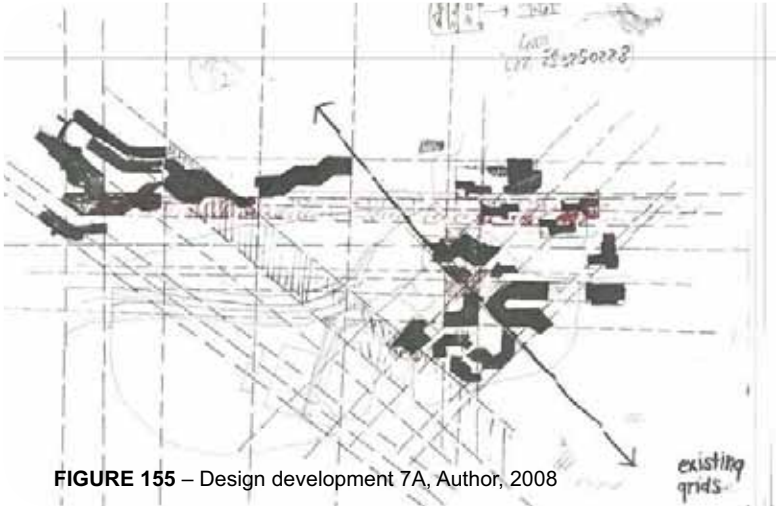


FIGURE 155 – Design development 7A, Author, 2008

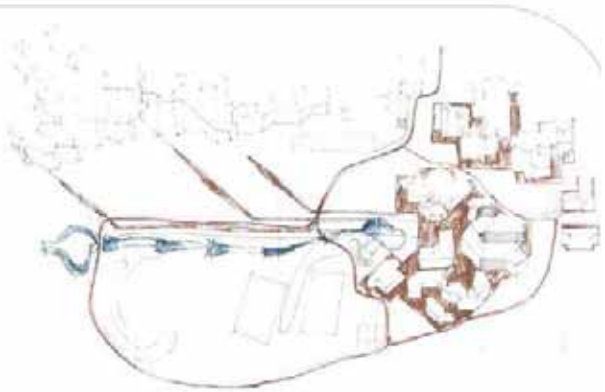


FIGURE 156 – Design development 7B, Author, 2008

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.

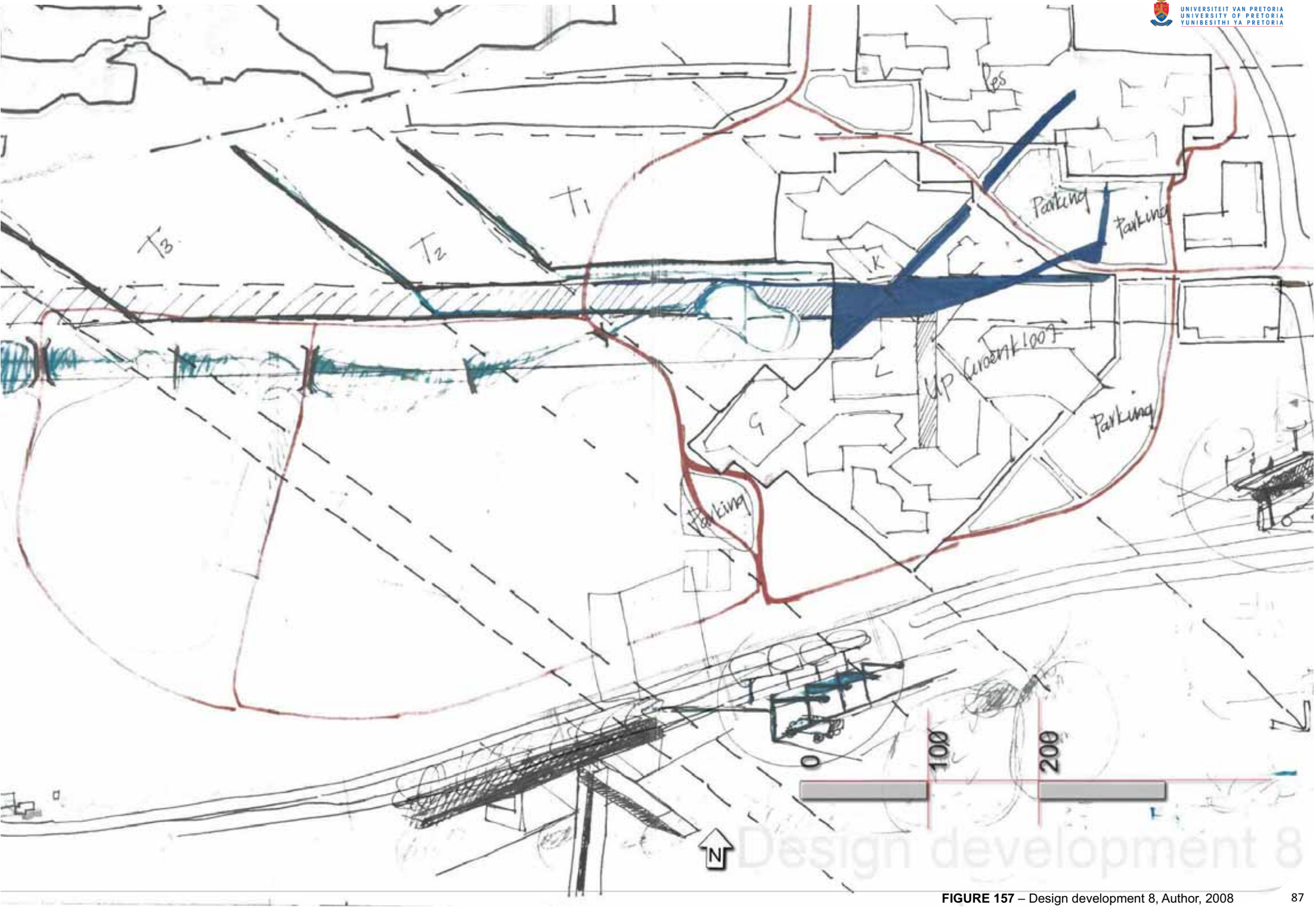


FIGURE 157 – Design development 8, Author, 2008

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:

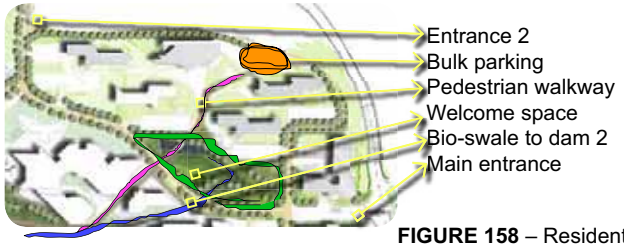


FIGURE 158 – Residential zone, Author, 2008

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 daylights 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

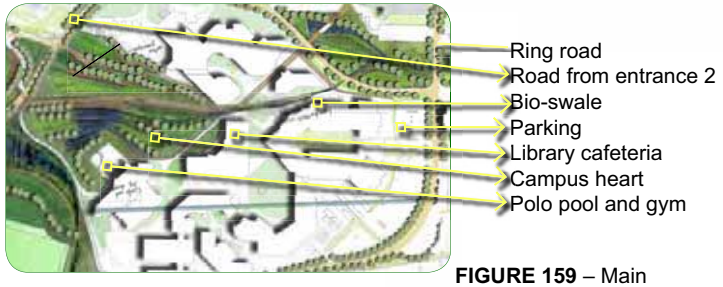


FIGURE 159 – Main campus zone,

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

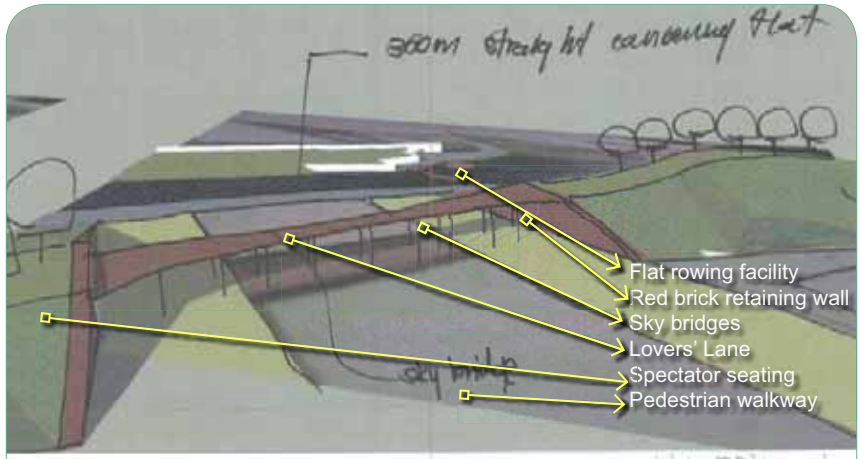


FIGURE 162 – Sky bridge, Author, 2008

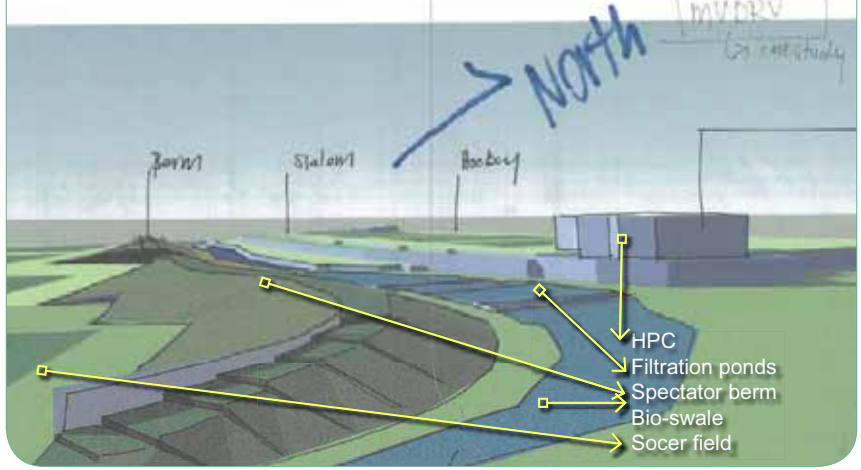


FIGURE 163 – Spectator berm, Author, 2008

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

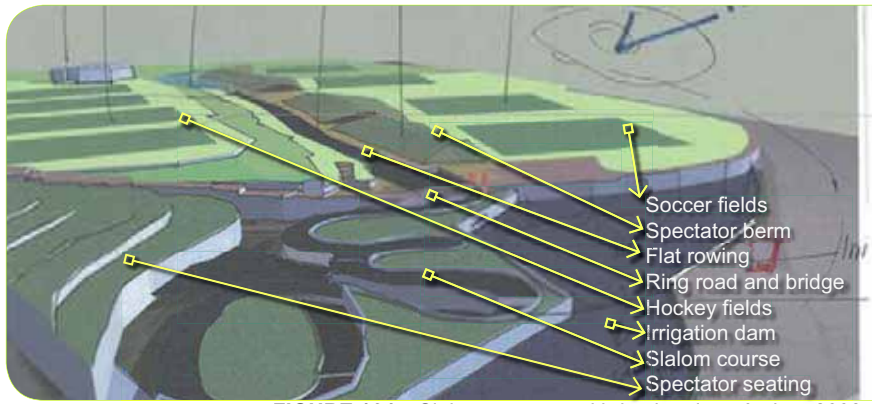


FIGURE 164 – Slalom course and irrigation dam, Author, 2008

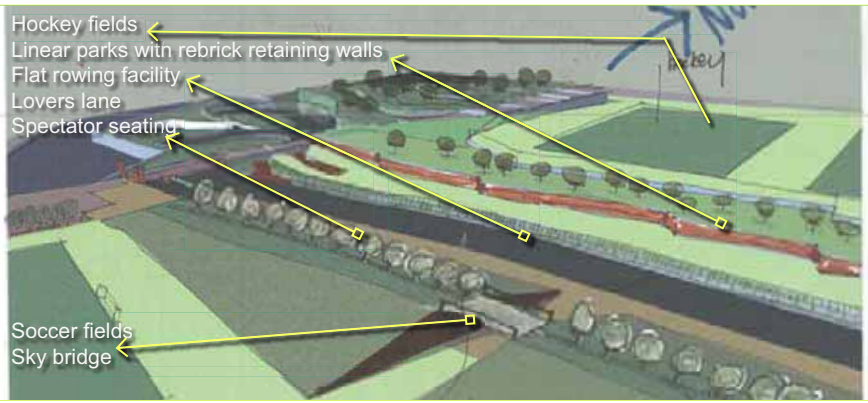


FIGURE 165 – Spectator berm and flat rowing facility, Author, 2008

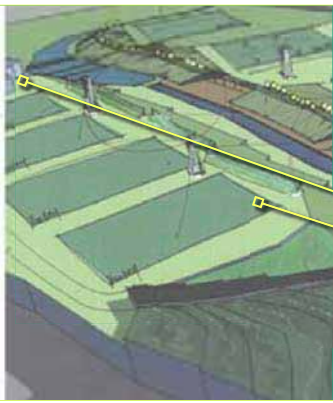


FIGURE 166 – Bi

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.

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

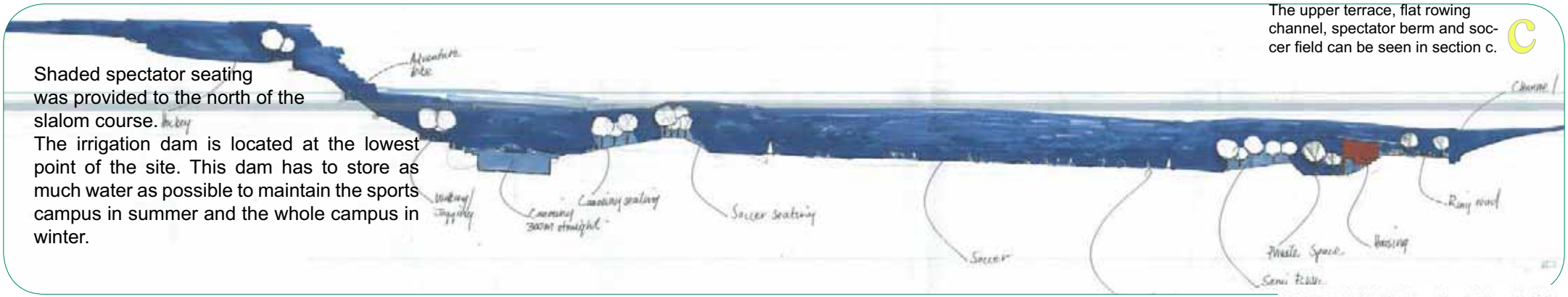
Shaded spectator seating was provided to the north of the slalom course.
The irrigation dam is located at the lowest point of the site. This dam has to store as much water as possible to maintain the sports campus in summer and the whole campus in winter.

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

FIGURE 168 – Section A, Author, 2008

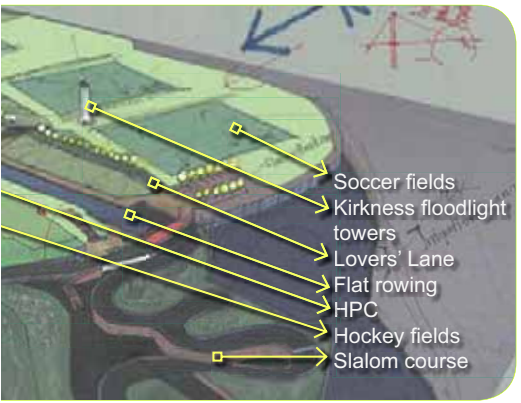
The HPC, bird hide in the filtration pond, existing berm and soccer field can be seen in section b.

FIGURE 169 – Section B, Author, 2008



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

FIGURE 170 – Section C, Author, 2008



rdseye view of proposed Groenkloof HPC, Author, 2008

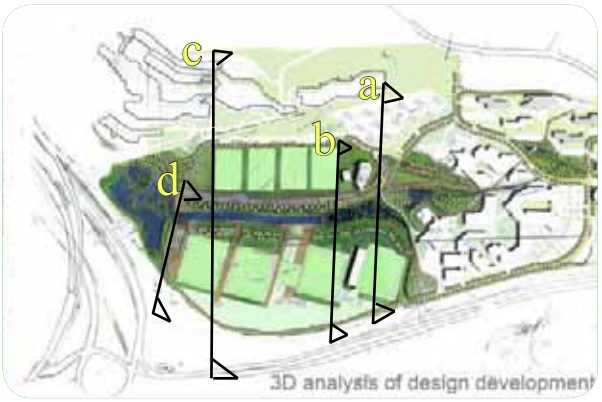


FIGURE 167 – Groenkloof map with section lines, Author, 2008

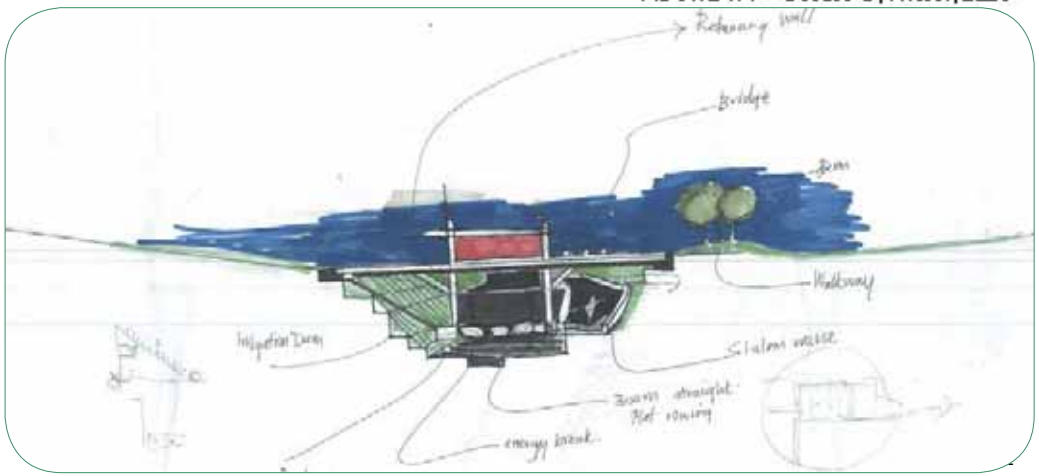


FIGURE 172 – HPC plan on L.C de Villiers, KWP, 2005

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

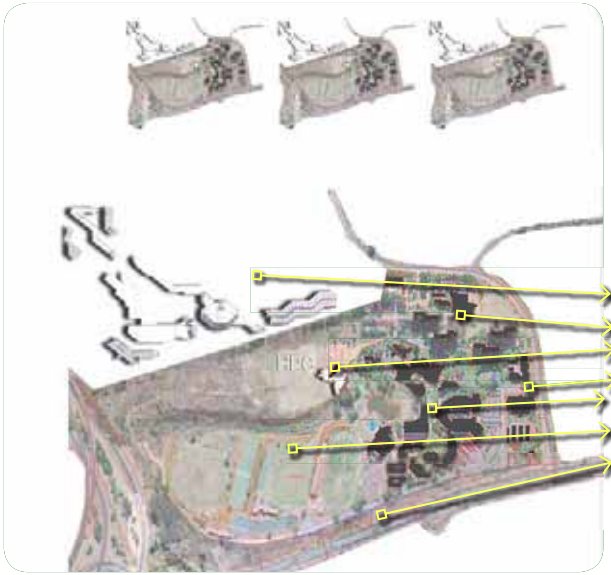


FIGURE 174 – Groenkloof campus with HPC, Author, 2008

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 allowes 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.

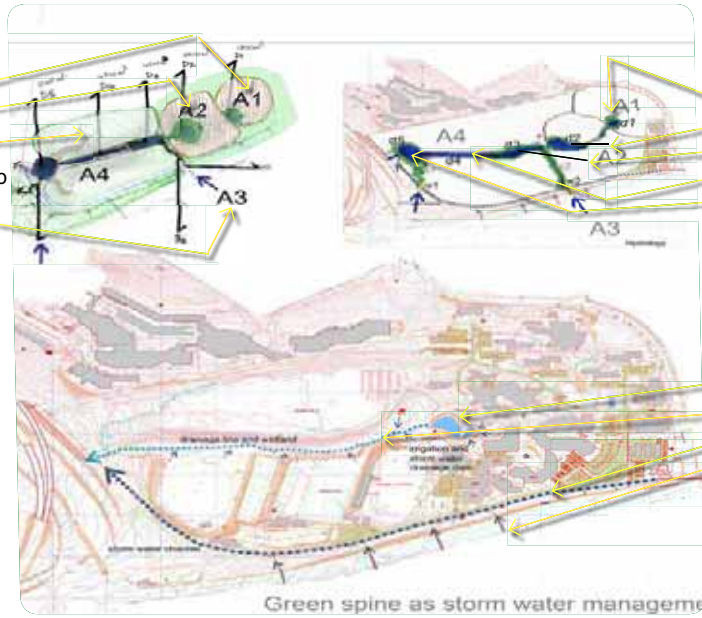
4.2.2 Green spine as storm water management

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.

Residetial campus
Main campus
Sports campus
Storm water from Klapperkop and Groenkloof



Dam 1 “welcome space”
Dam 2 “campus heart”
Dam 3 “filtration ponds”
Dam 4 “flat rowing facility”
Dam 5 “irrigation dam”

FIGURE 175 – Hydrology concept, Author, 2008

FIGURE 176 – Hydrology concept on Groenklood campus, Author,

Existing dam
Eroded drainage line
Stormwater channel
Stormwater drainage pipes from Klapperkop

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

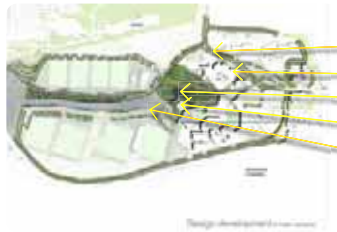
The residential campus:

Ring road
Residential campus
Dam 1 (welcome space)
Welcome space
Bio-swale
Dam 2 (existing dam)

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:



Ring road
Main campus
Dam 2 (existing dam)
Polo pool
Dam 3 (filtration ponds)

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).

The sports campus:

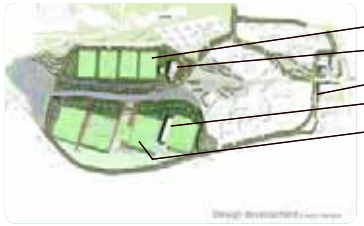


FIGURE 181 – Stormwater on the sports campus A, Author, 2008

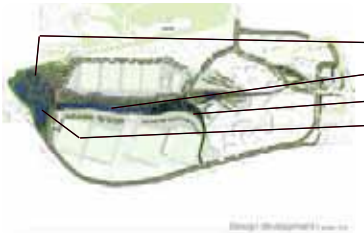


FIGURE 182 – Stormwater on the sports campus B, Author, 2008

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-alligned 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.

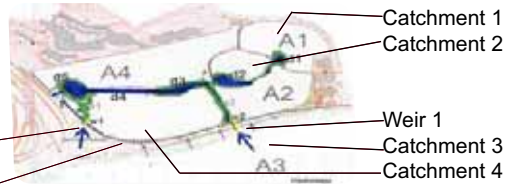
A second adjustable weir has been implemented in the existing stormwater channel, south of the irrigation dam.This weir collects water not rerouted at the first weir onto Groenkloof campus. An adjustable weir is proposed to control the volume of water rerouted onto the site. Water rerouted from this 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 Excell 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 considerately.

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

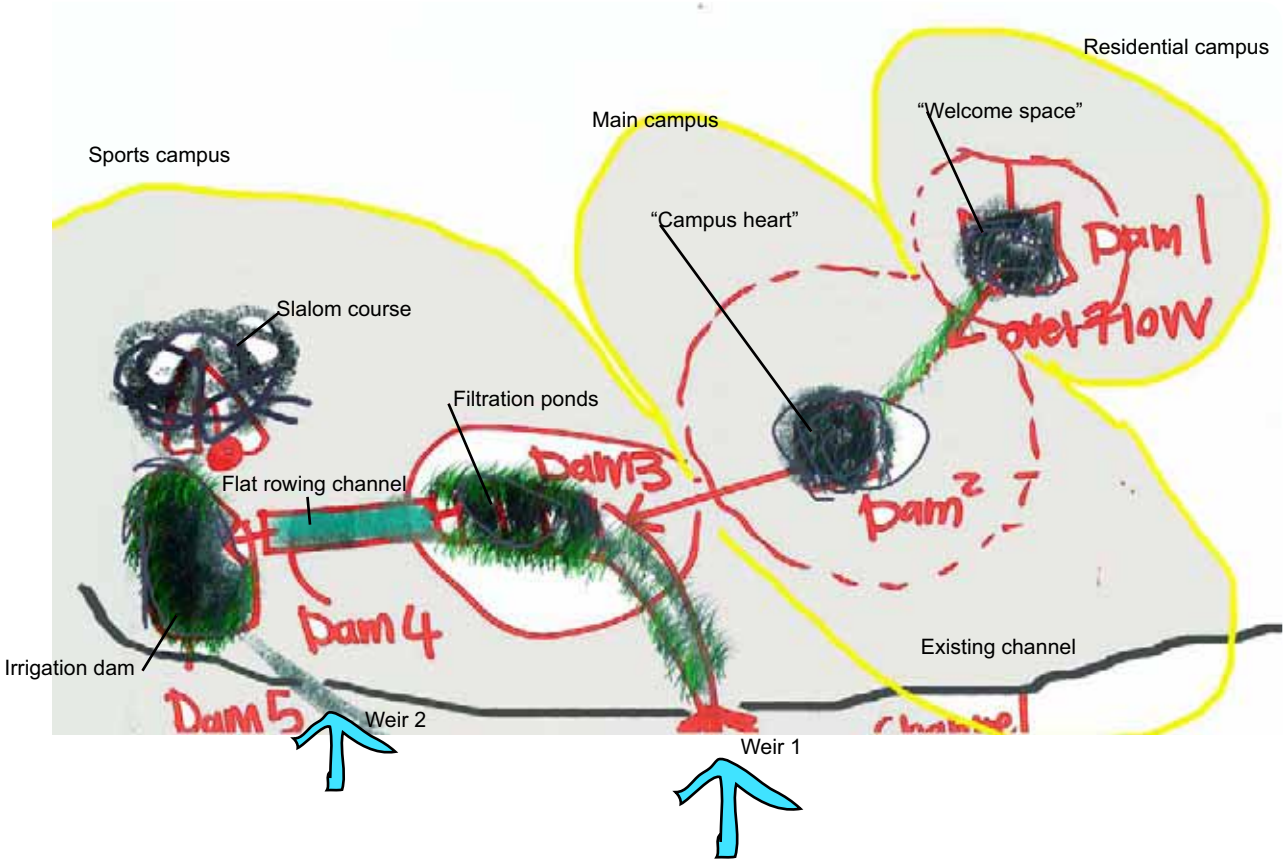


FIGURE 178 – Stormwater diagram, Author, 2008

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.

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).

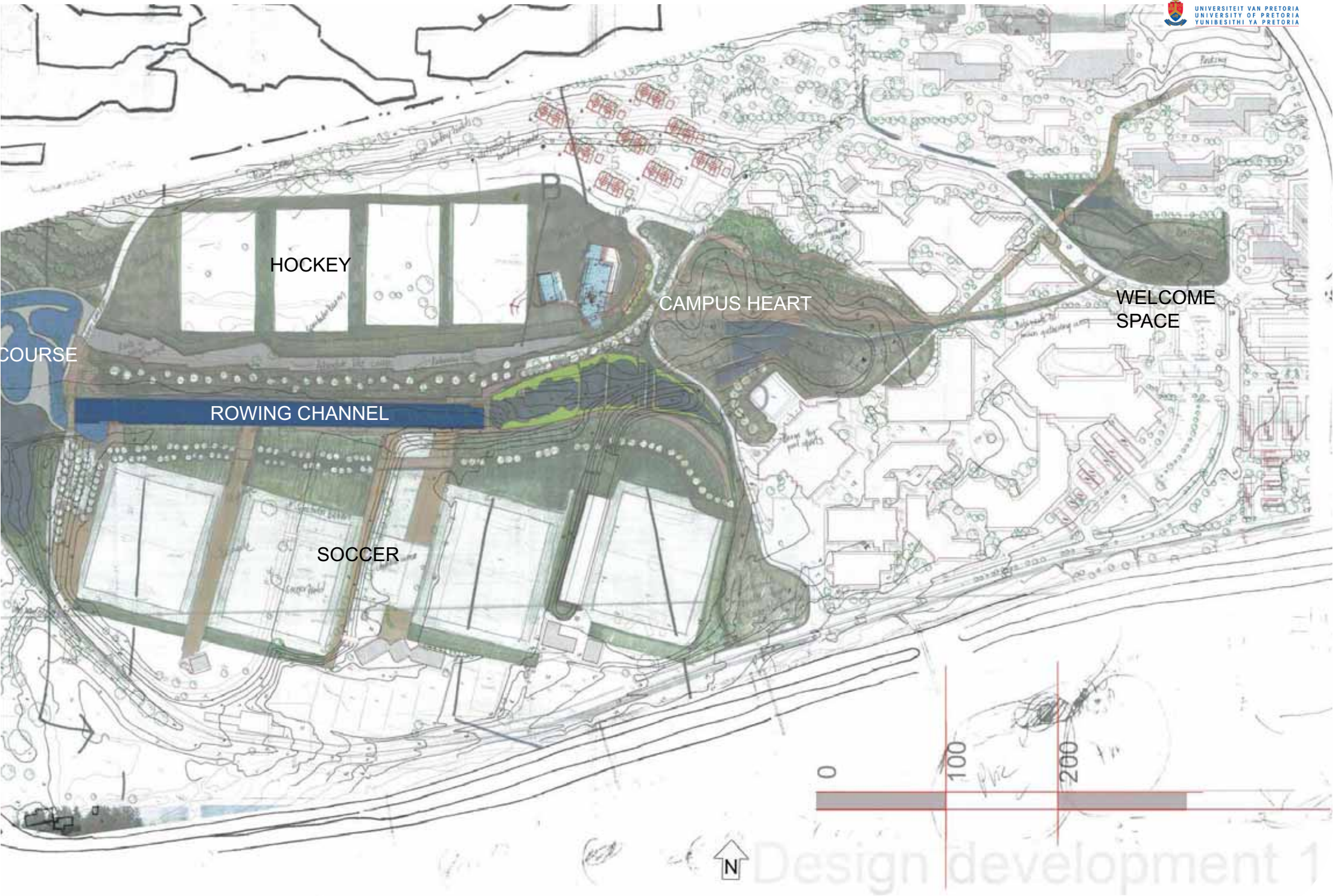


FIGURE 184 – Design development 10, Author, 2008

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).

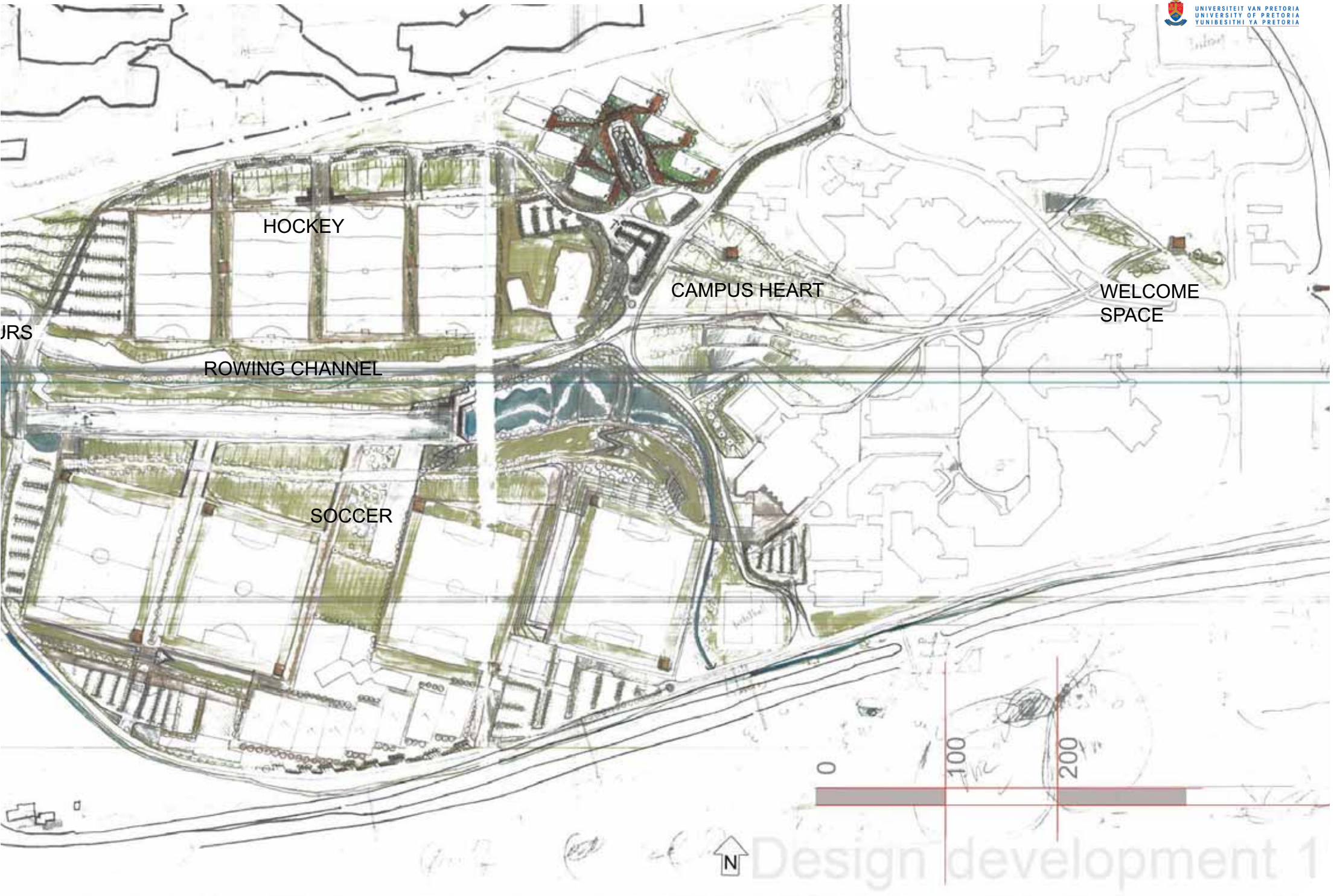


FIGURE 185 – Design development 11, Author, 2008

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