Chapter 5

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

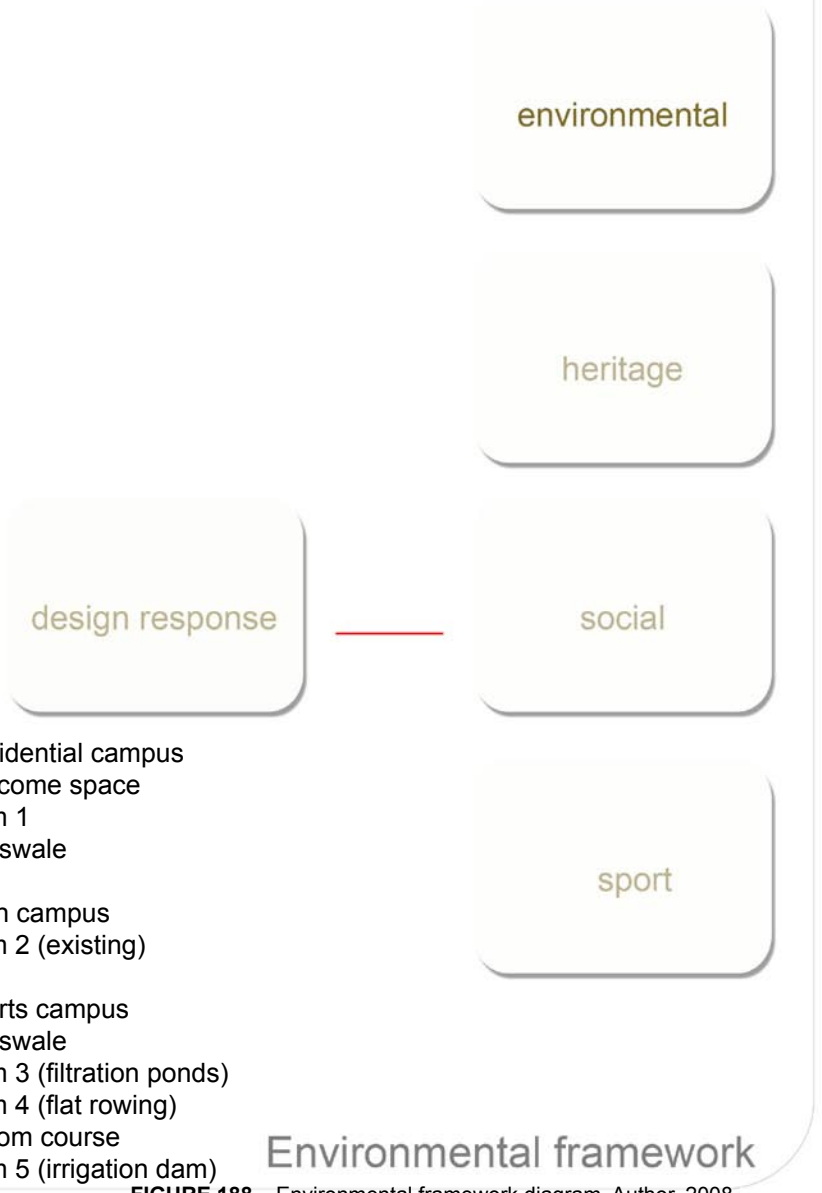

FIGURE 188 – Environmental framework diagram, Author, 2008

5.1 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).

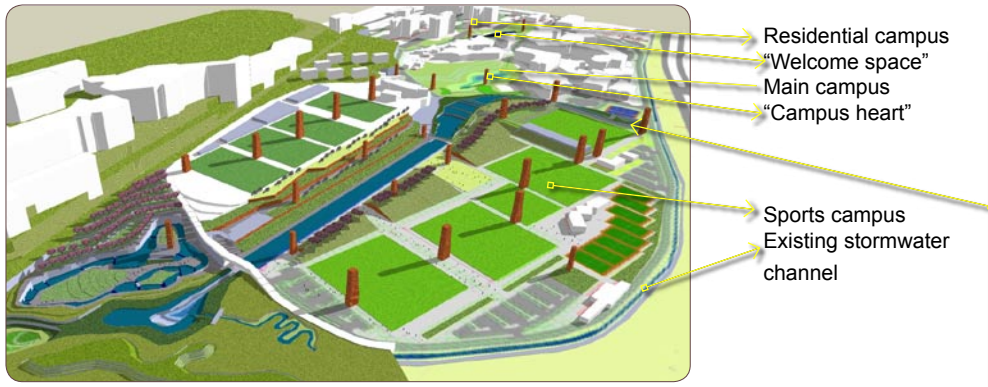

FIGURE 189-Birdseye view of HPC Groenkloof, Author, 2008

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.

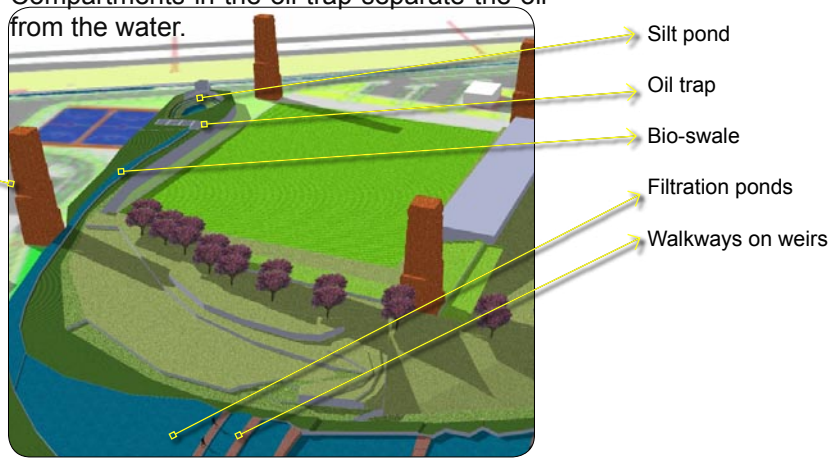

FIGURE 190 - Bird's-eye view of silt pond, oil trap, bioswale and filtration ponds Author, 2008

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 asse ter and provide recommendations and guidelines.

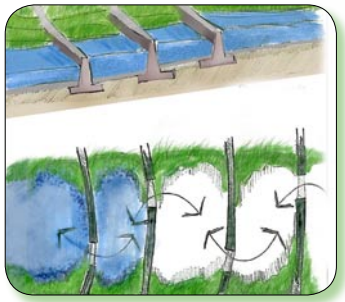

FIGURE 193 - Filtration ponds and waterflow manipulated by weirs

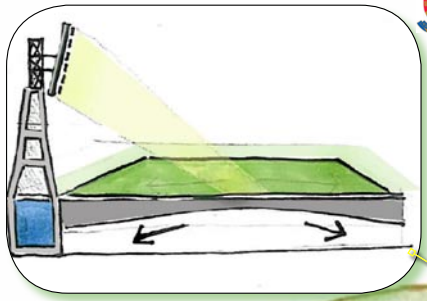

FIGURE 192 - Water storage at base of tower

FIGURE 194 - Slalom course

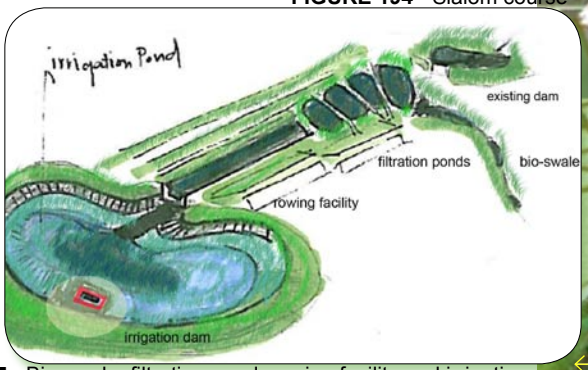

FIGURE 195 - Bio-swale, filtration pond, rowing facility and irrigation dam

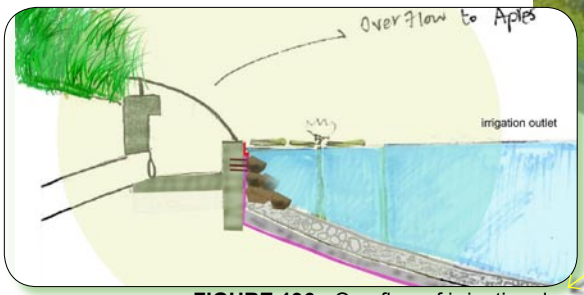

FIGURE 196 - Overflow of irrigation dam

Figure191: 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:

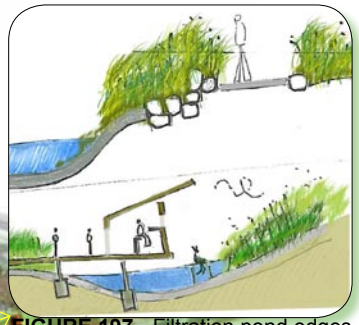

FIGURE 197 - Filtration pond edges

FIGURE 198 - Campus zones

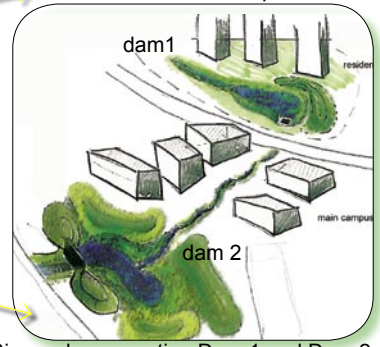

FIGURE 199 - Bio-swale connecting Dam 1 and Dam 2

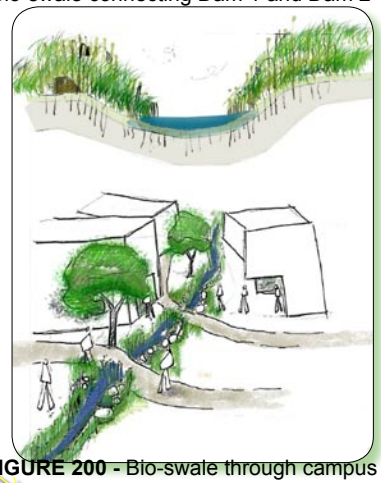

FIGURE 200 - Bio-swale through campus

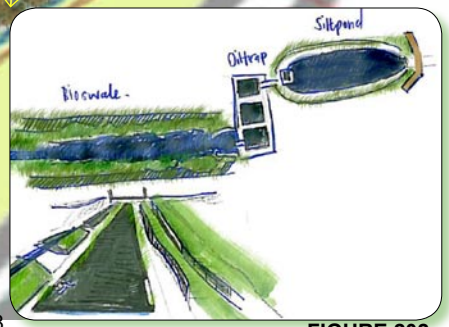

FIGURE 203 - Bio-remediation measures

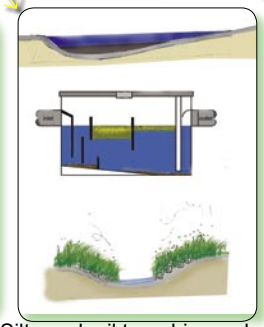

FIGURE 202 - Silt pond, oil trap, bio-swale

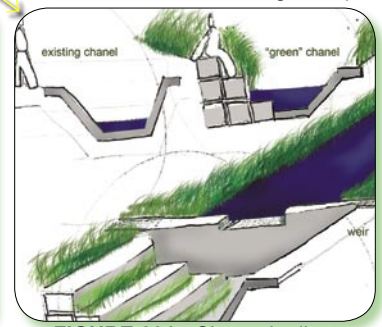

FIGURE 201 - Channel adjustment

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

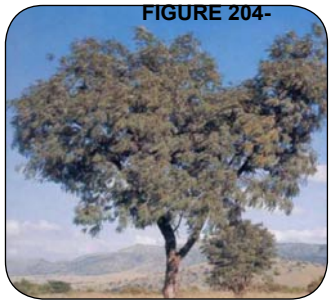
FIGURE 204-

List of trees:

Acacia caffra

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


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.

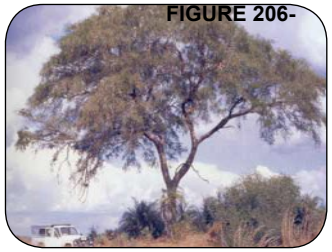
FIGURE 206-

Acacia sieberiana var. woodii

This species will be used in focal points.


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 208-

Celtis africana – White stinkwood

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


FIGURE 209-

Rhus pyroides

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

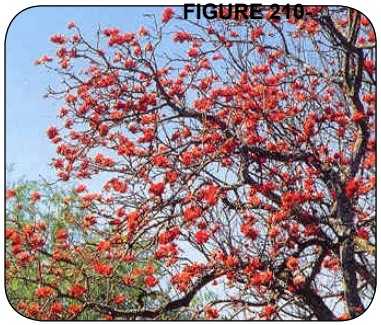
FIGURE 210-

***Erythrina lysistemon* – Coral Tree**

The Coral tree is an ideal focal feature tree.

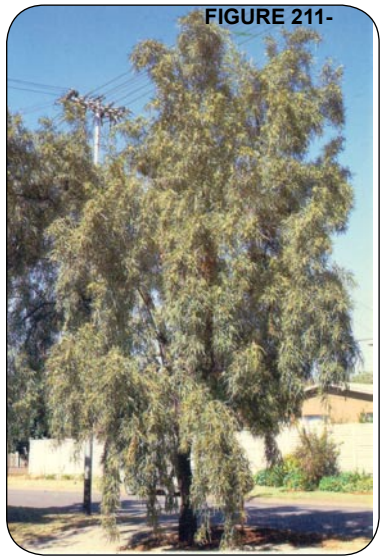
FIGURE 211-

Rhus leptodictya

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


FIGURE 212-

List of Herbaceous perennials:

Juncus krausii

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


FIGURE 213-

***Cyperus papyrus* -** *papyrus*

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


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 215-

Typha latifolia -Bullrush

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 217-

Phragmites australe – Common reed

Phragmites australe will be used in areas in and adiacent to the filtratio

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

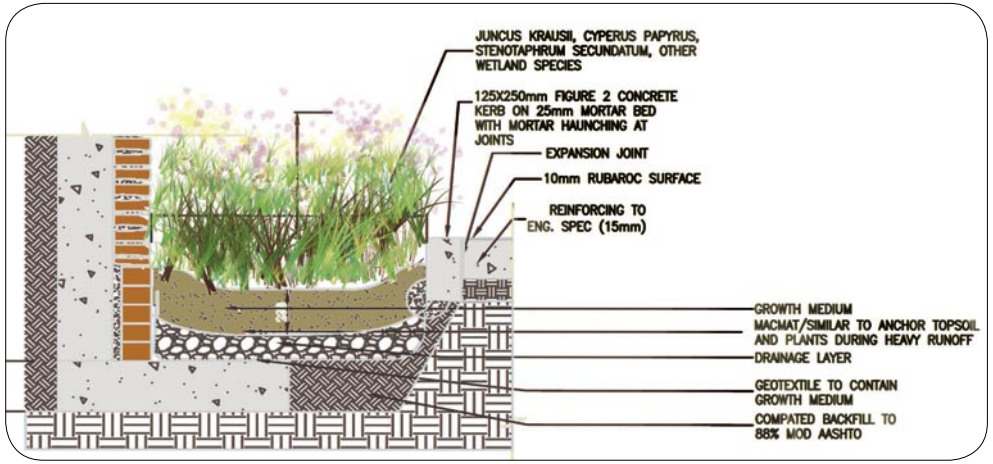

FIGURE 221 - Bio-swale section, Author, 2008