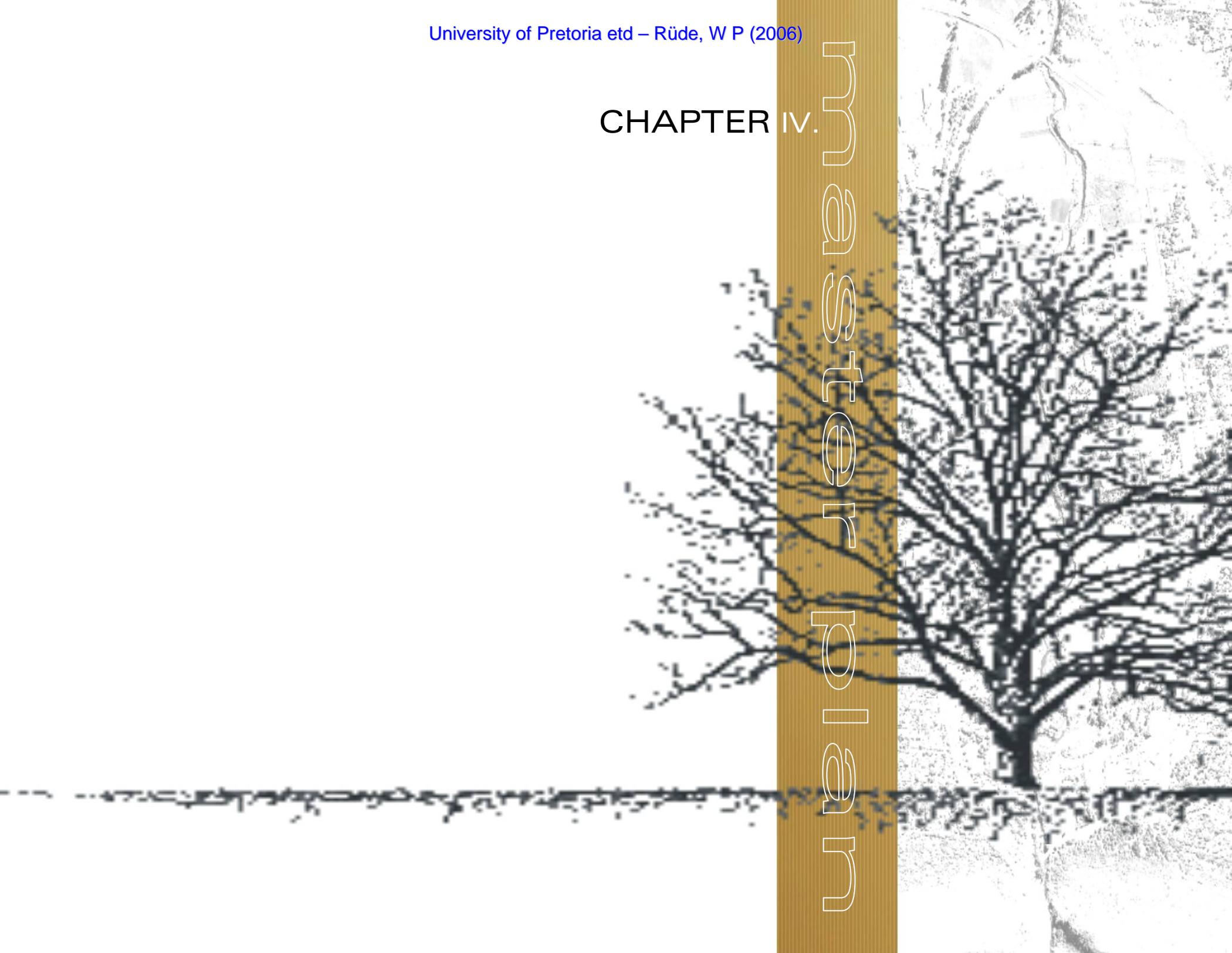


CHAPTER IV.

unisa id: 10101/1/2011



# 04 masterplan development

## 4.1 Developing the master plan

The master plan will aim to set out a framework that will guide future development in this area. The master plan must indicate all the different forms of land use along the river and what areas should be protected and treated as conservation areas. To form this master plan all existing natural and unnatural features of this area must be analysed.

## 4.2 Upgrading the Apies River

Before anything can be done on the side of the Apies River, the river itself must become a safer and cleaner system. The two main problems making the river an unsafe place is a large amount of sediment and wide flood lines along the northern part of the river.

### 4.2.1 Sediment

The problem of sediment can be overcome by controlling the sediment upstream. There is always a certain amount of sediment in a river, but when there is any urban development happening around the river it increases the stormwater runoff and more stormwater means more sediment into the river. Sediment gets trapped on the banks of the river and creates massive sediment banks and can increase the flood lines of the river.

The sediment problem can easily be solved by placing sediment traps at specific points, creating retention ponds along the river to give the sediment time to settle at the bottom of the pond and then be excavated and

used as topsoil. Managing stormwater upstream at the CBD will help with this problem downstream.

### 4.2.2 Wide flood lines

The second problem being wide floodlines requires a careful investigation so that we don't disturb the semi natural state of the river.



fig 4.1: Sediment embankment.

The floodplain topography is flat and about 500m wide in general. The river in its current state can only accommodate 1:5 and 1:10 year floods. The meandering section of the river between Wonderboom nature reserve and the Retirement village was historically a problem area for flooding. River meandering is caused by a constant amount of energy distributed between fixed upstream and downstream points, i.e. Wonderboom Poort (solid rock) and Bon Accord dam (inlet). Elevations of control points are fixed, therefore river can only move horizontally. Meandering over years was plotted from historical records and 'erosion boundary' within which river moves laterally was established.

Five options were considered in this study and attempt to narrow the flood lines:

- Water retention structure for flood attenuation at the Wonderboom Poort: An insufficient amount of space is available for the required storage volume of approx.  $2 \times 10^6 \text{m}^3$  (represent area of about 40ha with average depth of 5m). In fig.4.2 you can see that this was the situation in the early 20<sup>th</sup> century. At present there are buildings and roads dominating the area in the Poort limiting the amount of space available for retention of water.



fig 4.2: Early 20th century, Poort as a dam. (Nel)

- Excavation of flood channel whilst at the same time retaining existing low flow channel and fill on riverbanks: Environmentally unacceptable - complete removal of existing riparian habitat except for flow channel and total re-establishment thereof. Fill in banks restricted by existing development (buildings and services). Refer to fig.4.3
- Concrete-lined canal: Hydraulically preferred alternative but environmentally unacceptable - complete removal of ecosystem and large amount of excavated material to dispose. Refer to fig.4.4

- Flood bypass channel (auxiliary river channel) on western bank: Environmental unacceptable - interfere with river morphology. Cost of land expropriation, excavations and disposal of excavated material not economically viable. Refer to fig.4.5
- Berms outside river riparian zone: Environmentally most acceptable solution. However, several practical considerations e.g. continuity of berms, land issues, protection of illegal structures, sources of material for construction of berms and financing. Refer to fig.4.6

(Apies River Rehabilitation document)

The lines on the following figures represent the following:

- Blue lines = 1 in 20 year flood lines
- Red lines = 1 in 50 year flood lines
- Purple lines = 1 in 100 year flood lines
- White line = river bank summary
- Yellow lines = implementation option
- Orange lines = cut and fill area



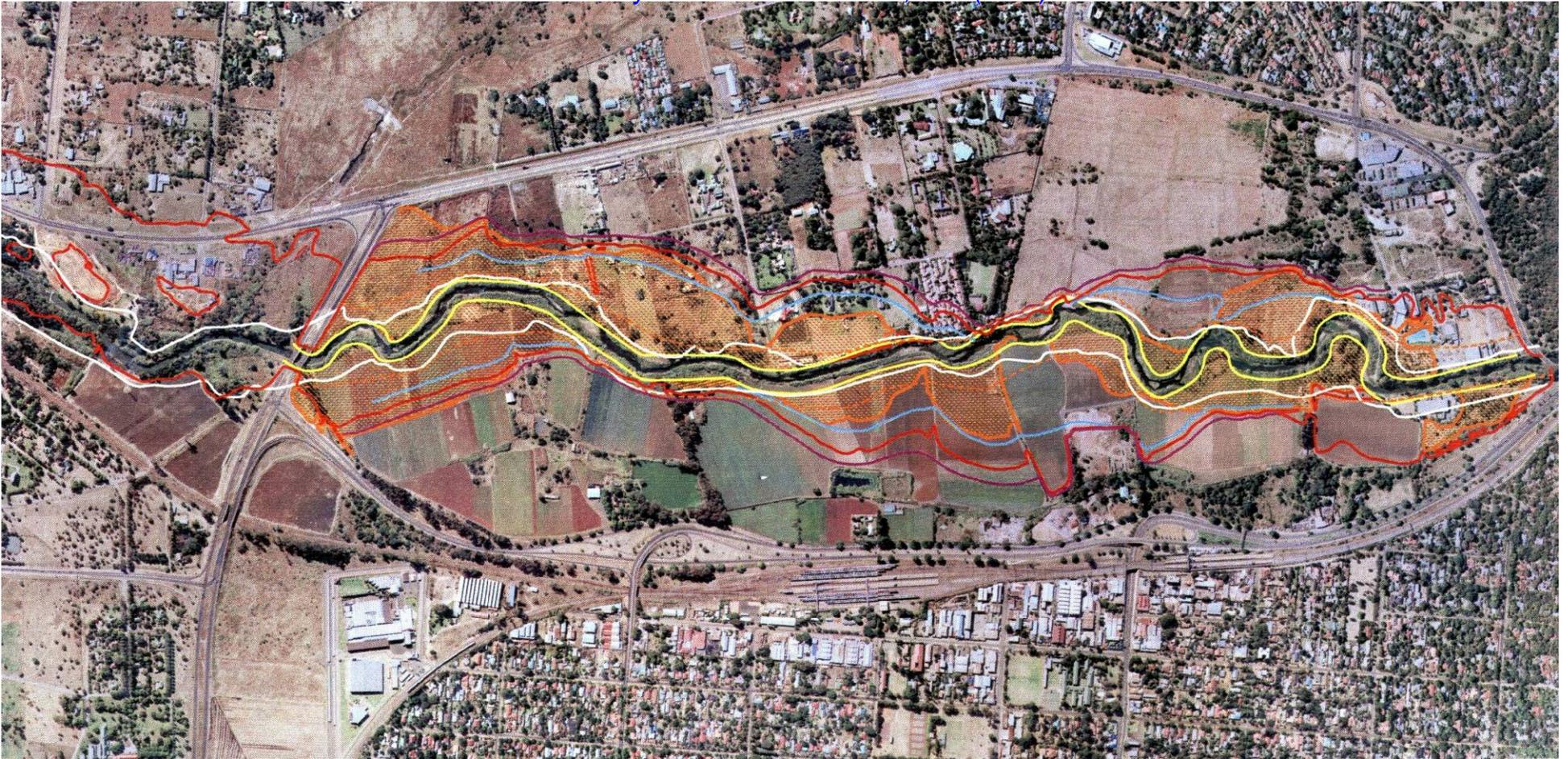
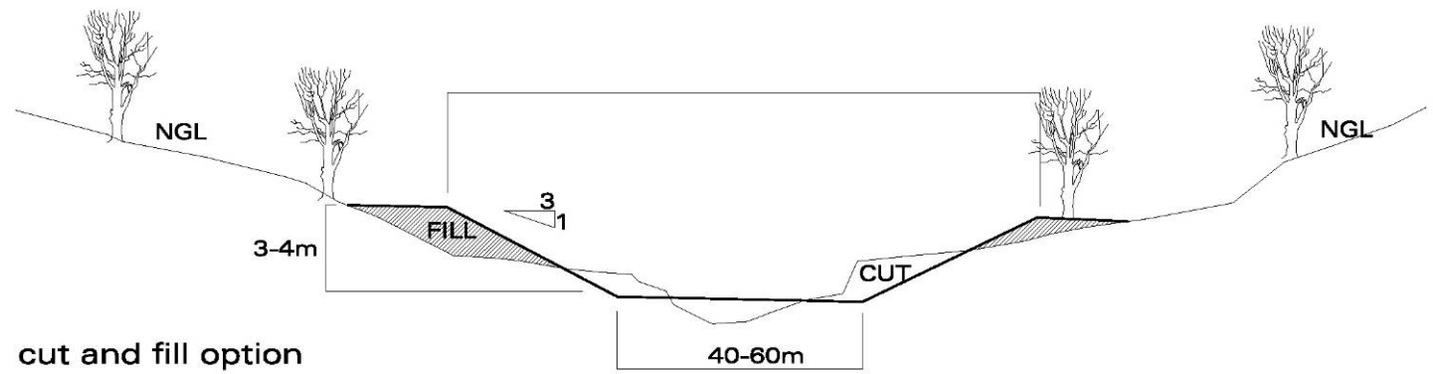


fig 4.3: cut and fill  
(Rehabilitation document)



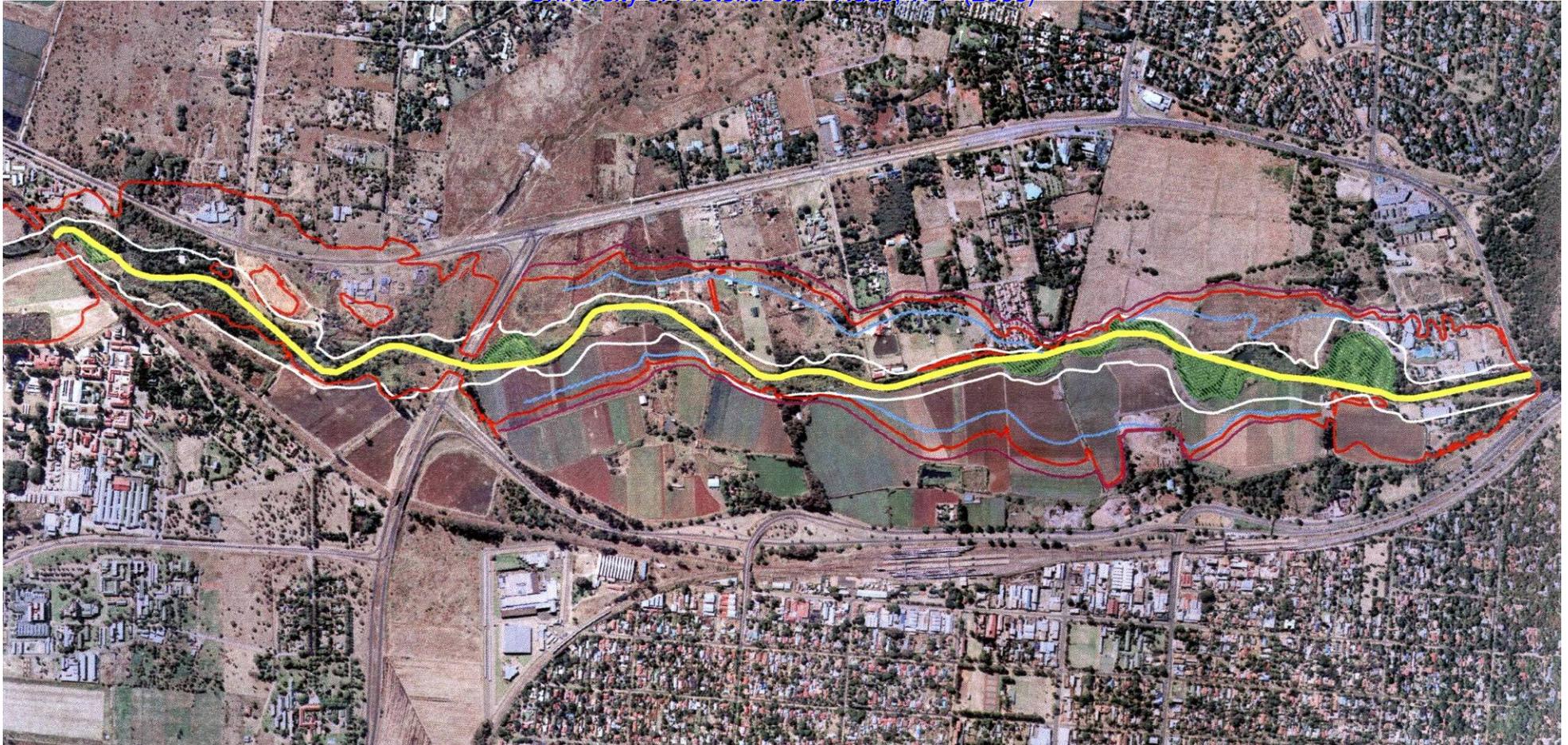
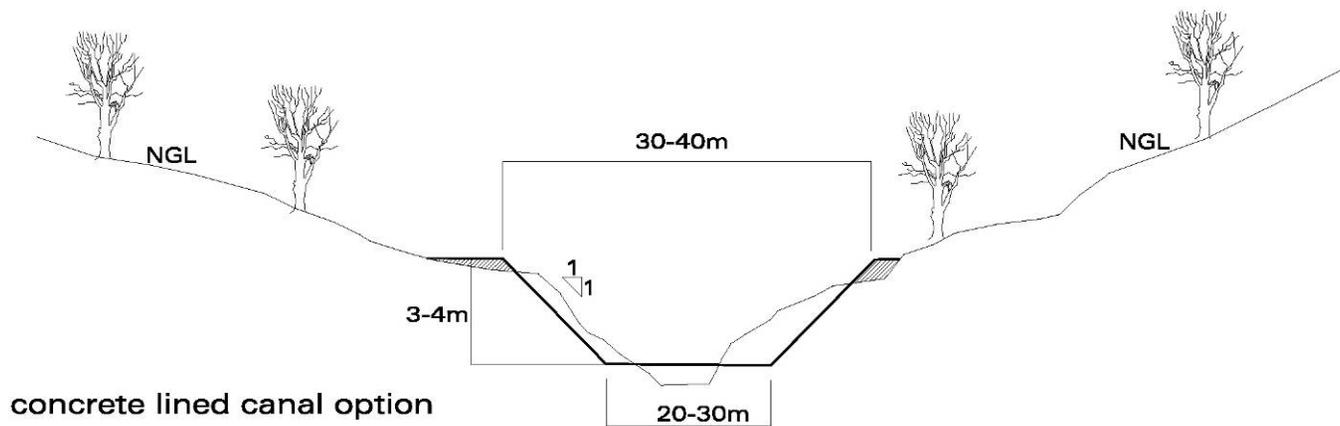


fig 4.4: concrete lined canal  
(Rehabilitation document)



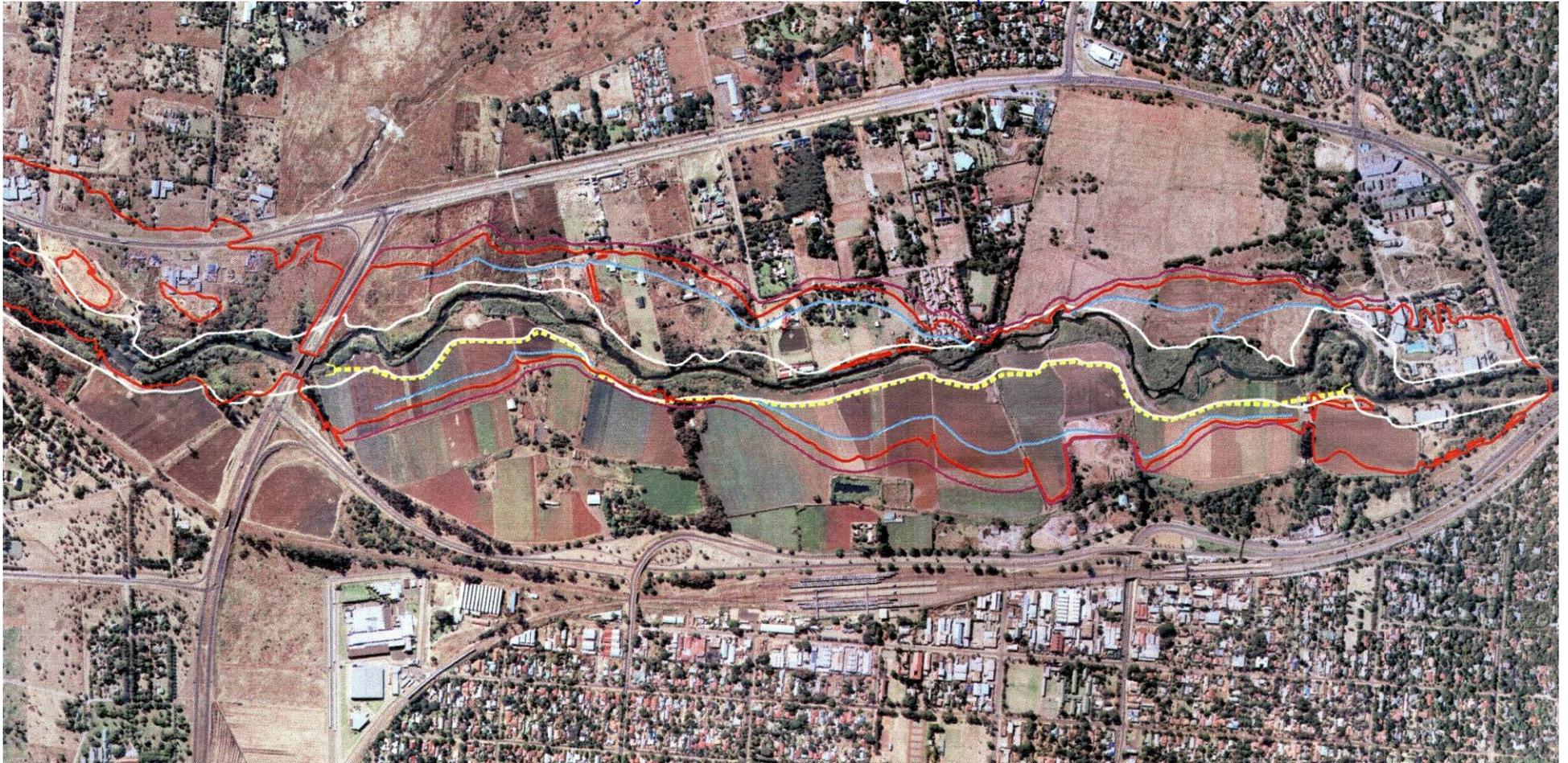
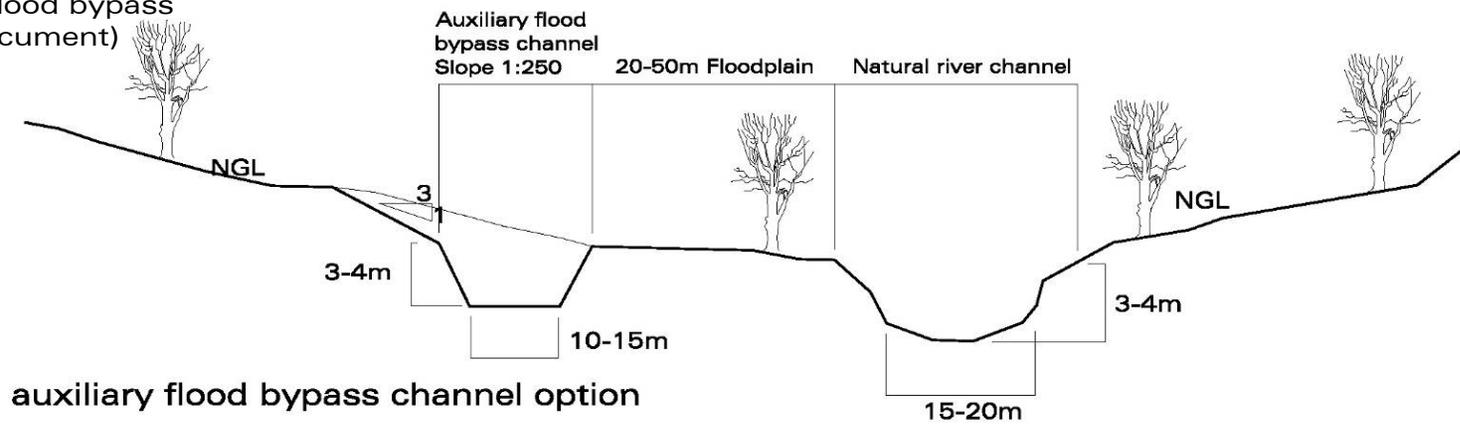


fig 4.5: auxiliary flood bypass  
(Rehabilitation document)



auxiliary flood bypass channel option

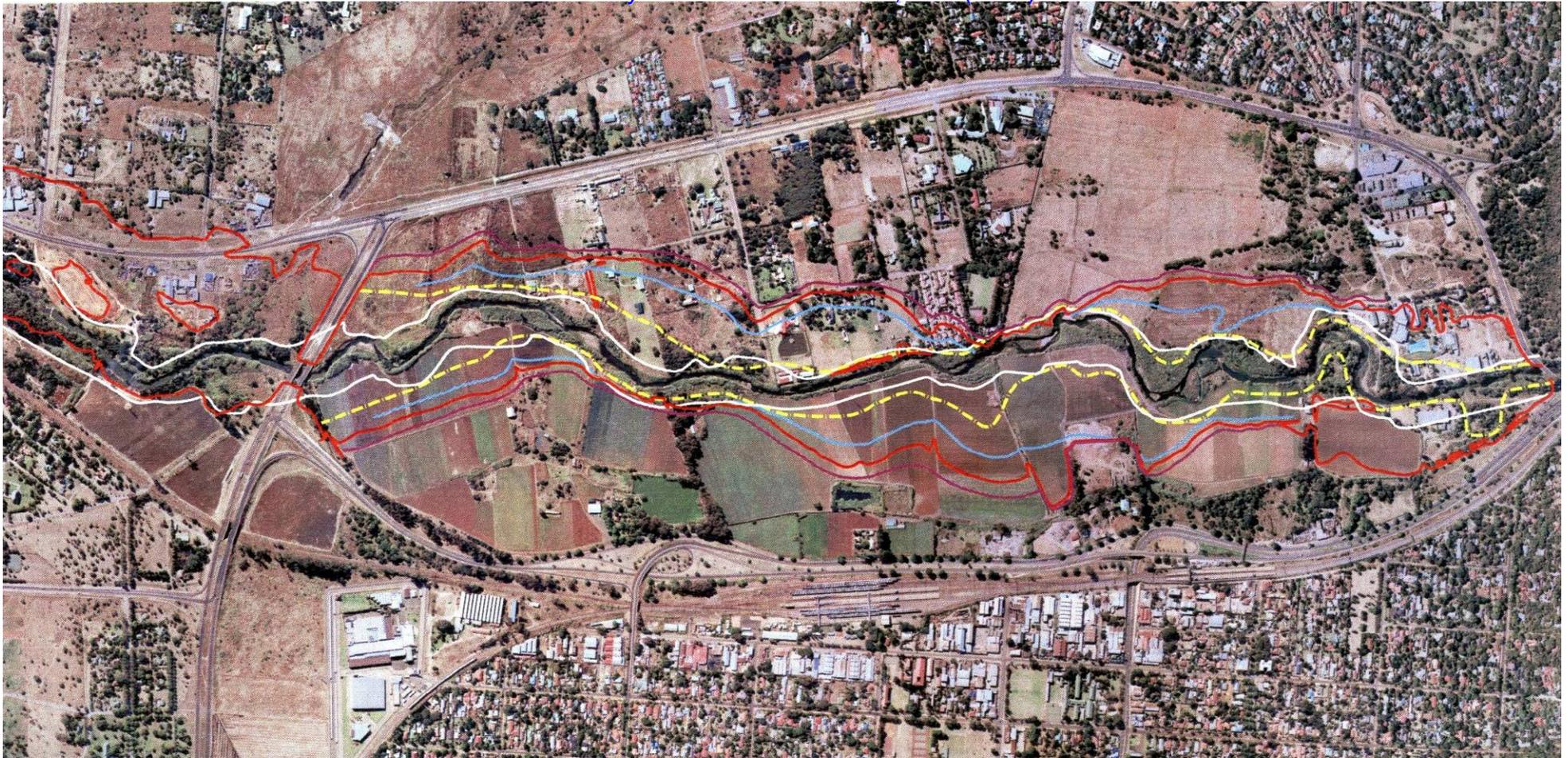
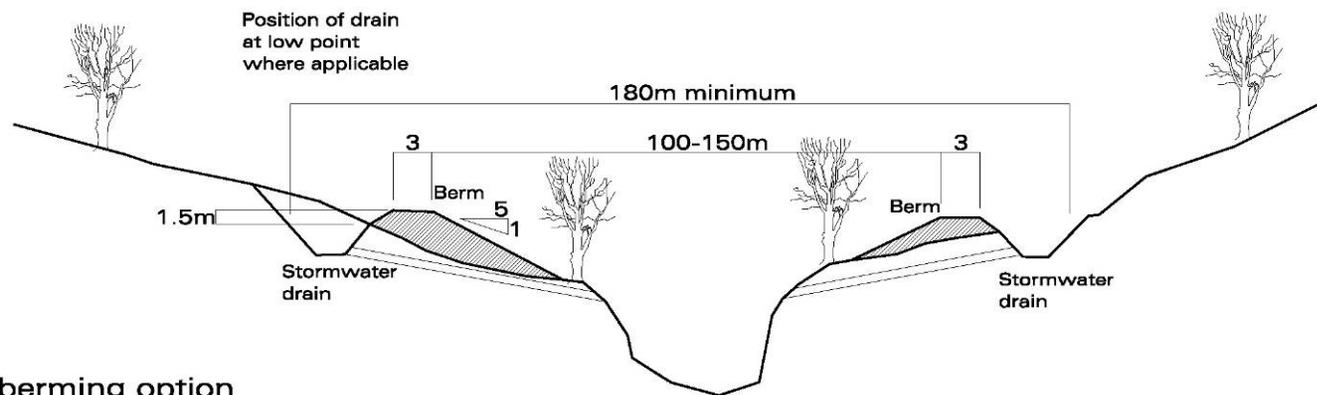


fig 4.6: berming  
(Rehabilitation document)



The best option for narrowing the flood lines is to use the berming option. Sediment can be harvested from the sediment traps and used to form these berms on the banks of the river. The sediment has a high nutrient level and will help establishing vegetation on the banks in a short period of time. Fig. 4.7 indicates the position of these berms. The berms are positioned 80m away from the river itself.

### 4.3 Treatment Zones

The character of the river ranges from natural to urban. Each Zone type has a different type of treatment and the river interacts differently to each land use type. Four character categories have been identified:

- Treatment Zone 1: Natural refers to an area where the natural ecology is dominant.
- Treatment Zone 2: Cultivated refers to an area where nature is put to use with activities taking place in symbioses with nature.
- Treatment Zone 3: Suburban refers to an area where nature is organised and discernible as a green strip running through a low to medium density built-up area.
- Treatment Zone 4: Urban refers to an area where the urban ecology is dominant, with nature being purely decorative and the river being a water feature within an intense urban environment where a concentration of activities and buildings occur.

In order to set up a proper working master plan, all of the above mentioned treatment zones should play a role in the development of the master plan. The treatment of all these zones should preserve agricultural land, open space and the character of the river. This can be done by locating appropriate recreation access and linking open space and parks to the river front. Providing safety for

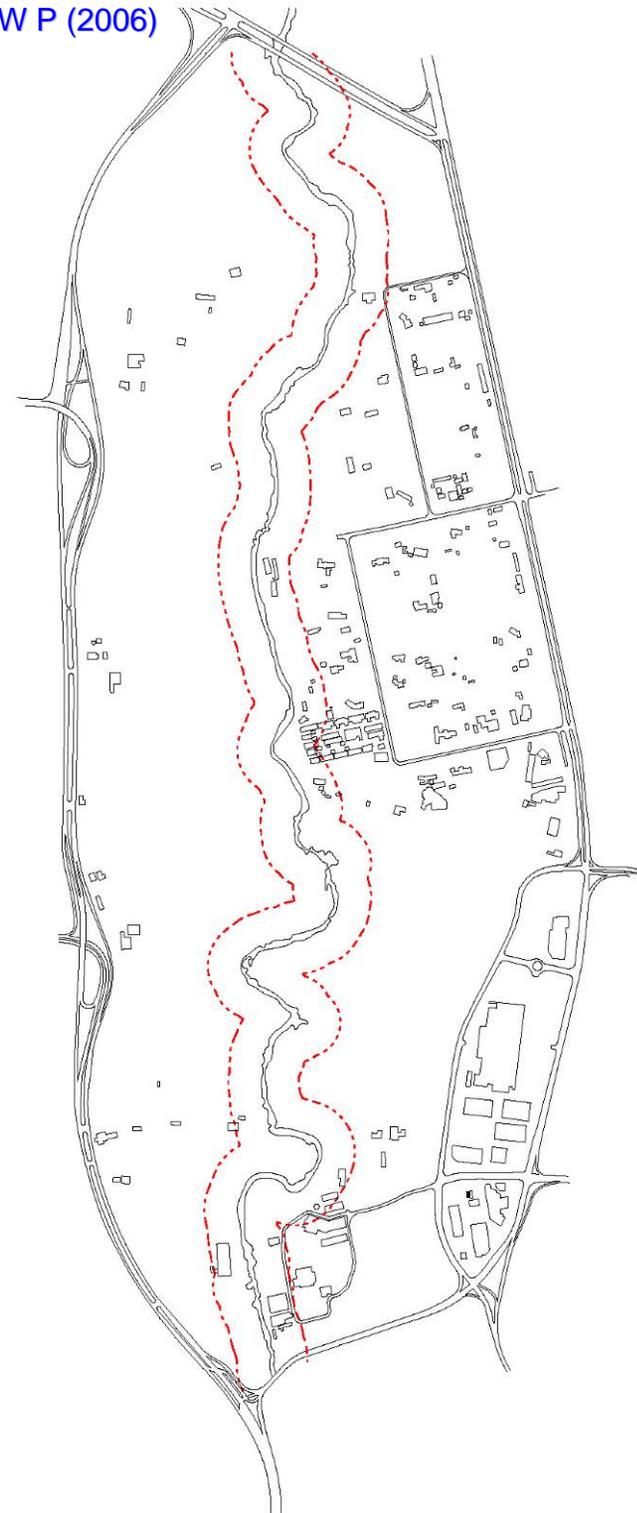


fig.4.7: berm position

greenway users is of ut most importance. This is the reason why it is not used as a recreational entity; it is recognized as an unsafe environment.

## 4.4 Master plan Development

### 4.4.1 Capturing Existing Form

One of the most important precedents is the existing urban fabric that frames the site. The street and city layout is very old but it can be a valuable indication of what work and what doesn't work. By capturing the existing urban form, it is clear that all past development ignored the river and it's potential. All the existing development face away from the river and the river front became 'backyards'. There are some residential areas that do face the river but they still have a strong buffer between them and the river for safety purposes.



fig.4.8 the houses are situated away from the river for security from flooding (Tshwane)

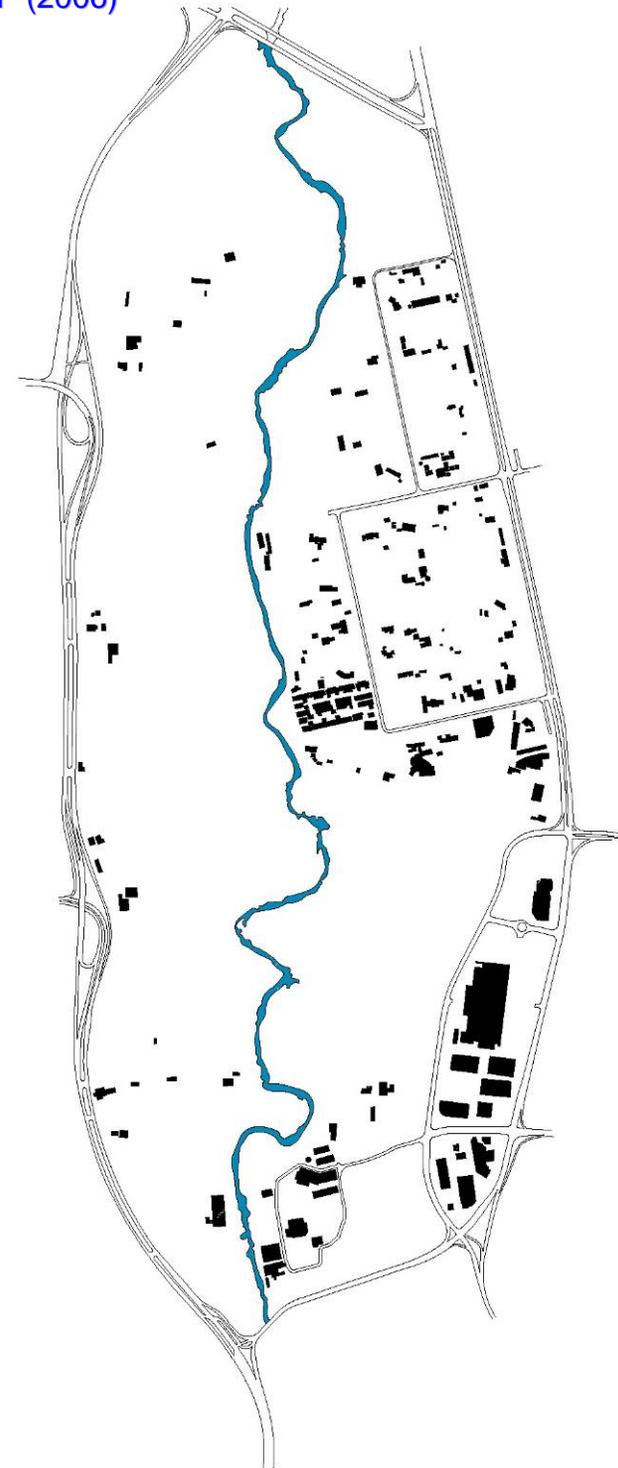


fig.4.9: capturing existing

## 4.4.2 Familiarizing with the Site

### 4.4.2.1 Movement

Movement in nature is crucial and unavoidable. On this specific site, nature's movement is best experienced with the river changing over passing years. Through human movement we experience landscapes, not in a fixed condition, as a picturesque view. Rather, we move through the landscape in a cross-sectional horizontal motion, experienced in the vertical. The path of movement through and around the site becomes an important aspect of the design.

The site is framed by large roads and in the near future will be cut in three by two new roads connecting the east and the west of the site. This is not necessarily a bad development; it may give life to the centre of the site. There are two stations on the western border of the site which bring working people from the north into Pretoria. In this instance the movement creates strong energy (see 1.4 Energy) around the site which creates the boundary.

The river currently divides the site into two halves with agriculture on the western side and residential and commercial on the southern side.

### 4.4.2.2 Topography

This is the measure, the orientation, our finding the horizon and manipulating the surface to be occupied. It is important to establish a place in a balance of existing shapes of land so that the interventions on ground level not impact the topography negatively.

The topography of this site is not constant. The presence of the river makes it a changing environment that can be changed in a very short span of time; for example with the construction of new roads or the flooding of the river. (see 1.5 landform conservation)

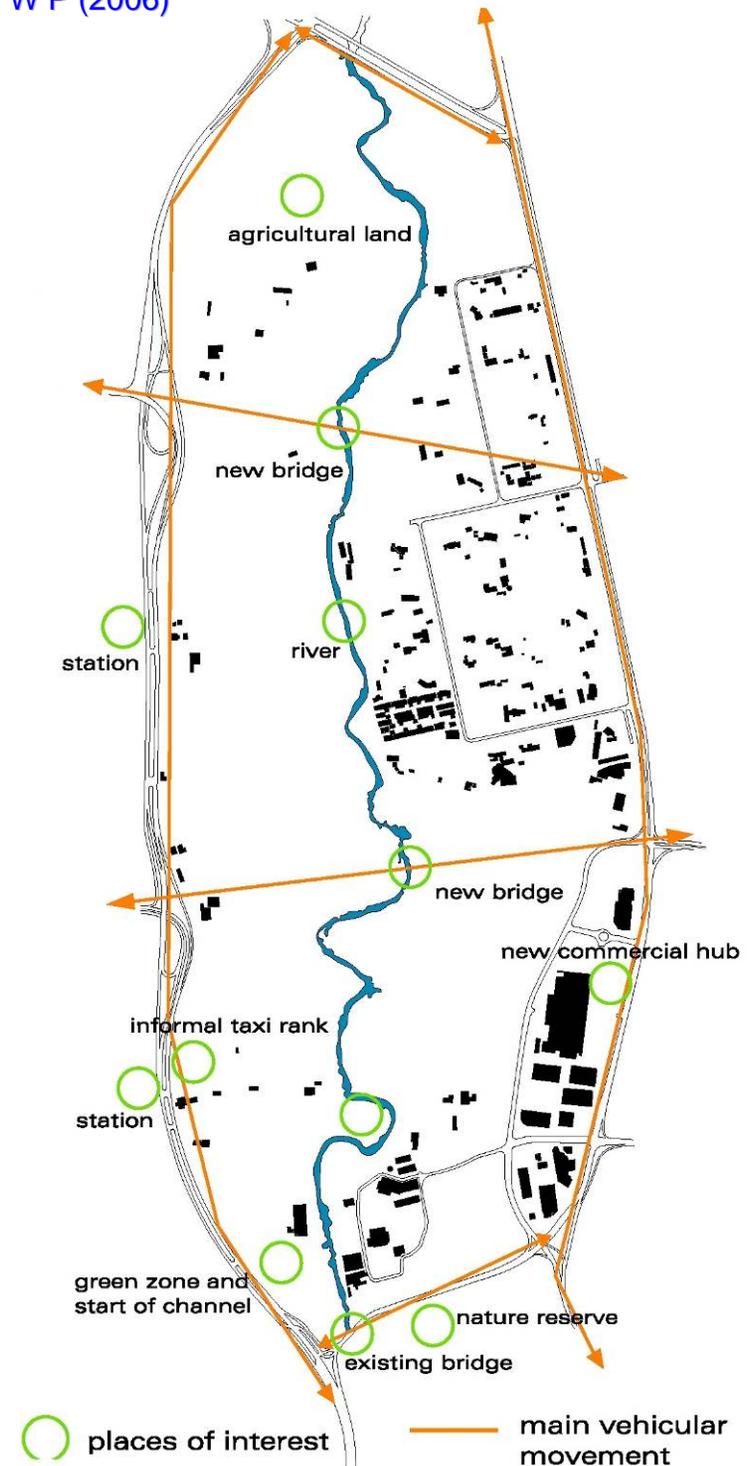


fig.4.10: familiarizing the site

### 4.4.3 Harvesting Form

In the process of forming a concept for the master plan, the form of the urban fabric around the site enforce the form of the new fabric on the site itself. The immediate environment serves as a precedent for the new development. The main form generators for the masterplan are:

- The River
- The main roads
- The surrounding urban fabric
- The historic watering channels
- Precedent studies

The three main precedents for the masterplan are:

- A site layout plan done by Holm Jordaan Architects (fig.4.12)
- Bear River greenway masterplan
- The site and surrounding environment



The first consideration was to respond to the site boundaries (the roads) and incorporating the water by means of links between the river and the site boundaries. The intention is to create new topography along the river, following the study done on the floodplains. This will largely impact the interaction between the river and any new development along the river. The strong and clear form of the river indicated the new location of the boulevard connecting the two new roads that is currently in development.

The green open space that sits in the eighty meter buffer zone will become a linear park with pedestrian walkways. The second green corridor will be along the existing watering channel and will run all the way to the northern part of the site and end up in the existing dam.

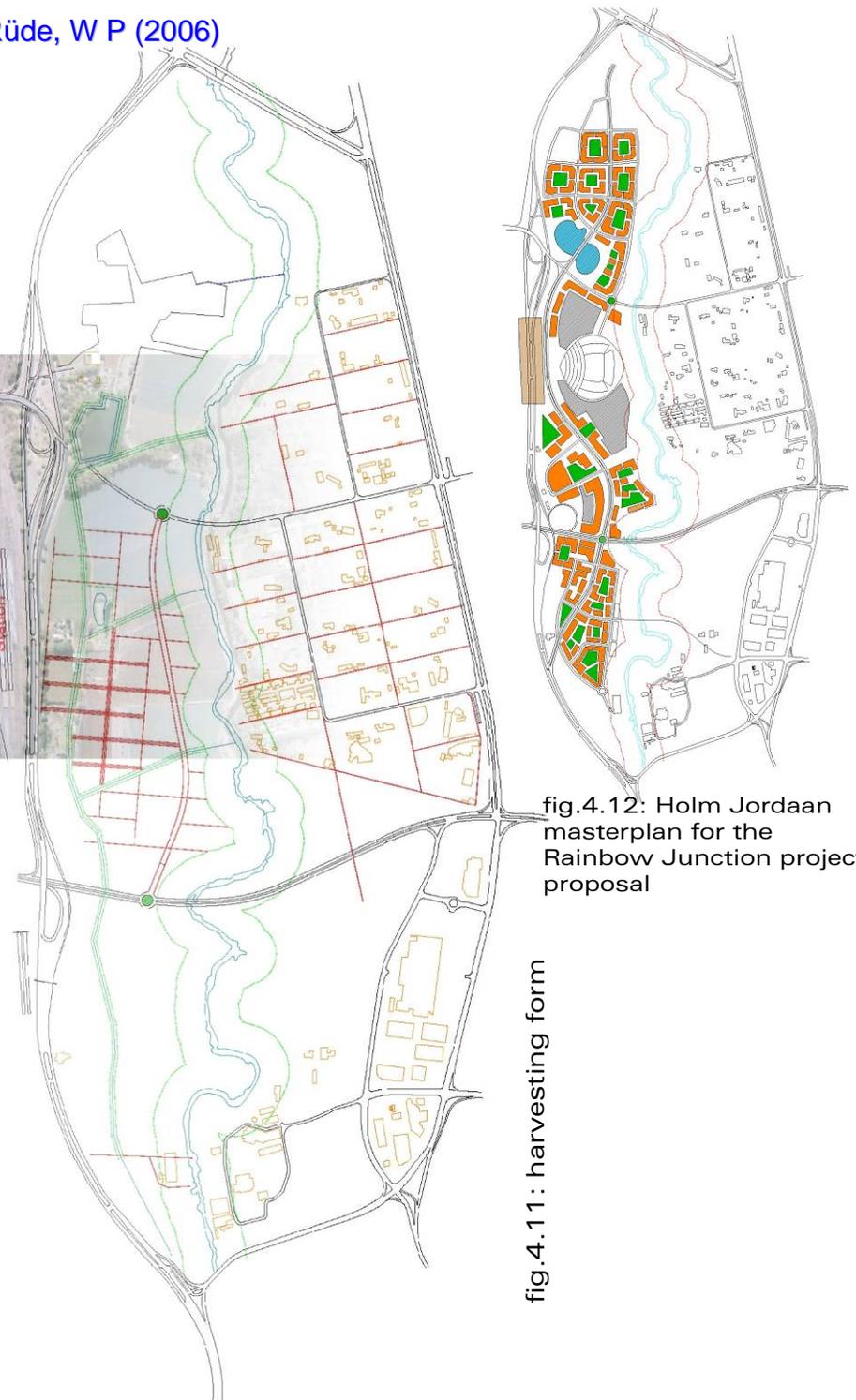


fig.4.12: Holm Jordaan masterplan for the Rainbow Junction project proposal

fig.4.11 : harvesting form

#### 4.4.4 Agriculture

Preserving agricultural land is very important due to the fact that this is some of the last agricultural land near the CBD of Tshwane. The agricultural land has a form of aesthetics to it. (see fig.1.3) There is a different colour each season with crops ageing and getting ripe to be harvested. This visual asset should be harvested by means of development that embraces the views to the river over the agricultural land.

#### 4.4.5 First design solution (see fig. 4.14)

In the first design solution some of the key features of the site were lost. The urban form did not respond to the agricultural land or the existing historic features of the site. It was also necessary to maximize the quantity of agricultural land to make an urban agricultural program more self sustainable. Furthermore it is important to have a clear centre of development which will function as a heart for this development.

The grid street form that was adopted from surrounding urban fabric is to overpowering and does not respond positively to the existing landform. A better solution will be a to cut back on the amount of streets and having one main boulevard with high density development bordering the boulevard.



fig.4.13: Aesthetics of agricultural land



fig.4.14: first design solution

#### 4.4.6 Final design solution

The centre of the new development is situated over the main station (Pretoria North station) and can be the starting point for development in this area. All development should preferably occur between the eighty meter river buffers and the exiting watering channel. This will control urban sprawling and protect the urban open spaces.

There is not only a great need for public open space but also for places where public activities can take place. One of the best meeting places where all cultures mix and interact is in entertainment and more specific sports. This masterplan accommodates just that, with a mix use sporting facility that borders the centre of the development. This centre is situated right alongside the new transport interchange, so to make it easy for people to come from different directions with different forms of transport to one place and have social interaction.

The existing farm market buildings alongside the dam will become the base for the urban agricultural land surrounding the new development. The income of the agricultural produce will go to the maintenance and development of this stretch of the Apies River and public open spaces.

The green river corridor should eventually form part of the Wonderboom nature reserve and fall under the protection and maintenance of the reserve. The reserve and the corridor will be connected by means of new meandering pathways running from the reserve to the transportation interchange at the development centre.

The land use will be zoned in such a manner that it encourages residential development on the eastern bank of the river and commercial and retail development on the western side. It is still important that this piece of land is seen as a green cell and not loose its 'urban nature' appearance.



fig.4.15: final master plan

## 4.5 Master plan – Conclusion

For the master plan to work, it needs a starting point. This starting point must be a specific development within the master plan that will give life to the rest of the master plan. By analyzing the existing infrastructure in and around the site it came to a conclusion that this starting point should be the new plaza across the existing Pretoria North station. By doing so you give life back to the station and you pull people into this area of new development. All services are running along the site and with public transport situated right across the street, it makes this the perfect starting point to ignite new developments.