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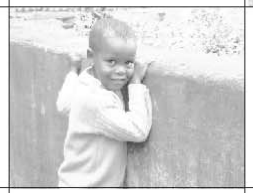

Kwasizabantu

A spatial development framework and detail design

thea wentzel

mentor and study leader:
Graham Young

submitted in partial fulfillment of
the requirements for the degree of
Masters in Landscape Architecture (Professional)
in the Faculty of Engineering, Built Environment
and Information Technology

University of Pretoria
Department of Architecture
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This book is dedicated to Fano Sibisi and his wife, Lindiwe, who are an example for all. In the moments I have seen them, they never stopped smiling.

"For my strength is made perfect in weakness"- (2 Cor 12:9).

When a farmer plows for planting, does he plow continually? Does he keep on breaking up and harrowing the soil? His God instructs him and teaches him the right way.
All this also comes from the Lord Almighty, wonderful in counsel and magnificent in wisdom
(Is 28: 24,26,29).

What would creation have been without his design? Is there a fish in the sea, or a fowl in the air, which was left to chance for its formation? Nay, in every bone, joint, and muscle, sinew, gland, and blood-vessel, you mark the presence of God working everything according to the design of infinite wisdom.

He hath in his mind a clear knowledge of every stone which shall be laid in its prepared space, and how vast the edifice shall be, and when the top-stone shall be brought forth with shoutings of “Grace! Grace! unto it”. At the last it shall be clearly seen that in every chosen vessel of mercy, Jesus did as he willed with his own; and that in every part of the work of grace he accomplished his purpose, and glorified his own name.

Charles Spurgeon

Thanks to all the people that helped me:

To uncle Tobie, who first gave me the idea to work on Kwasizabantu and then provided all the information possible! To all the people working with the different projects who were willing to answer all my many questions. To Hennie Reynders who guided me to the understanding of the problem. To Graham Young who coordinated the thesis. To Clinton who was willing to read the thesis and act as an internal “external”. To the youth of Pelindaba Mission who helped me right through the night to build a model. I know it was Hanrick’s and Jonathan’s first all-nighter, and hopefully their last. To Daniel Wunderlich who gave so many beautiful photos of the mission. The thesis would have been quite dull without them. To uncle Volkmar and aunt Angelica who provided in so many ways: from a house to work from, to the base for the model. To Uncle Waldemar and aunt Susan for your support and prayers. To Dr. Andre van Niekerk who provided the funds for the model and the printing of the thesis. To my father and mother who helped where they could and even where they couldn’t. If you weren’t such wonderful parents in obedience to our Father, I wouldn’t be writing this thesis. To Ronel who willingly edited my work and even made me feel it was an honour for her! To Christien who took my ups and downs with such wisdom. Who reminded me every time to keep faith. It was quite a blessing to share the commune with you. Thanks to Mia and Esti who shared the growth pains of thesis writing. To Mareli who just shared in my tears and laughs.

And then to my Heavenly Father to whom I owe my life, who made Himself known as the provider, father, and friend. Who gave me all these wonderful people with whom to share my life.

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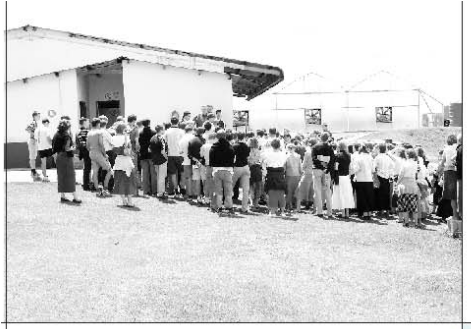


Photo 1: www.ksb.co.za

Photo 3: www.ksb.co.za

Photo 2: D. Wunderlich

Brief

Photo 4: www.ksb.co.za

Photo 5: D. Wunderlich

Photo 6: D. Wunderlich

Brief

Thesis objective

The aim of this thesis is to analyse and interpret the existent and future needs of the people and environment of the mission station, Kwasizabantu, to ensure settlement growth that will enhance the social, economical and environmental aspects of the settlement. This will result in a development framework of the whole site, a master plan for the lifespan of the settlement and detailed design of the heart of the settlement (refer to Figure 1).

Process

The planning methodology is not a linear process (although Figure 1 appears to be so), but rather an interactive process that grows from the initial problem to the end goal, as illustrated in Figure 2. The planning relies on the idea of cause- and effect-analysis, synthesis and implementation (Harris 1992: 2). Design depends on an intuitive creative process of evaluation, creating idea and conceptualisation (Harris 1992: 2).

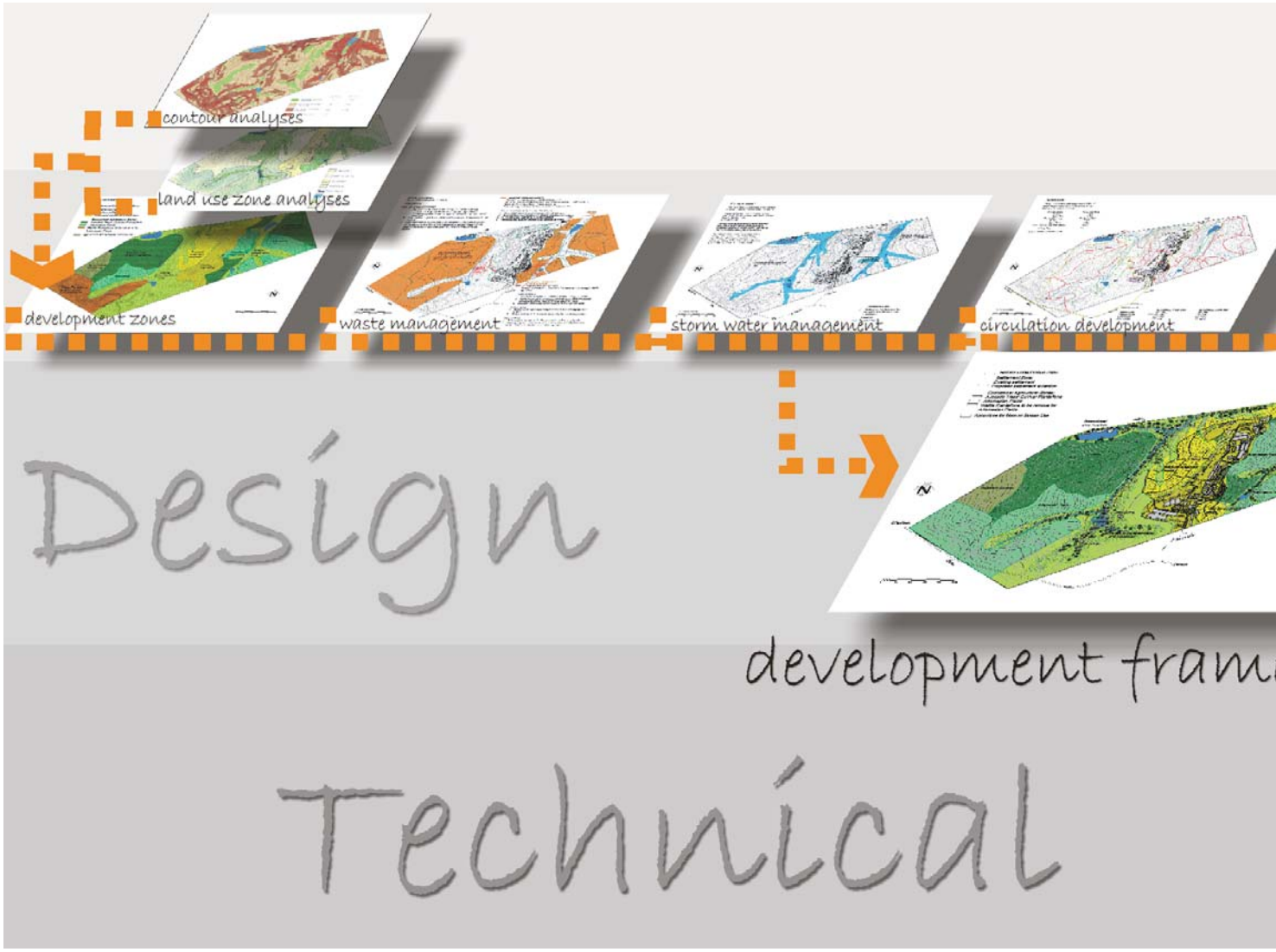
Approach

The approach is to postulate a perspective on criteria, principles, issues and concerns surrounding the issue of human settlements and the natural environment for the design of a positive environment of collective living for people and nature.

Fig 2: Matloch, 1991: 239

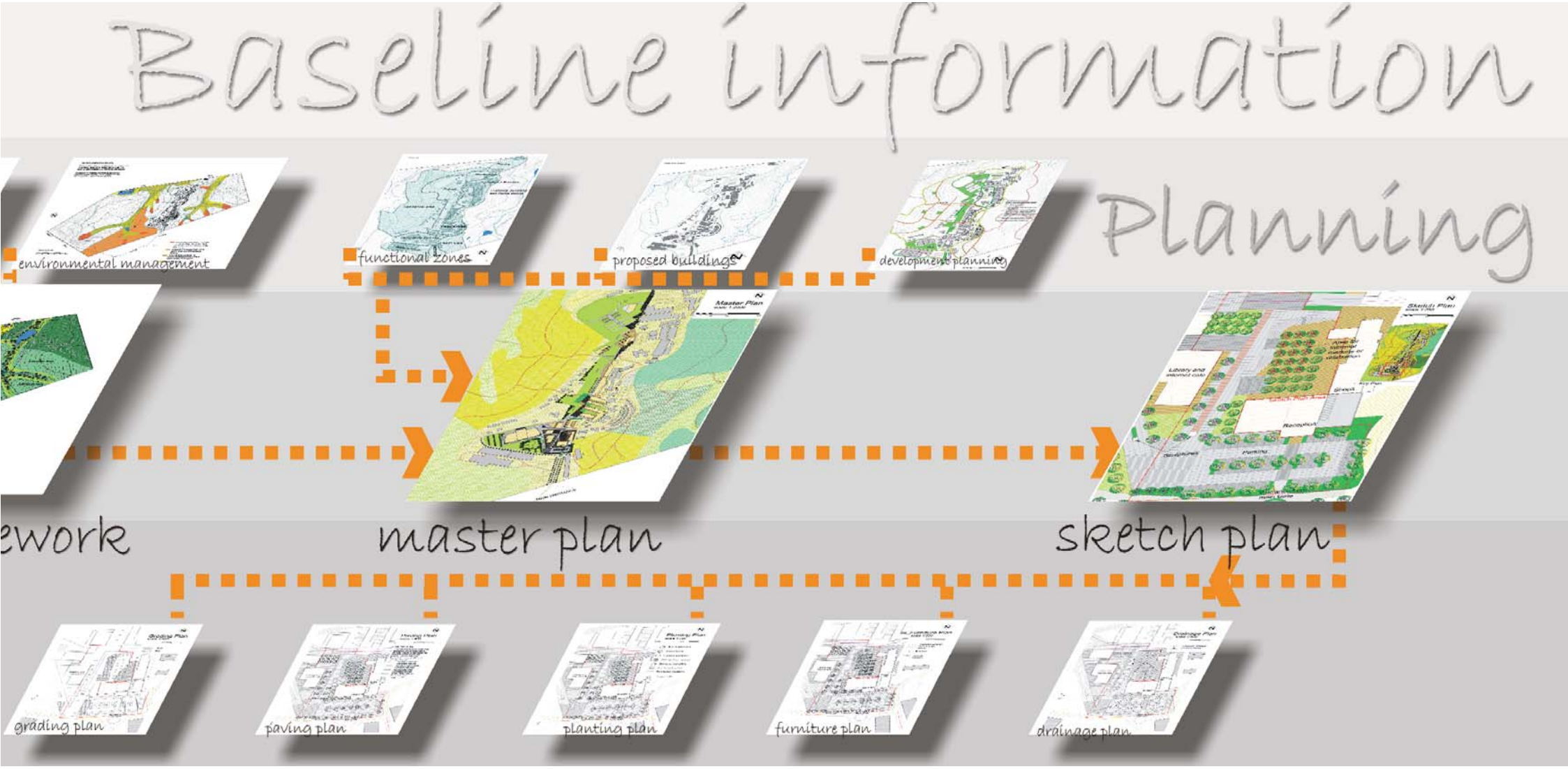
Design as an interactive growth towards the solution

Fig 1: D.M. Wentzel



The baseline information is about understanding the site, and its cultural, environmental and economical context to make informed design decisions. Out of the baseline information the necessary data is collected for the planning and design of the site as a whole and then for the settlement.

Planning and design for the site:
1. Determining the development boundaries, Development Zones;
2. Waste Management;
3. Drainage Management;
4. Circulation Planning and Design; and
5. Natural Conservation Management.
(The planning of the waste and drainage systems is to holistically understand the site development context, and is



subject to specialist opinion).

Planning and design for the settlement
1. Determine the ideal relationship of settlement functions with functional zones;
2. Remedial work of existing fabric; and
3. Determine the growth direction through structuring and holding actions.

The development framework is the synergy of the site planning and design layers, while the master plan is composed of the planning and design layers for the settlement. The sketch plan is a detailed part of the master plan that is refined into technical drawings of design exploration.

Project challenges

1. The lack of adequate urban planning for existing development or future development within the Umvoti municipality, in terms of the social, environmental and economical context;
2. The location, type and density of development within development;
3. The lack of defined public, social and recreational places in the landscape;
4. The deterioration of the natural system; and
5. Place-making for a multi-cultural community.

Limitations and delimitations

1. The locality of the site, as well as the economic situation of the Umvoti municipality, necessitates independent additional implementation of infrastructure and social services;
2. Due to the scale of the project and the specialty of the different sub-projects, infrastructure and community services, this discourse does not deal with the technical detail and planning of the individual projects, infrastructure elements or services, but rather the planning and interaction of the different buildings, infrastructure and services in relationship to each other and their future growth. The aim is to minimise the overall waste of unused open spaces as well as improving the cost-effectiveness and maintenance of infrastructure. This is done through sensitive and careful planning to provide for the physical location and functioning of associated structures;
3. The natural environment is studied and evaluated in order to make informed decisions for development and rehabilitation, but it is not an environmental impact assessment (EIA) and cannot be legally used for the purposes of an EIA.

From the eastern side of the station, a birds-eye view of the settlement with the avo plantations in the back.

Photo 7 www.ksb.co.za

Client profile

Client introduced:

The clients are the people that live on the farm Kwasizabantu. Mr. T. Vermaak (the coordinator of the projects as a whole on the mission station), together with the project leaders of the twenty to thirty projects that are managed on the station, urgently need to reassess the planning of the site and its functions to solve the growth pains of the site.
The farm supports between 1200-4000 people daily, with up to 10 000 people for biannual events. Facilities for the upliftment of the individual and the community such as education, health, social/emotional support, rehabilitation and job creation, are provided on the site.

Client's development objectives:

1. To provide more facilities for various training, health, educational, rehabilitation, social and emotional support projects, and general accommodation; and
2. To create a safe and secure environment for the rehabilitation programs.

The landscape architecture for this development

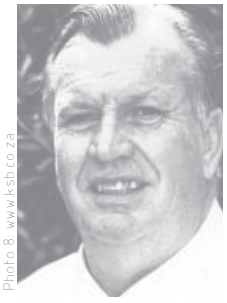


Photo 8: www.ksb.co.za


Photo 9: D Wunderlich


Photo 10: D Wunderlich


Photo 11: Unknown


Photo 12: D Wunderlich


Photo 13: D Wunderlich


Photo 14: D Wunderlich


Photo 15: Unknown


Photo 16: D M Wentzel

Photos of some of the workers on the mission stattion, with the director, Mr. E. Stegen, on the far left.

is focused on the planning of these projects to fulfill the spatial need for the optimal functioning of people effecting the least amount of impact on the environment and the cost. It also proposes that the natural areas are rehabilitated and enhanced, and presents design guidelines to create places in the urban fabric.

Site selection

The farm Kwasizabantu overlooks lush green valleys in the rural heart of the northern coast of KwaZulu Natal (KZN). The farm is situated halfway between the towns of Greytown and Stanger, on the R74 road, and covers approximately 349ha of fertile ground, richly supplied with mineral water and with a natural river.

Funding

The administrative organisation of Kwasizabantu is a non-profit and non-governmental organisation. The people on the mission station generate their own supportive funding system through the many projects located on the mission station. Due to the location of the station, all services and infrastructure must be provided by the people themselves, with the result that the mission station is largely independent from the Umvuti municipality's services. During its forty years of existence the economic projects on the farm grew logarithmically from the provision of only the inhabitant's needs, to the provision of thousands of AIDS orphans' needs. The success of the economic projects, and funds for development and change are limited, and planning and design must take the funds available into consideration.

The urban and natural areas must be viewed as a total system contributing to the diversity of place (different elements working together to a coherent whole) (Harris 1992: 8).

Locality within South Africa

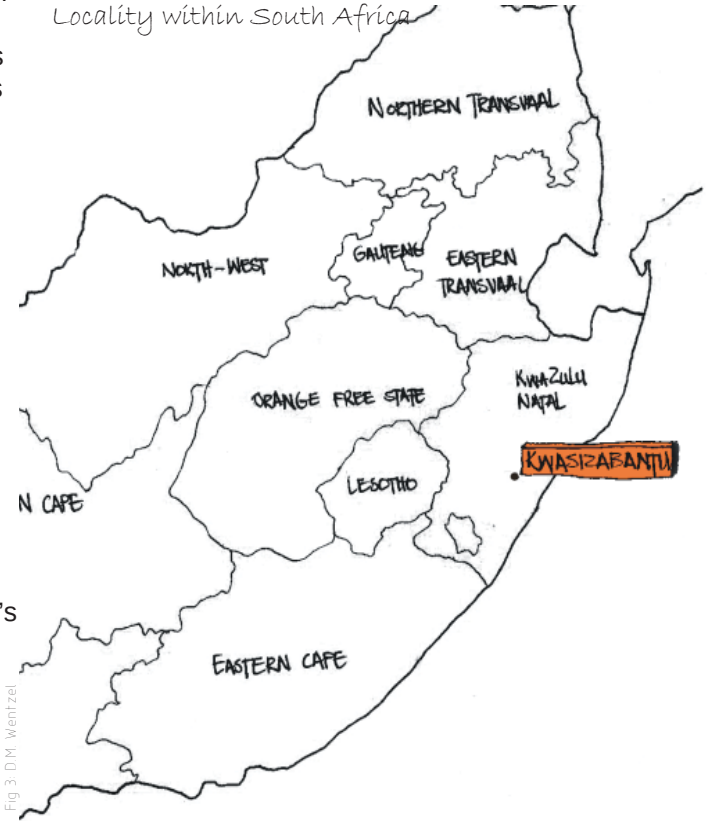


Fig 3 D M Wentzel

Locality within KwaZulu Natal

Fig 4 D M Wentzel

Interested and affected parties

National branches

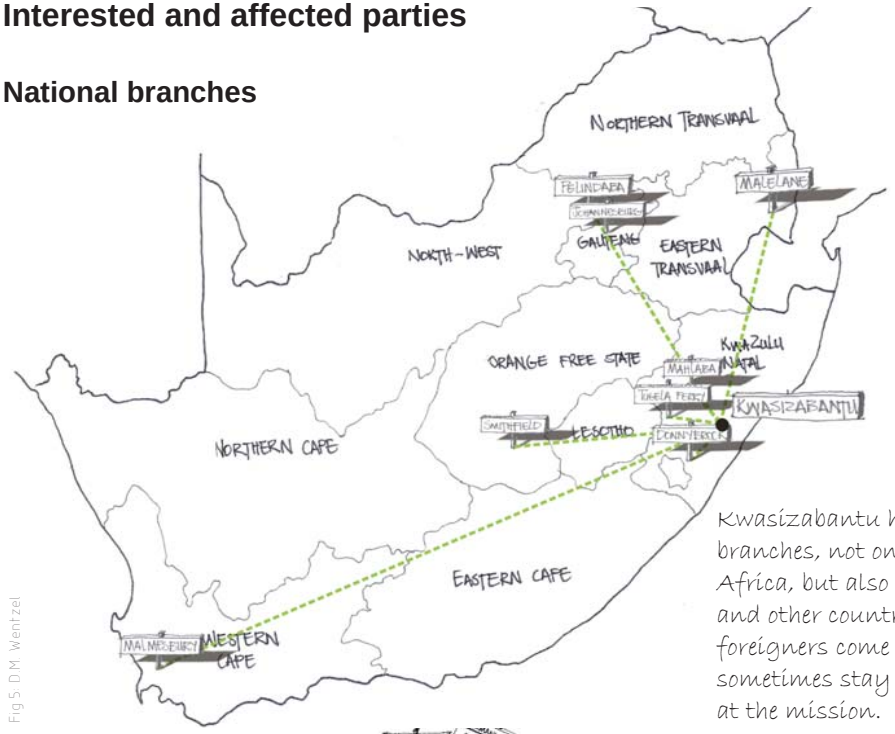


Fig 5. D.M. Wentzel

Kwasizabantu has many branches, not only in South Africa, but also in Europe and other countries. Many foreigners come to visit and sometimes stay permanently at the mission.

International branches

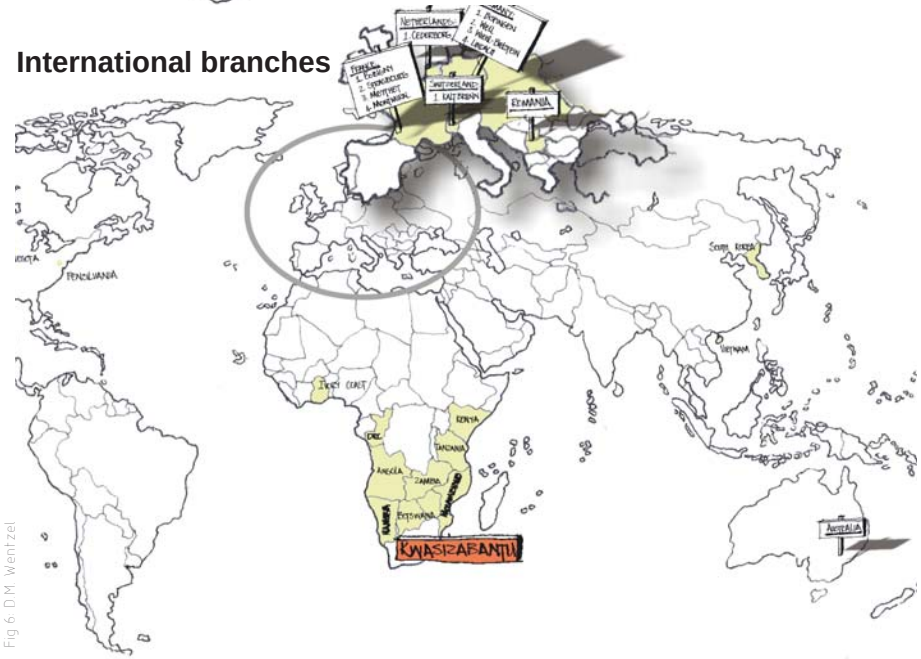


Fig 6. D.M. Wentzel

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Photo 1: www.ksb.co.za

Photo 2: D. Wunderlich

Photo 3: www.ksb.co.za

Baseline

Photo 4: D. Wunderlich

Photo 5: D. Wunderlich

Photo 6: D. Wunderlich

Site within its local context

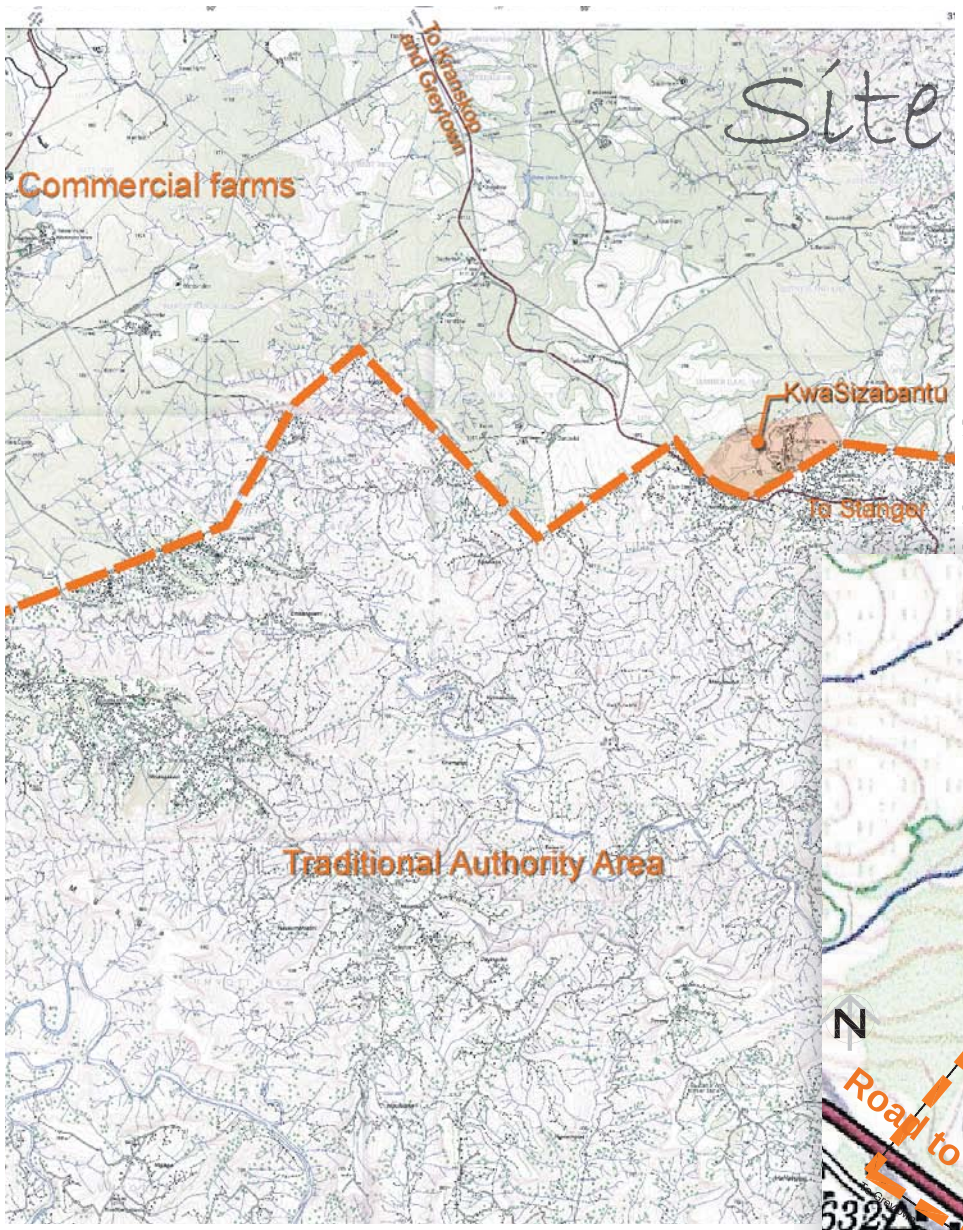
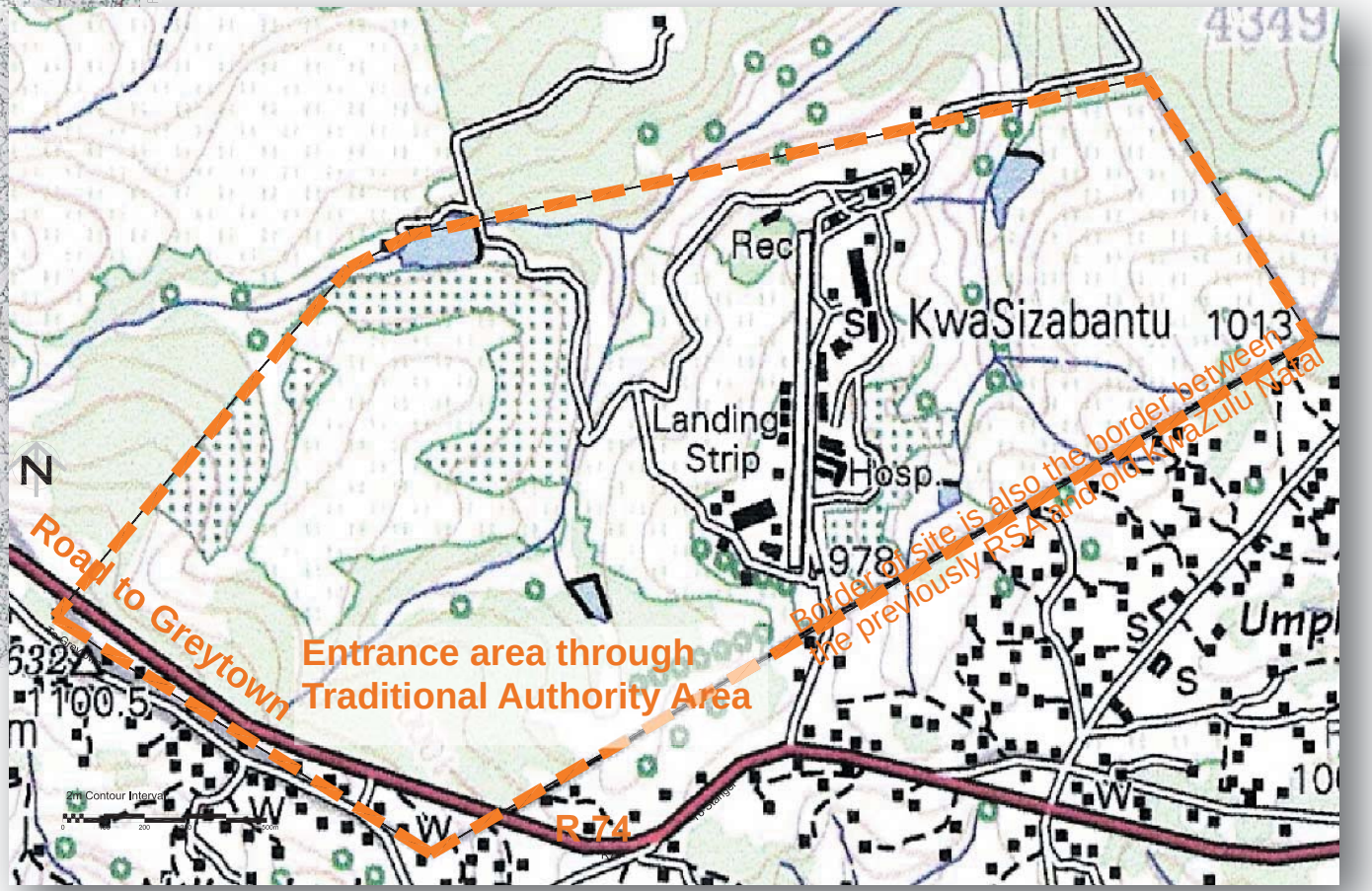


Fig 1 Government Press



The Traditional Authority Area is characterised by scattered households, high poverty rate and poor infrastructure.

Analysis

The analysis is about the production of site knowledge (Kahn 1995: 199) to determine the possibilities and constraints of the project, not only for future development, but also for the sustainable existence or establishment of natural systems. It relates to the existing development within its social, natural and economic context, and explores what it must become.

Climate:

Temperature:

Due to its altitude and distance from coast, the seasonal and diurnal temperature shows frequent fluctuations:

1. The average daily maximum in January is 27°C, in July 19°C, and extremes of 30°C to 40°C that can be reached during the summer; and
2. The average daily minimum in January is 15°C, 3°C in July, and extremes of 3°C to -10°C during summer and winter.

Wind:

Winds are mainly southerly and northerly to north-westerly, the latter often very strong, especially in August (Schulze 1982: 319).

Rainfall:

Rainfall ranges between 900-1200mm per year and occurs mostly in summer from November to March. The rainfall is largely of the thunderstorm type, sometimes of great intensity, with anything between sixty to ninety thunderstorms experienced per annum (Schulze 1982: 319).

Hail occurs relatively frequently and there can be quite severe storms, causing a large amount of damage to structures such as hothouses. The high humidity and rainfall results in the corrosion of metals and rotting of wood. Water is easily accessible for animals and plants, but is also ideal for fungi, viruses and other pathogens. Care must be taken with storm water to keep the surfaces as dry as possible and to reduce the erosive impact of storm-water runoff.

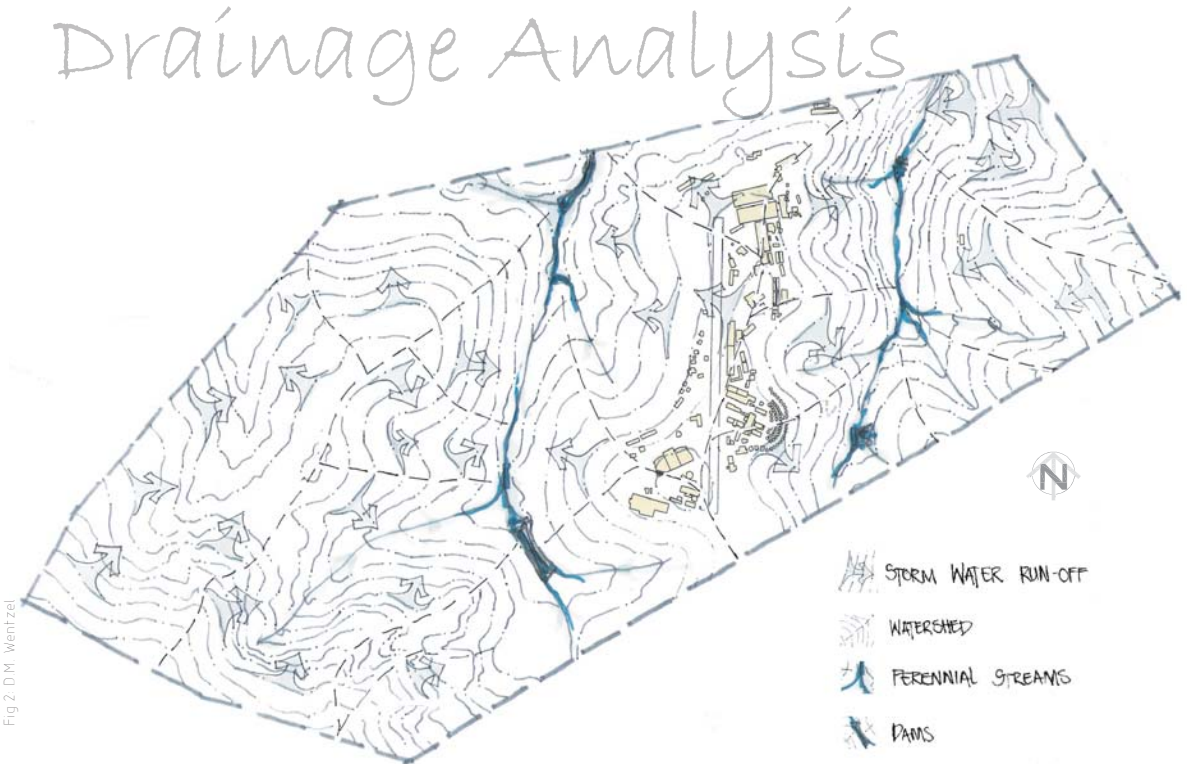


Fig 2: D.M. Wentzel

Photo 7: D.M. Wentzel

Mist: a regular sight for the local people.

Photo 8: D. Wunderlich

Storm water is a great problem, causing severe degrading of the roads.

Photo 9: D.M. Wentzel

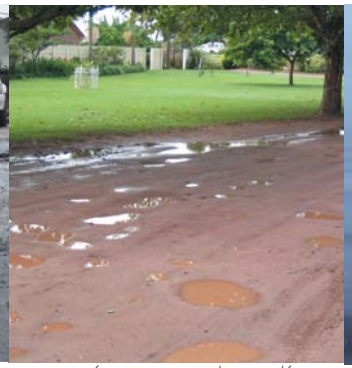


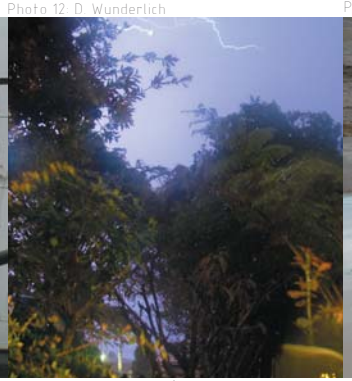
Photo 10: D. Wunderlich

During one of the hail storms.

Photo 11: D.M. Wentzel

Hail damage to the tunnels.

Photo 12: D. Wunderlich



A thunderstorm.

Photo 13: D. Wunderlich

Some of the results of poor drainage from the roads.

Photo 14: D.M Wentzel

Photo 15: D.M Wentzel

Alien vegetation invaded all of the existing natural areas of the site; above left: wattles; above right: the well known buck wheat invader.

Vegetation

Kwasizabantu falls within the "Short Mist Belt Grassland" biome, with grass species such as *Themeda triandra*, *Nonocymbium ceresiiforme*, *Eragrostis racemosa* etc. Large areas of this Grassland biome have been disturbed by intensive agriculture.

The area is poorly conserved (only 2.37%) and large areas have been invaded by exotics such as Black Wattle (*Acacia meamsii*) and Silver Wattle (*Acacia dealbata*).

According to the GIS maps of Enpat, Kwasizabantu falls in the KZN Sandstone Inland Sourveld.

Fig 3: Enpat

Photo 16: D.M Wentzel

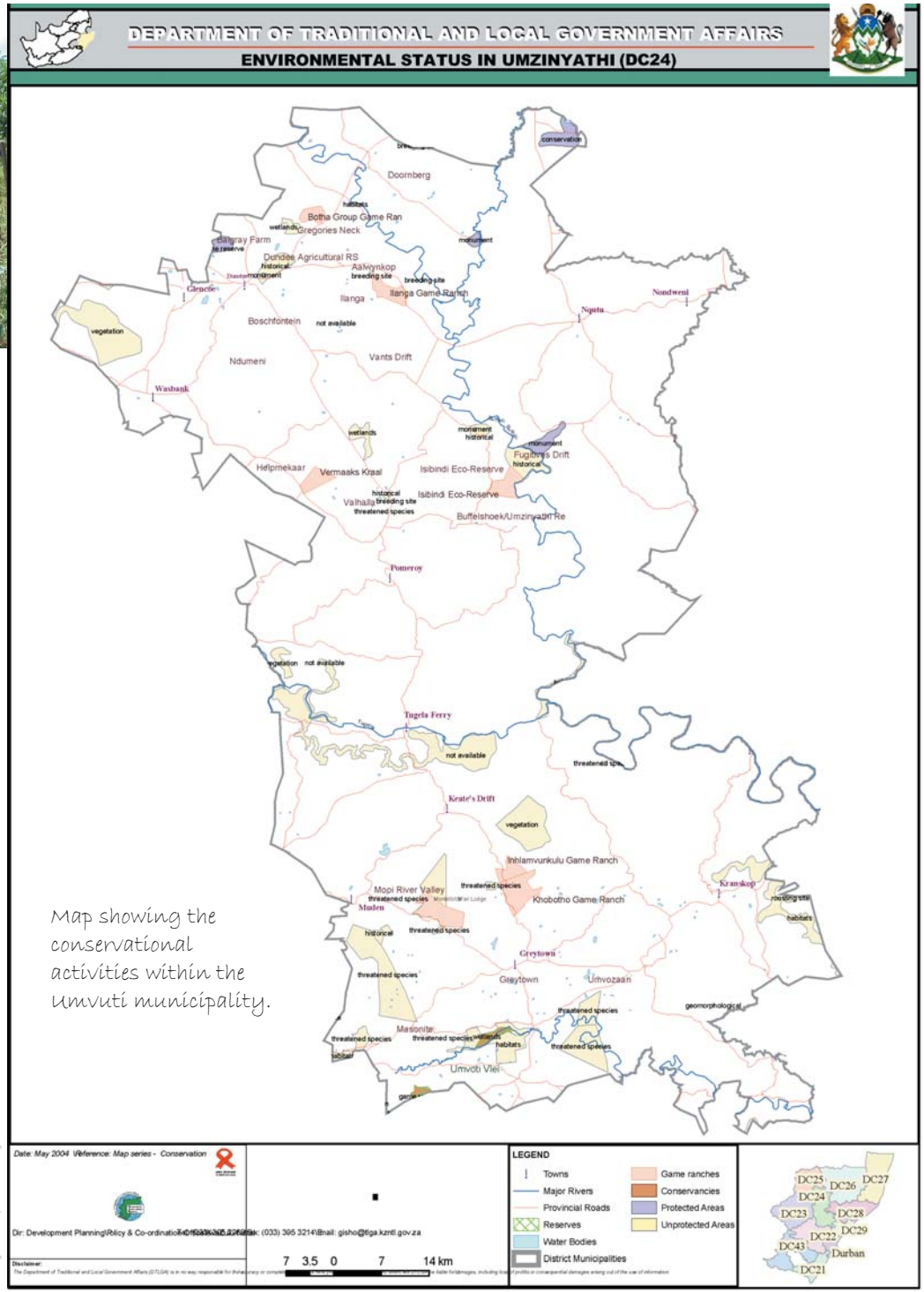
Alien species growing in valley.

Photo 17: D.M Wentzel

Bramble bush growing in the valleys of the site, close to perennial streams.

Photo 18: D.M Wentzel

More bramble bush.



Map showing the conservational activities within the Umvuti municipality.

Fig 4: devplan.kznlf.gov.za

Vegetation Zones

Photo 19 D M Wentzel

One of the many beautiful tree ferns that grow in the valleys around the

Fig 5 D M Wentzel

N

GRASSLAND
AGRICULTURAL USE
SETTLEMENT
PLANTATIONS
OPEN WATER
WETLAND
RIPARIAN FRINGE
KIKUYU VELDS

Geology and Soil

Geology

Soils are characterised by yellow or red apedal sub-soils, whereas top soils tend to be high in organic matter and free-draining. The high rainfall results in the soils being dystrophic.

Fig 6: Enpat

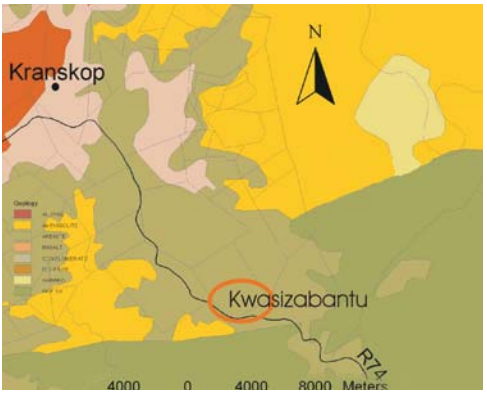
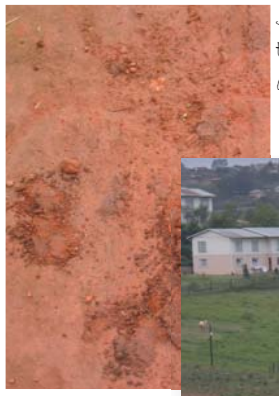


Photo 20: D.M Wentzel



Sample of the top layer of soil of the

Photo 23: D. Wunderlich

Photos of earth works during the construction of residential houses on the site.

Photo 21: D. Wunderlich

Photo 22: D. Wunderlich

Kwasizabantu has its own earthwork machinery.

Slope Analysis

The site is characterised by steep slopes. Although this limits the options of available functions to specific areas, spaces with beautiful views and specific natural characters can be used to enhance the identity of the place. Development can occur mostly on the crest of the middle and western hills of the three hills that lie north to south, relatively parallel to each other on the site. These three hills are embraced and separated by perennial streams that flow north-east. Closer to the streams the slope inclination increases to the point that no development (relative to the cost of construction) can take place.

Fig 6 D M Wentzel

Historical development Analysis

The farm Kwasizabantu, was bought approximately in 1970 by a group of people, whose aim was to help the people of KwaZulu Natal who were in physical and mental need. They bought the farm for very little, from an Indian man, who decided to sell his piece of the inheritance of the farm, Jammerdaal, due to family conflict. A small building, the only building on the farm, was converted to the service hall. As the number of visitors increased logarithmically more buildings were erected. The visitors who received spiritual, mental or even physical help changed from receivers of help to givers of help and became part of the team on Kwasizabantu. Because of the location of the site, they were forced to provide their own infrastructural and physical needs. Today they are pro-active in job creation and community upliftment, with projects such as Tabitha school for adults, as well as pre-primary, primary, secondary and tertiary education, water bottling, sweet pepper production, avocado exportation and a diary factory (to name a few).

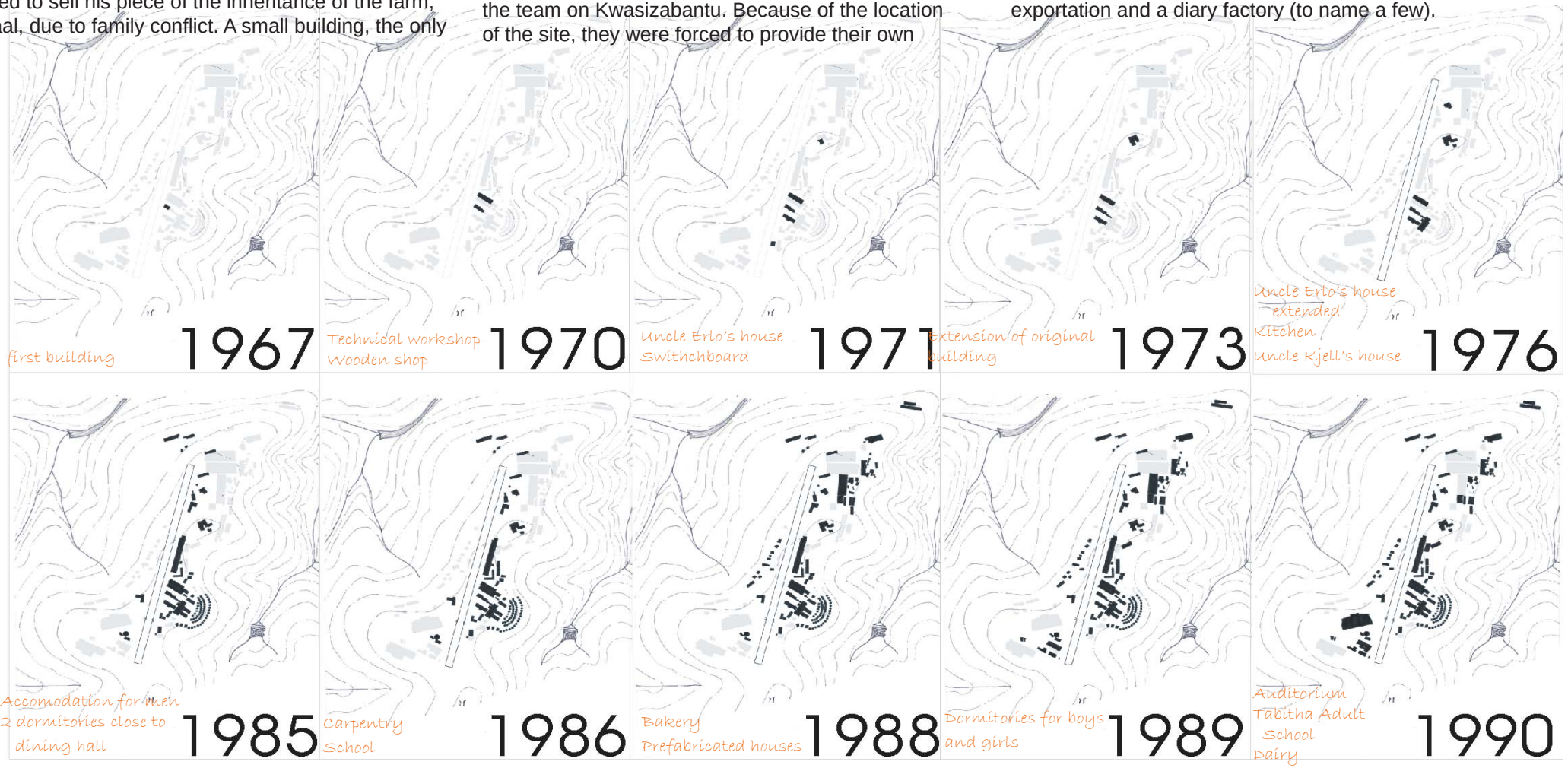
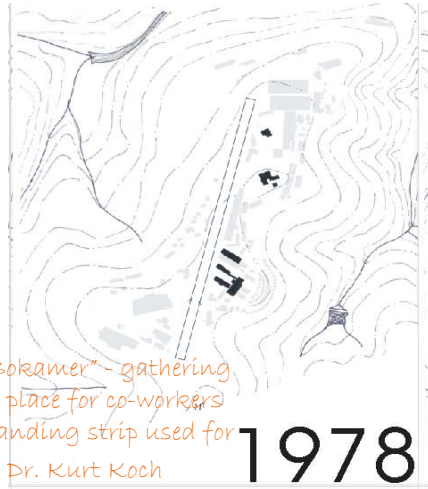


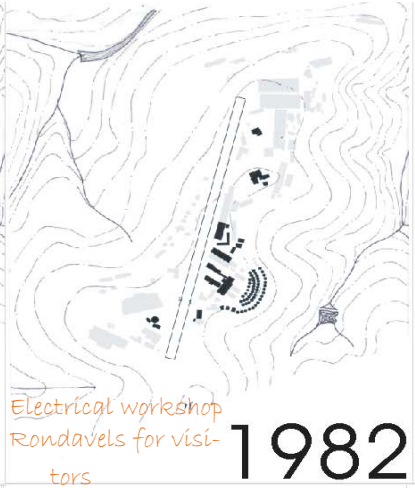
Fig 8 DM Wentzel

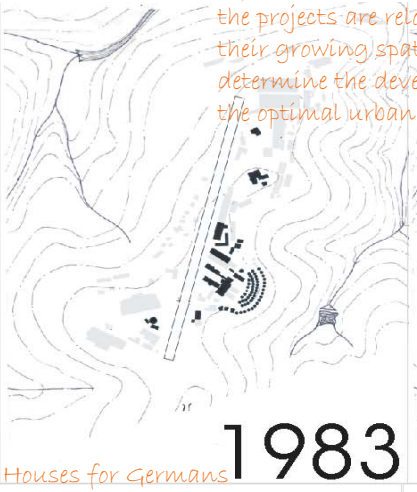
Development rythm

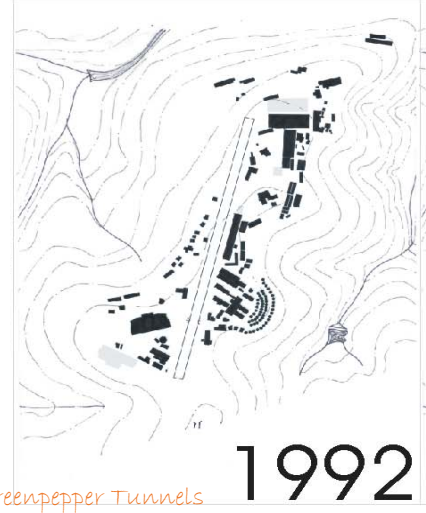
The buildings were developed mostly on the eastern side of the crest of the hill. Buildings were erected as initiatives as needs arose. No specific planning was done, although there were reasons for the placement and form of the different buildings. Later on, gaps were filled as small projects arose or as individuals needed accommodation. Thus you will sometimes find projects such as the pasta factory being located just behind the technical workshop, or the pre-primary school building competing for space with the sweet pepper tunnels.

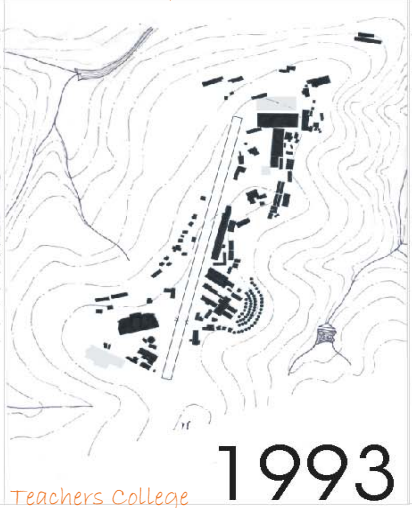
According to the diagram at the bottom of the page, it seems that there is a slight decrease in the rate of development on the mission station. This may be due to the spatial shortages for large-scale structures, or the expansion of existing structures. Currently some of the projects are relocated to other farms to accommodate their growing spatial needs. Thus, it is necessary to determine the development boundaries for the site and the optimal urban fabric texture for the settlement.

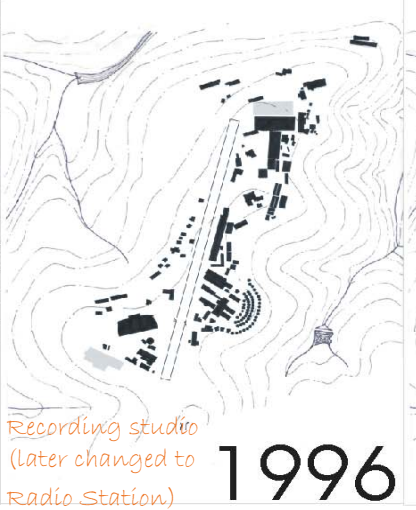












Movement analysis

Entrance to site and movement between different ventures or buildings is very difficult for the uninformed visitor. Open spaces are undeveloped and serve merely as the void between the buildings. Defined walkways and a public park are some of the open spaces needed for the creation and establishment of the character of the settlement.

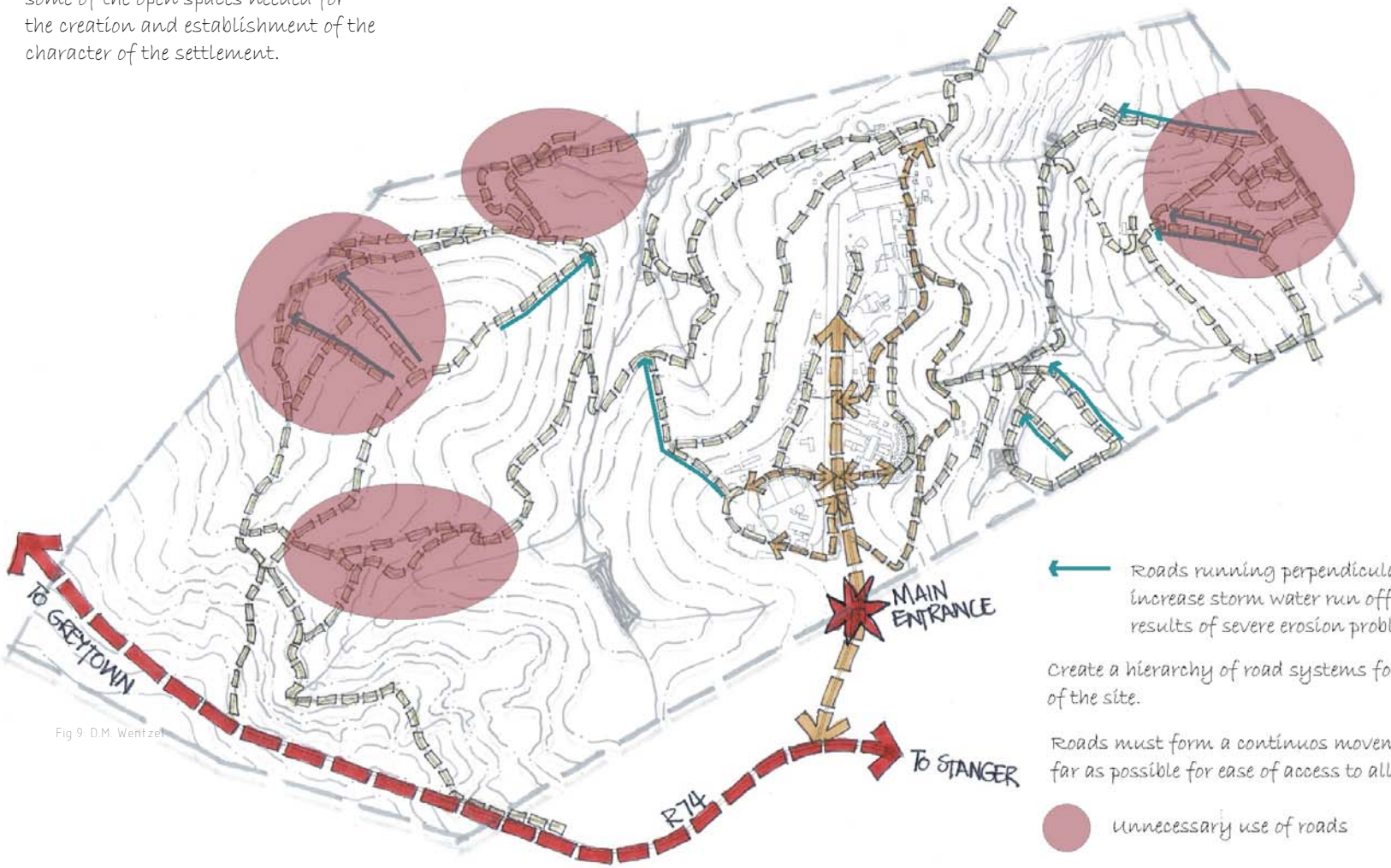


Fig 9. D.M. Wentzel

Roads running perpendicular to the contours increase storm water run off velocity, with the results of severe erosion problems

Create a hierarchy of road systems for the legibility of the site.

Roads must form a continuos movement network as far as possible for ease of access to all functions

Unnecessary use of roads

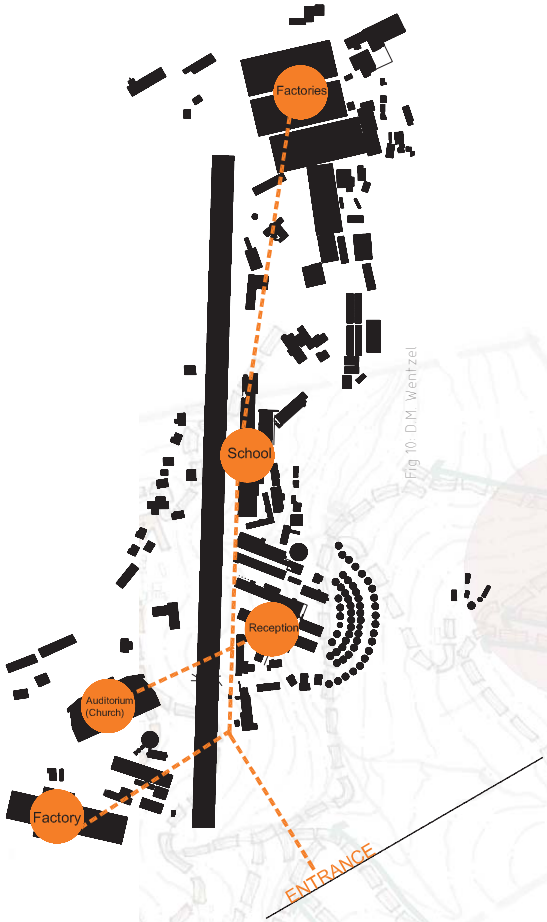


Fig 10. D.M. Wentzel

Waste analysis

Photo 24. D.M. Wentzel

The Existing sewerage system of the mission station

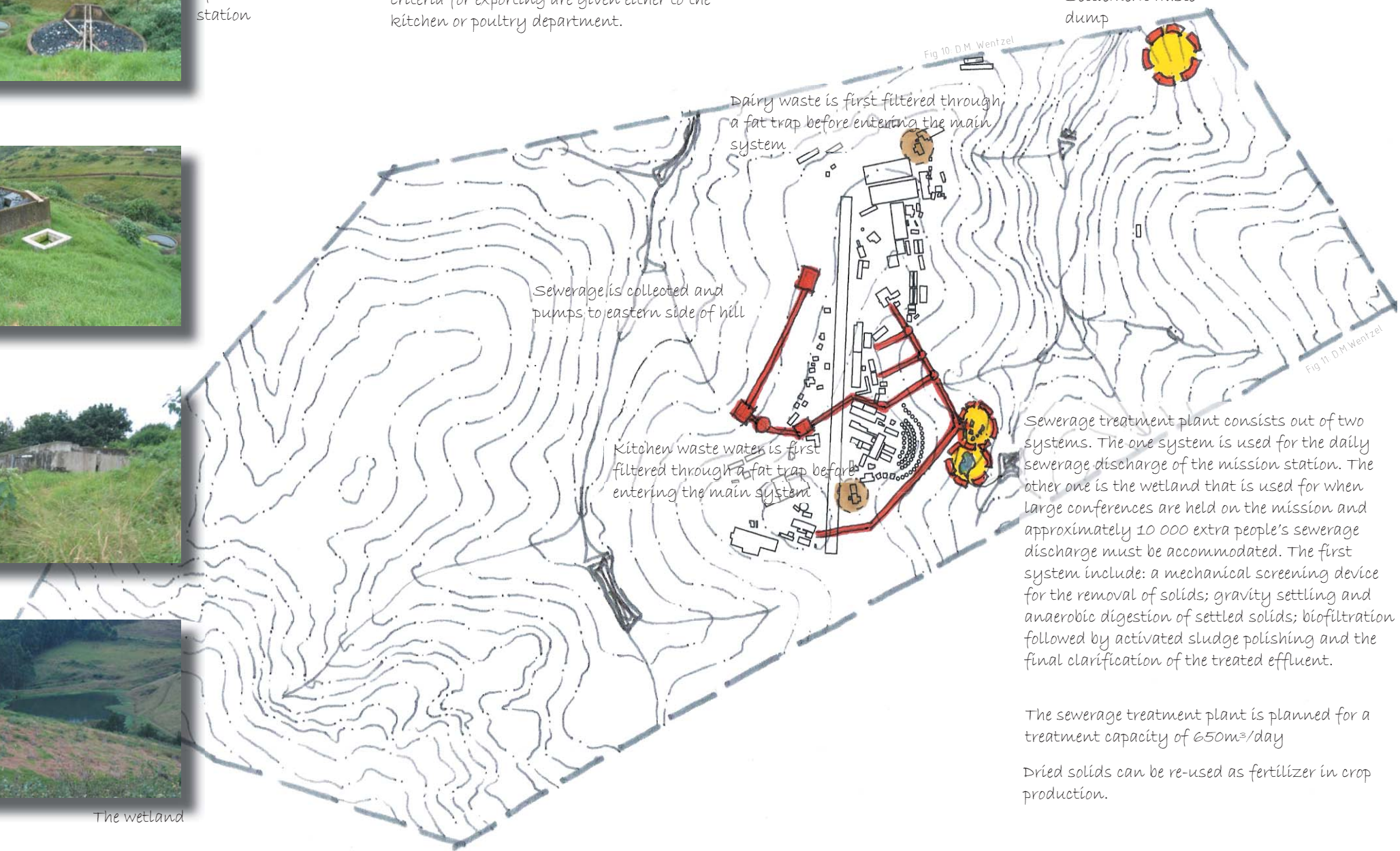
Photo 25. D.M. Wentzel

Photo 26. D.M. Wentzel

Photo 27. D.M. Wentzel

The wetland

Waste produce due to the cleaning of tanks or fruit that does not conform to the grading criteria for exporting are given either to the kitchen or poultry department.



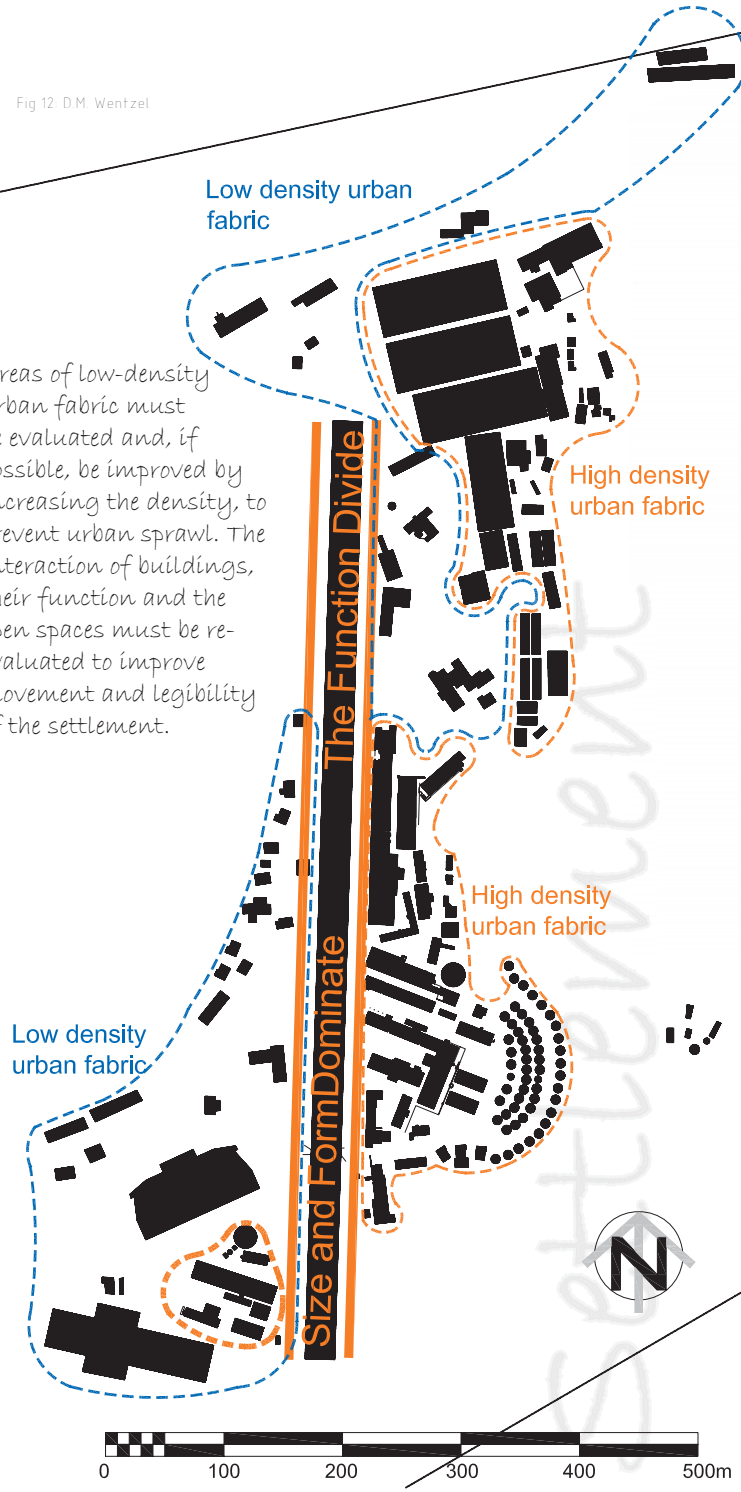
Sewerage treatment plant consists out of two systems. The one system is used for the daily sewerage discharge of the mission station. The other one is the wetland that is used for when large conferences are held on the mission and approximately 10 000 extra people's sewerage discharge must be accommodated. The first system include: a mechanical screening device for the removal of solids; gravity settling and anaerobic digestion of settled solids; biofiltration followed by activated sludge polishing and the final clarification of the treated effluent.

The sewerage treatment plant is planned for a treatment capacity of 650m³/day

Dried solids can be re-used as fertilizer in crop production.

Settlement fabric analysis

Fig 12: D.M. Wentzel



Areas of low-density urban fabric must be evaluated and, if possible, be improved by increasing the density, to prevent urban sprawl. The interaction of buildings, their function and the open spaces must be re-evaluated to improve movement and legibility of the settlement.

Landuse Analyses

Fig 13: D.M. Wentzel

The urban fabric of the settlement shows a diversity of functions, mixed in unexpected ways. This can create the necessary complexity for the unexpected to happen spontaneously. The relationship between functions must aim at the interconnectedness of the functions, and the directness of these connections will ensure the economic and social efficiency of the settlement. To ensure interconnectedness and directness of connections, the physical structure must be added to, subtracted from, or changed. These changes in the urban fabric will also lead to the clarifying of the settlement with a hierarchy of spaces and will improve legibility for the uninformed.

Land use analysis

According to Ghian du Toit, agricultural specialist at the University of Pretoria, the agricultural practices at the mission station is economically sustainable through the production of a variety of crops and produces. Huss avocado and Artemesian plants are wisely chosen cultivars for the specific climate. In earlier times, the planting of wattle trees were encouraged, but due to the fact that it is an invasive species the wattles should ideally be removed.

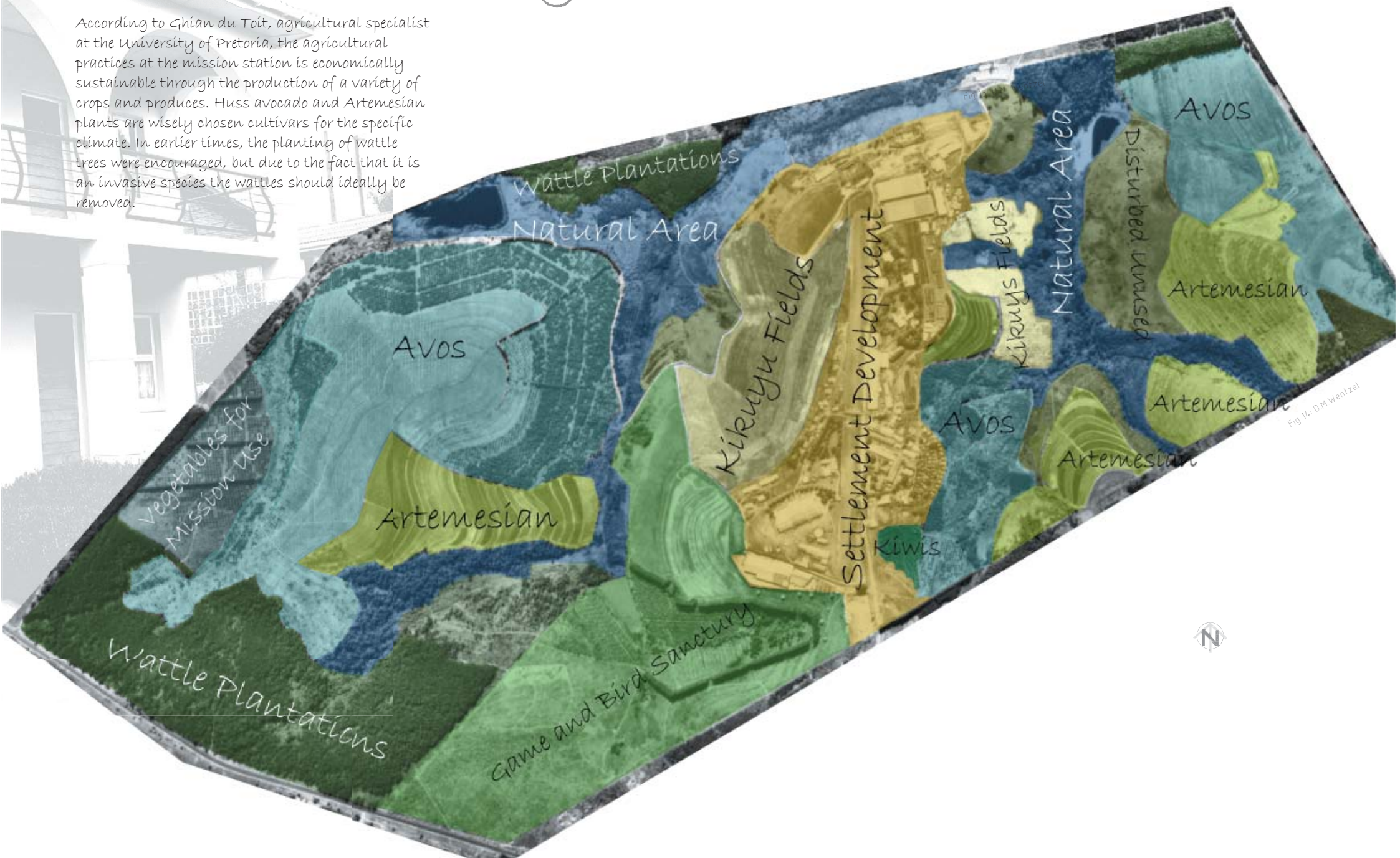


Fig 14: D.M.Wentzel

The mission station

The administrative organisation of Kwasizabantu is non-profit and non-governmental, while the farm is not very close to any other industries and the people must, therefore, be self-supportive in all aspects, as far as possible. Methods of development and creation of jobs for now and future generations is of utmost importance for the success of this community. Infrastructure is as for a small town. The re-evaluation of the activities, and the buildings and their functions, is crucial, as well as the careful planning of future development.

Photo 28: D. Wunderlich

Open day at the primary school for the parents to come and see.

Photo 29: D. Wunderlich

Assembly for the primary school in the Auditorium.

Photo 30: D. Wunderlich

School athletics

Photo 31: D.M Wentzel

In the Teachers' College library.

Photo 32: D.M Wentzel

Pasta made on the station.

Photo 33: D.M Wentzel

Weaving room.

Photo 34: D. Wunderlich

A play performed by the school children in the Auditorium.

Photo 35: D. Wunderlich

The team responsible for the production of educational videos eg. for HIV/AIDS.

Photo 36: D. Wunderlich

In the recording studio of the radio station, Radio Kwezi.

Photo 37: D. Wunderlich

Residential development on the western slope of the settlement, done by the local people.

Photo 38: D. Wunderlich

Photo 39: D.M Wentzel

A coal boiler for water heating for part of the settlement.

Photo 40: D. Wunderlich

Zebras for the game and bird sanctuary at the western side of the settlement.

Photo 41: D. Wunderlich

Flower nursery for the use of the station.

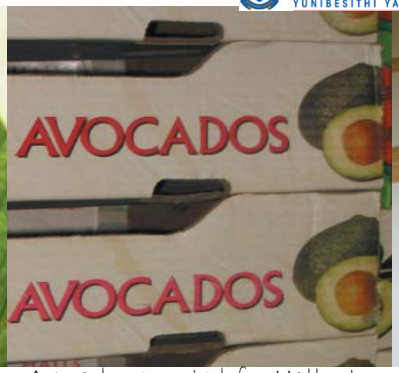
Current Activities

Photo 42: D.M Wentzel

Hothouses for the production of green, red- and yellow peppers that are sold to Woolworths, to provide in AIDS orphans' (in the Traditional Authorities Areas) needs with a power meal.

Photo 43: D.M Wentzel

Photo 44: D.M Wentzel



Avocados exported for Halls, to England.

Photo 45: D.M Wentzel

Photo 46: D.M Wentzel

Artemesian, a plant imported from China by an German doctor, have many medicinal qualities. The plants are dried and processed into a herbal tea and malaria pills;

Photo 47: D.M Wentzel

The mission has its own nursery for flowers, trees or any other plant that grows in Natal.

Photo 48: D. Wunderlich

Photo 49: D. Wunderlich

The newly erected coffee shop provides many delicacies from Italian pastas to Germany pastries.

Photo 50: Unknown

Photo 51: Unknown

The bakery produces bread and pastries for the mission station, the shop and for the surrounding community.

Photo 52: Unknown

Photo 53: Unknown

The shop at the entrance of the mission station sells the produce made on the station, as well as products for everyday use.

Photo 54: D.M Wentzel

Photo 55: D.M Wentzel

aQuellé is a very fast growing water-bottling factory, and provides bottled water to many areas even outside South Africa.

Photo 56: D.M Wentzel

Bonlé, the diary factory, produces juices, as well as yoghurt and maas (a Zulu delicacy).

Photo 57: D.M Wentzel

The sawmill, that processes the wood from the plantations on site as well as from farms in the area.

Photo 58: D.M Wentzel

Technical workshop for local repairs and maintenance of equipment.

Photo 59: D.M Wentzel

The carpentry, where all kinds of wooden furniture and trusses are made.

Visual Analysis

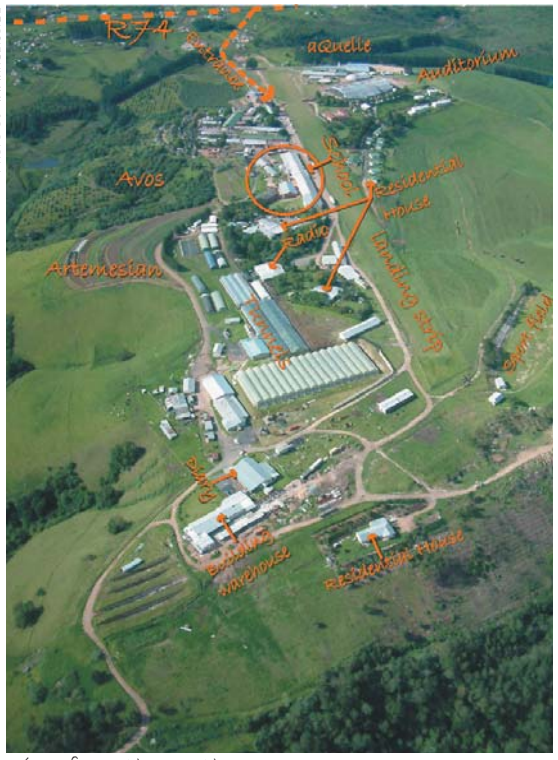


Photo 60: www.ksb.co.za

View from the north

Photo 61: www.ksb.co.za

View from the west

Photo 59: D.M Wentzel

Auditorium: used for services, school hall or anything that requires a hall.

Photo 62: www.ksb.co.za

View from the north: An earlier view of the mission station, before the big tunnels were built at the northern part of the settlement.

Photo 63: www.ksb.co.za

View from the eastern side with the rondavels very prominent on the eastern slope.

Photo 64. D. Wunderlich

Photo 65. D. Wunderlich

Photo 66. D. Wunderlich

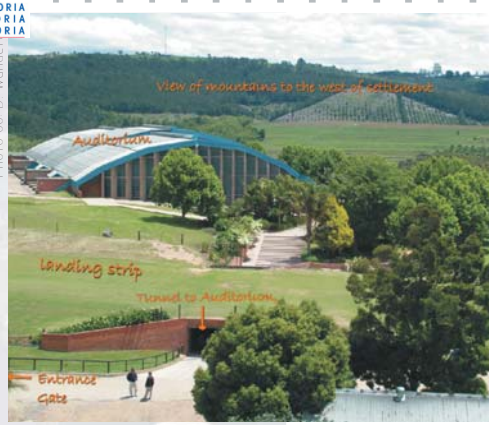


Photo 67. D. Wunderlich

Tourists in the main road.

Photo 68. D.M. Wentzel

Photo 69. D.M. Wentzel

The entrance area needs to welcome the visitor and to create an expectation of the mission, as well as to present a point of reference from which the visitor can orientate him-/herself on the first visit.

Photo 70. D.M. Wentzel

Photo 71: D.M. Wentzel

Through the spatial aspect of the landing strip the settlement is visually linked, but spatially separated. The views to the north and south, and some to the west and the east are wonderful assets to any design.

Photo 72: D.M. Wentzel

The size of the open space is ideal for the design of a public gathering space.

Photo 73: D.M. Wentzel

The landing strip is an open space where many things happen, being at times a soccerfield to an area where chickens scratch for bits and pieces.

Photo 74: Unknown

Photo 75: D.Wunderlich

Fig 16: Landsurveyers Generla Maps

Photo 76: D Wunderlich

The main road that connects the inner part of the settlement runs parallel to the landing strip.

Photo 77: D Wunderlich

It is also the place for the visitor to park for the first time, as well as the place to say farewell.

Photo 78: D. Wunderlich

Photo 79: D.M. Wentzel

The reception building (above) is very difficult to find for the uninformed visitor.

Photo 80: www.ksb.co.za

Fig 17: Landsurveyers General Maps

Photo 81: D.M. Wentzel

Photo 82: D.M. Wentzel

Photo 83: D.M. Wentzel

This photo of the area between the rondavels shows the need for parking areas, and the erosion problems due to storm water run-off.

Again, the beautiful view from the landing strip.

Photo 84: D.M. Wentzel

There are always tourists all over the place...

Some of the spaces between the buildings are neglected and need to be used as the connector of the buildings to establish or enhance the character and identity of the mission.

Photo 86: D.M. Wentzel

Social and economic context:

KwaZulu Natal

KwaZulu Natal is known for its political and taxi violence, and also faction fighting and criminal activities due to the poverty of the province. Added to these factors are high transport costs, leading to bus-boycotts; the role of town councilors in black local authorities, school unrest and boycotts; the rise of vigilante groups and several other factors (Paton 2003). The unofficial war between the Inkatha Freedom Party and the ANC has, since democratic elections have been held (in April 1994 till the year 2000), claimed two-thousand lives (Taylor 2002: 473). According to Taylor, the legal system fails to meet the people's right to live in a safe and secure environment, through the lack of successful prosecutions of the initiators of the political violence (499). The taxi violence poses another serious threat to the stability of this province and is visible to every tourist as he/she drives on the road from Greytown to Stanger where a burnt-out taxi-minibus stands next to the road. Many of the residents of the mission station have had personal experience of violence while travelling between the station and neighboring areas.

Photo 87: D. Wunderlich

Existing guidelines and proposed developments according to the Integrated Development Plan for the Umvoti Municipality (2003/2004)

Social situation

Kwasizabantu falls within the uMvuti Municipality, which is one of four local municipalities within the greater Umzinyathi District. To understand the social and economic structure of the uMvuti Municipality, we need to differentiate between the urban areas and the rural settlements, where Kwasizabantu is situated on the periphery of both of these areas. According to the Integrated Development Plan (IDP) of the uMvuti Municipality, the majority of the population lives in rural areas or what is known as the Traditional Authority (referred to as TA) areas. The TA is a poverty-stricken area where people live in scattered traditional houses, known as imizi. Of the people in the uMvuti Municipality, 43% have no-income (IDP 2003/2004: 7), and a large portion of those who do have an income receive it through social grants and remittance (IDP 2003/2004: 6).

Only 18% of the people are employed (IDP 2003/2004: 24).

In the TA areas the situation can sometimes deteriorate to the point where up to fifty people can be dependant on one person with a salary or income (IDP 2003/2004; 12). Job opportunities are also very low, due to the small amount of economic activities in these areas, and 60% of inhabitants are functionally illiterate, which has a significant impact on employability (IDP 2003/2004: 11). The agricultural and tourism sector seem to offer some promises of reprieve, but need to be developed first.

Infrastructure is relatively well developed in and around the primary urban areas of Greytown and Kranskop. In the TA areas the roads and road signage are in a very poor condition, 62% of people are dependent on springs, wells, boreholes and streams for water (IDP 2003/2004: 23), 30% of people have no access to sanitation facilities (IDP 2003/2004: 23), and 72% of people are dependent on gas, paraffin or candles for light (IDP 2003/2004: 21).

With only 45% of the population falling into the economically active group (according to age classifications, (IDP 2003/2004: 9) and 46% at school-going age (IDP 2003/2004: 9), the population depends severely on social and economic support. This dependency is intensified by the fact that the majority of the population is female (IDP 2003/2004: 10), due to the fact that the males leave the area to seek employment in the cities. This in turn results in increased HIV/AIDS infectations. Many children are orphaned at a very young age due to the HIV/AIDS crisis.

Rural residents must take responsibility for their own sewage disposal, which causes the spread of waterborne diseases such as cholera, especially in the hot summer months (IDP 2003/2004: 20).

Spatial reality (IDP 2003/2004: 14)

Two routes, the R33 and R74, serve as access and main travel routes in the uMvuti Municipality, where the R33 connects Msinga and Dundee in the north with Pietermaritzburg in the south, and the R74 connects Greytown to Kranskop, Stanger and Mooirivier.

According to the IDP review of the uMvuti Municipality, the spatial pattern is formed by history, natural features and infrastructure (IDP 2003/2004: 15):

1. History: traditional areas formed along rivers while commercial farms were developed on the high rainfall plateau;
2. Natural features: topography, type of soils and the rainfall patterns determined which areas were developed; and
3. Infrastructure: No hierarchical ordering of the space economy is present, as Greytown and Kranskop dominate the area.

Main strategic development aims according to priority (IDP 2003/2004: 30):

1. Social: addressing poverty alleviation, quality of life and empowerment:
    a. Poverty alleviation;
    b. Removal of gender inequality;
    c. Provision of basic services;
    d. Improving safety and security of citizens; and
    e. Improving health levels of citizens.
2. Stimulation of local economic development;
3. Physical and social integration of the Umvoti society;
4. Institutional capacity building;
5. Improvement of revenue-based financial management;
6. Promotion and maintenance of a sustainable environment;
7. Addressing the HIV/AIDS pandemic;
8. Development of social and economic infrastructure;
9. Land reform through the economic and sustainable utilisation of land;
10. Development of the tourism sector; and
11. Growth and diversification of the agricultural sector.

Spatial Development Framework (SDF)

The SDF of the Umvuti Municipality focuses on the development of a corridor system with service centers that give meaning to the corridors. Primary investment will go into the rural settlements. The environmental management of the municipality is based on the economic potential of assets such as heritage areas, eco-tourism sites, agricultural land and the Mooi River Irrigation Scheme.

Kwasizabantu lies on one of the two “Primary Development Corridors” (IDP 2003/2004: 57), the linkage road between Greytown and Stanger, which is the R74. This corridor must facilitate in the delivery of services for the rural population and serve as a tourist access route to the historical Zulu battlefields. Furthermore, Kwasizabantu can be a “Tertiary Development Corridor” (IDP 2003/2004: 58) that serves as a linkage between settlements through the provision of public facilities.

The Land Use Management Framework (LUMF), Environmental Management Framework (EMF), Public Open Space Framework (POSF), Active Open Space System (AOSS) and the Core Mixed Use Framework (CMUF) are only clarified in terms of their aim:

- LUMF is about the identification, protection and reservation of land which has agricultural value and which should be optimally utilised in accordance with national legislation and provincial policy guidelines related to sustainable development, agricultural production and natural resources (IDP 2003/2004: 60).

- EMF: the conservation and protection of ecosystem services and natural areas that is essential to the sustainable development of cities, towns and settlements, which includes natural disaster management systems (IDP 2003/2004: 61).

- POSF and AOSS are concerned with the provision of land for passive and active recreational activities that also provide in the needs of people with physical or mental impairments and attract visitors and tourists (IDP 2003/2004: 62).

- CMUF is about the development and management of land for the provision of the primary activity focus or foci of urban areas in terms of commercial, trade, office administration, cultural, residential and low impact industrial activities and developments (IDP 2003/2004: 64).

Conclusion:

The IDP of the Umvuti reveals the bleak picture of economical and social situation of the area. Education of young and old, the availability of jobs and the provision of services for basic physical needs are of utmost importance. Kwasizabantu is promoting this vision of development through the many educational, health and work opportunities that are found on the site which are, as previously mentioned, situated on the primary corridor development area of the Umvuti municipality.

Summery of problems to be addressed

Kwasizabantu is situated, as previously mentioned, between Greytown and Stanger, on the R74. This area is characterised by a lack of infrastructure, poverty and political violence, and only 2,37% of this small biome is conserved, thus:

1. Areas to be conserved must be established and be recovered to present the character of the Short Mist belt Grassland biome;

2. Infrastructure such as roads, open spaces, waste- and drainage systems must be planned to form an interconnected network for the sustainable future of the site within its context;

3. Settlement fabric must be clarified and designed to resemble the identity of the community, ensure the multi-use of spaces and places and improve the legibility of the settlement; and

4. Public open spaces are needed for the gathering, relaxing and socialising of the community. These spaces must be designed to create or enhance the identity of the specific function.

Photo 88 D. Wunderlich

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UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Photo 1: D. Wunderlich

Photo 2: D. Wunderlich

Photo 3: D. Wunderlich

Design Principles

Photo 4: D. Wunderlich

Photo 5: D. Wunderlich

Photo 6: D. Wunderlich

Introduction

Design and nature: they are such a cardinal part of the landscape architect's profession: what is the position we as landscape architects need to take when it comes to design interventions in the natural environment? In this discourse we look at the planning of the whole site, as well as design as an expression of identity and the relationship between the built and unbuilt environment.

The site

The basic proposition employed is that any place is the sum of historical, physical and biological processes, that these are dynamic, that they constitute social values, that each area has an intrinsic suitability for certain land uses and finally, that certain areas lend themselves to multiple coexisting land uses (McHarg 1992: 104).

Nature is a process that is interactive, that responds to laws, representing values and opportunities for human use with certain limitations and even prohibitions (McHarg 1992: 7).

Understanding the possibilities and restrains inherent to the site is to understand the different layers of the intrinsic forces that shape the site, the environmental character and the social structure. Survival depends on such knowledge. These layers range from the active shaping forces such as water, vegetation and geology, to the non-active forces such as history, culture and politics. Overlaying these forces gives a clear understanding of the site for the success of the planning and design intervention of the site.

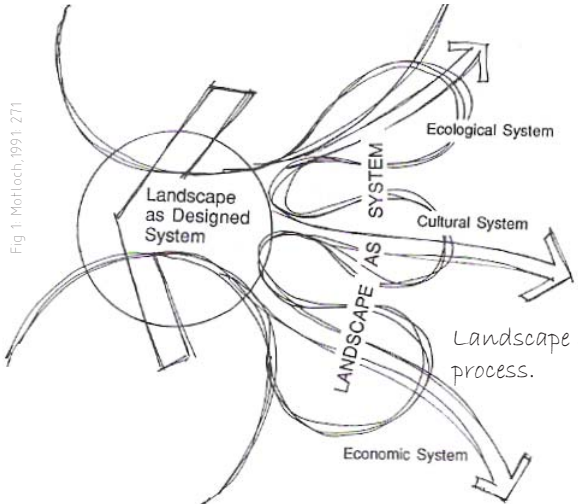


Fig 1: Motloch 1991: 271

Landscape as design process.

Urbanisation and converting land from a predeveloped to developed condition includes the integration of natural, structural, and infrastructural systems. This includes integrating the differing patterns of dynamic, natural and static human systems (Motloch 2001: 275).

Fig 2: D.M Wentzel

These layers must also include the in-between (Corner 1999: 50-51) for the reviving of the marginal and peripheral zones, thus paying special attention to the boundaries, adjacent areas, surroundings, and backgrounds. Christopher Alexander emphasises the identity of the "in-between" in his article, A City is not a Tree, in which he wrote: "Wherever two units overlap, the area of overlap is itself a recognisable entity and hence a unit also" (www.rudi.net). Thus design becomes the synergy of the different site dimensions for the sustainable future existence of the site.

Natural systems

People's Interaction with the Natural Systems

The health of the natural system is of cardinal importance for the present and future existence of all living organisms on earth. As designers we can begin with the site we are working on to create green islands through the use of open spaces and materials in such a way that it will create or enhance the ecological processes of the specific area. The designer seeks, not arbitrarily to impose design, but to use to the fullest the potentialities – and with them, necessarily, the restrictive conditions – that nature offers (McHarg 1992: viii).

The interaction between people and nature is necessary for the sustaining of nature as the source of life, teacher, sanctum and challenge (McHarg 1992: p19). Through interaction with nature people learn to appreciate the environment, to establish a healthy working relationship between man and his environment. It is only when an appreciation and understanding of natural systems, which is indispensable for survival, is established that people can act as true stewards of nature.

Direct contact with the natural systems will also lead the users to perceive the destructive impact of pollution on the environment, and that it results in the lowering of the habitability for humans (McHarg 1992: vii).

Bill Mollison proposes Permaculture (permanent agriculture) as the answer to this working relationship. As he explained, Permaculture alone will not be enough; rather a change in attitude is necessary to change sustainable relationships from design styles to life styles.

A few important guiding principles of Permaculture to

be used in this discourse is the care of people and care of the earth (Mollison1990: 2). These principles stipulate that care of people is about access to natural resources and care of earth is about the provision of all life systems to continue and multiply. Christopher Alexander wrote that access to the countryside, the experience of open fields and agriculture and access to wild plants, birds and animals give people a sense of comfort (Alexander 1977: 22). He proposes that the boundaries with the countryside must be close to every point in the city and concludes that the ideal is to "stretch out the urbanised area into long sinuous fingers which extend into the farmland" (Alexander 1977: 24). The countryside or farmland must be extended into the urban fabric through the conversion of streets, from being only movement channels for traffic and pedestrians, to green corridors and public spaces for the movement of animals though the city. These corridors and islands must provide in the feeding, breeding, nesting and resting needs of the animals.

Other guiding principles are the two rules of necessitous and conservative use to determine whether an area must be developed or not. Necessitous use can only be decided where there is a paradigm shift from 'what can I get' to 'how can I cooperate' (Mollison 1990: 3). Necessitous and conservative use must also be defined within the boundaries of how your cooperation can be enhanced through answering in your needs, and how it is a change from competition to cooperation as a group. Again it is clear that the designer needs to have a thorough understanding of each individual for the informed decision of necessitous use and the integration of these uses.

City Country Fingers

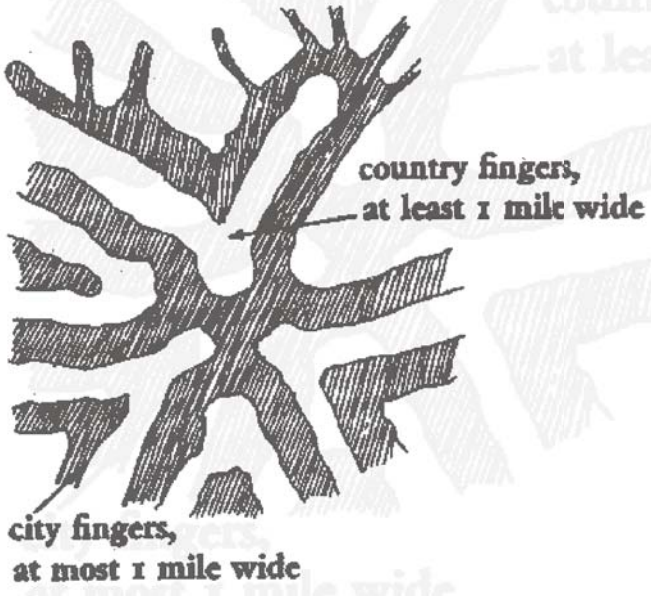


Fig 3 Alexander et al. 1977: 25

The environmental character

The aim is to develop the character of the disturbed and destroyed environment to the point where it represents its "original" identity, for the sustainable existence of the unique ecosystem, but also for the education and enjoyment of people. To define the original identity is quite a different subject and we will only refer to the identity of the biome within which the specific natural areas of concern fall for this discourse. The quality of the environmental system can be measured according to the richness of biodiversity. Vice versa biodiversity is directly linked to the availability and quality of habitat (the natural environment). Habitat consists of feeding, breeding, nesting and resting opportunities suitably juxtaposed in time and space for all life stages according to USFWS (Pieterse 2003: 3.12).

To design for the rehabilitation, restoration and enrichment of the natural surroundings, Breedlove (in Pieterse 2003: 3.13) proposes Function-based Habitat Design (FHD): the presence, diversity and abundance of animals are the desired products of Function-based Habitat Design (3.12). Animal guild design form the basis for FHD, and the type of guilds used determine the specific FHD. A guild is a group of animals making similar use of a similar resource (Root 1967: 317), for example "canopy feeding" and "ground resting". The kind of guilds designed must be according to the kind of biome within which the design is implemented, and the associated fauna and flora, to ensure the sustainable existence of the natural landscape. Five to eight guilds

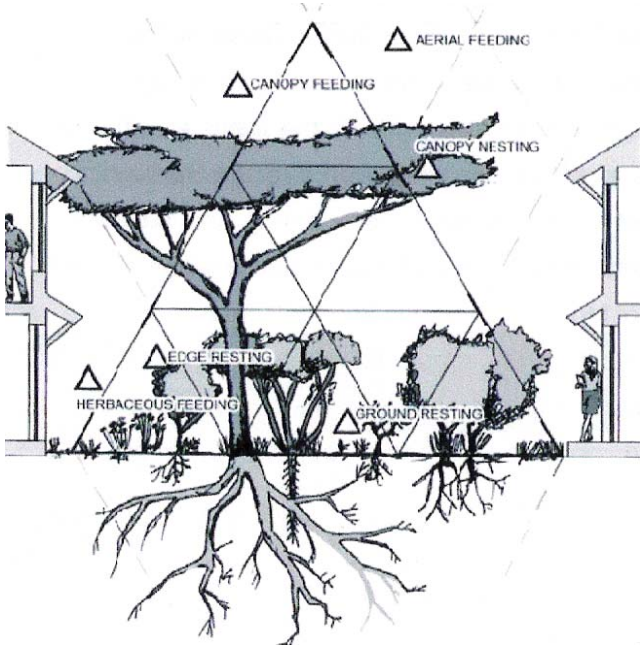


Fig 4 Breedlove (in Pieterse 2003: 3.12)

Guild design for the richness of biodiversity.

are enough to satisfy most systems due to the robust and versatile attributes of the process– (Breedlove *et al*. as quoted in Pieterse 2003: 3.13). According to Breedlove, to design more guilds will be redundant. To use five to eight guilds ensures the addition of unplanned species, thus creating robustness, functioning on more levels than the design intended (3.13).

It is important to recognize the habitat patterns on three different scales:

1. Habitat – near regional – governmental;
2. Project – developer – community; and
3. Stand/erf – individual home

(Pieterse 2003: 3.14)

The patterns of all landscape features with FHD-value are maps such as vegetation types, slopes and surface characteristics.

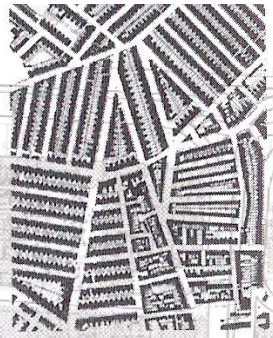


Fig 6: Marshall 2005: 79

Street patterns and types

Movement systems

Perception of the landscape involves movement, as we experience the landscape as a time-space continuum (Motloch 1991: 119). People tend to relate their experience of city spaces in terms of the vehicular circulation pattern: they do not give the block number for the location of an activity centre, but rather by the street location (Landphair 1988: 85).

Movement is also the linkage between spaces and buildings and forms a network of connections. It becomes the binding force of functions on the site and the site to the national movement system. The aim for good site design is accessibility and ease of movement, but due to the expensiveness of roads, the optimal relationship between movement roads and access must be designed.

The street

The traditional street was the meeting place that buzzed with activities, ranging from trading, hawking, and busking to public speaking. Originally every house in Pretoria was designed to face the street; not to serve as a grant facade, but as the direction of living. Streets were filled with activities where neighbours met. In the townships of South Africa the street is the overflow area of the residential home. Three physical roles were united in the traditional street: circulation route, public space and built frontage (Marshall 2005: 3). With the modern emphasis on the car and transportation, the street was transformed to a movement channel, which resulted in the fragmentation of the relationship between movement and urban place (Marshall 2005: 4).

Today we experience a counter-revolution within urbanism: from the rhetoric of the 'motor age' to the rhetoric of sustainability and neo-traditional urbanism (Marshall 2005: 9). Again, compact, dense, mixed-use neighborhoods are emphasised where the street space becomes the core of the public space, forming a continuum of connections. Thus the street becomes essential in the spatial organization of the urban fabric. Utility services are also channeled.

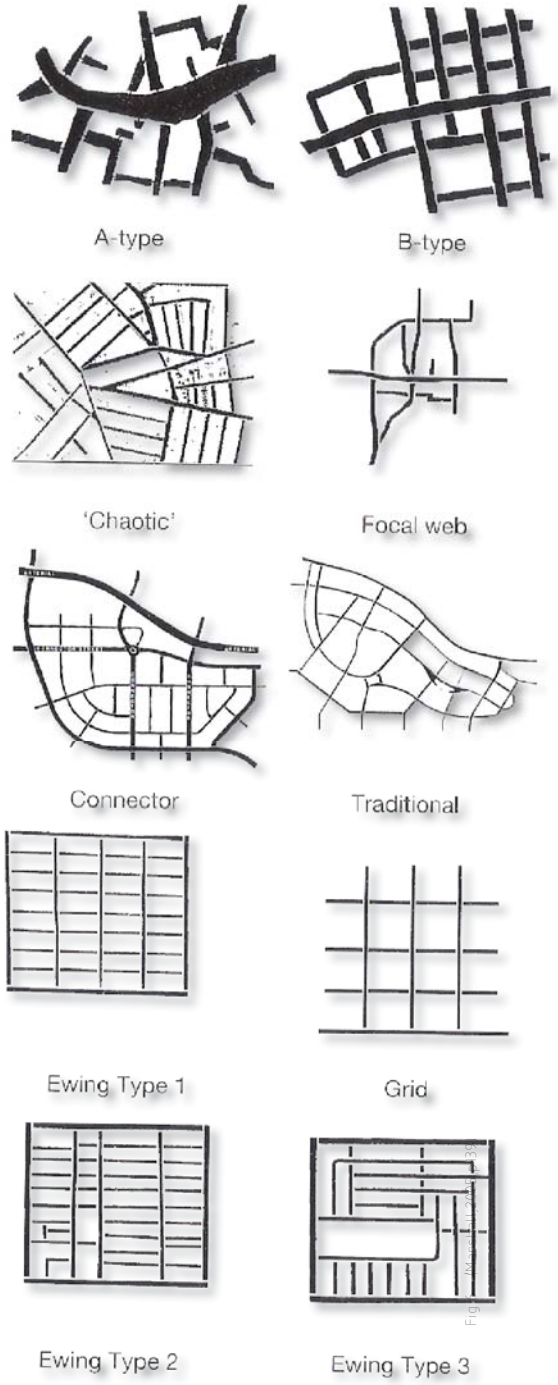


Fig 6: Marshall 2005: 139

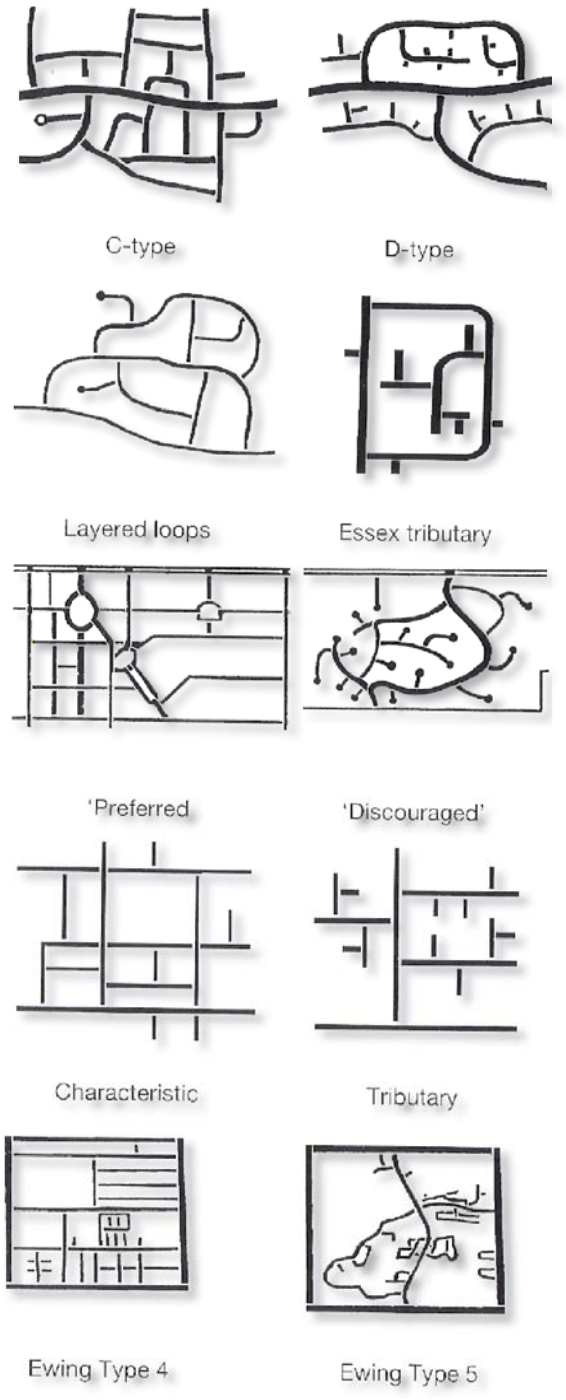


Fig 7: Marshall 2005:139

Street design

Street classification:
Traditional street classification is based on the form, use, relation and designation of the road, which does not reflect the characteristic diversity of roads:

1. Form refers to the physical characteristics of the street and can be ascribed to any section of the street;
2. Use relates to the demand such as traffic flow and speed;
3. Relation refers to the relative position of road in relation to other network elements; and
4. Designation refers to classification themes determined purely by allocation or assignation.

(Marshall 2005: 56)

Marshall proposes in his book *Streets & Patterns* a classification based on the arterial qualities of the street, which refers to the form of strategic contiguity whereby all 'top tier' elements join up contiguously (Marshall 2005: 62). Arteriality can be explained by looking at the arterial pattern of a leaf where the arterials are visible, but the flows within the arterials are unknown. The hierarchy is determined by the scale of coverage area (Marshall 2005: 64).

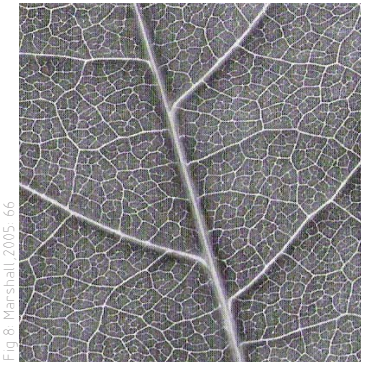


Fig 8: Marshall 2005: 66

The arterial pattern of a leaf.

Pattern type:
Though there are many kinds of patterns, to describe a specific pattern as the best is not possible. The best pattern for a specific settlement must be determined "on site". Pattern characteristics are strongly influenced on the constituent parts and thus, the key constituent parts must be determined for future/continuous design. The typology depends on the purpose intended with the aim of connecting and clarifying the composition and configuration of the network to a coherent whole (Marshall 2005: 102).

The water system

Water is the source of all life, an element that shapes the physical face of the earth and continually influences a great part of life for people, nature and earth. The drainage pattern within a watershed was formed through the surface flow of the water and formed a dynamic equilibrium (Motloch 2001: 66). Disturbing this equilibrium is unavoidable in any development. The degree to which this relationship between drainage and storm-water runoff is disturbed can be minimised through the careful management of storm-water runoff. Management begins with the thorough understanding of all the water moving on and through a site at or below the surface (Landphair 1988: 107). Due to the systemic character of water, efficient use and recycling must be promoted at all times.

The aim of water management is to protect the watershed, control agricultural runoff, reduce water diversions and control water quality.

1. Protecting the watershed through establishing permanent vegetation cover;
2. Agricultural runoff is controlled through shaping the earth into terraces and plowing according to the contours; and
3. Reducing water diversion is to make more water available in the area where it falls (Lyle 1994: 157).

Regenerative systems rely mostly on land form, soil, plants, and biological processes (Lyle 1994: 148).

Waste management

Definition of Integrated Waste Management in South Africa

As published in the Government Gazette of 17 March 2000, pollution can be defined as the introduction of any substance property (including radiation, heat, noise and light) into the environment that has or results in direct harmful effects to humanity or the environment, or that makes the environment less fit for its intended use.

Integrated pollution and waste management is a holistic and integrated system and process of management, aimed at pollution prevention and minimisation at source, managing the impact of pollution and waste on the receiving environment and remediating damaged environments.

The government gazette stipulations are formulated to reduce the holistic impact that waste has on the existence, now and for the future, on the earth, by starting in our country, on a private and commercial scale. This new approach is a great improvement from the paradigm of managing the waste at the 'end-of-the-pipe' paradigm. Management is about preventing, reducing and managing waste.

Principles of IWM Plan according to the Government Gazette (2000):

1. Transboundary movement (2000:13): The effect that pollution in one country has on another country will be taken into consideration;
2. Duty-of-care principle (2000: 13): The company/ person that produces waste is responsible for the management and treatment of the waste; and
3. Universal applicability of regulatory instruments (2000: 13): everybody will be subject to the same regulatory system.

Social responsibility

In the Constitution (Act no 108 of 1996) it is stipulated in section 24:

"Every one has the right

(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that -

(i) prevent pollution and ecological degradation;

(ii) promote conservation; and

(iii) secure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development ".

(Government Gazette 2000: 17)

Resources polluted

Water pollution

1. Nutrient enrichment of fresh water: changes the natural function of biota, producing a bad odour, and making outdoor recreation less pleasant;
2. Sediment and silt migration changes the natural composition of the water habitat;
3. Harmful inorganic and organic compounds are produced by industrial waste. These elements are not easily removed and can greatly influence the quality of potable water and the biota environment; and
4. Diffuse water pollution comes from sources such as: industrial seepage, agrochemicals in soil fertilizers and insecticides, run-off from farm lands, contamination from animal wastes, informal settlements, thermal pollution by power plants and leaking sewerage pipes.

(Government Gazette 2000: 21)

Air pollution

1. Domestic fuel combustion is very high due to the domestic use of coal stoves and fires in the area;
2. Dust problems due to construction, agricultural and industrial activities and untarred road can create a serious health problem;
3. Vehicle emissions have a great influence on air pollution due to the growing dependency on private/ personal vehicle ownership;
4. Air quality management shows a lack of efficiency with inadequate prosecution of offenders; and
5. Noise pollution is increasing at an alarming rate, while the current situation cannot be easily changed.

Land pollution

Some major sources of land pollution include the following:

1. environmentally detrimental agricultural practices;
2. the wood-processing industry;
3. waste treatment and disposal;
4. repair shops and scrap yards;
5. service stations;
6. medical waste;
7. the metal industry; and
8. mining-related activities.

The poor location of disposal sites and leaking of toxic materials can have a detrimental effect on the environment.
Erosion is another evidence of land pollution.

Strategy of IWM plan

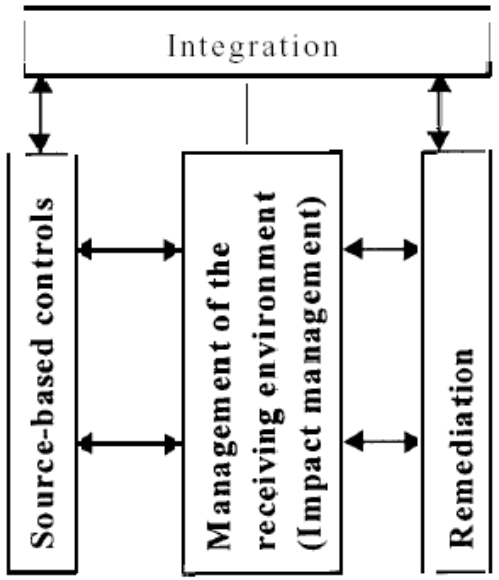


Fig 9: Government Gazette, 2000: 29

IWM is based on the integration of source-based controls, management of the impact on the environment and then the remediation of damage:

1. Source-based controls are used for the reduction of waste at the source with the implication of a reduction in the overall amount of waste that needs to be managed;
2. Management of the receiving environment is the management of the impact of waste on the environment. Standards for source-based controls must be in place and care must be taken to prevent/ minimise the impact on the environment; and
3. Remediation entails retroactive intervention to reverse environmental damage and achieve a specific ambient quality.

(Government Gazette 2000: 29).

Public participation forms the cornerstone for the development and the implementation of the strategies of the IWM policy. Specific mechanisms and processes, such as education and training to create an awareness and concern for pollution and waste, are established to ensure the participation of the public (Government Gazette 2000: 29).

Village Design

*Although Kwasizabantu is not a city, I draw the principles for designing the village from that of city design. Kwasizabantu's needs as a village compares almost in all aspects of urban design in the type of need, but not the scale.

A city

A city expresses the actions of individuals and collectives in an environment. It reflects the needs of individuals and collectives. "It orchestrates scenarios for collective living[...]. The city exists in memory, in the desire to remember" (Bunchoten 2001: 24).

A city is a compilation of different layers. There are the physical layers, such as the buildings, the ground and the climate, and then there are the invisible layers that Bunchoten calls the Proto-urban conditions. Proto-urban conditions simultaneously influence urban change in many places and lead to new form (Bunchoten 2001: 32). These proto-urban conditions are the driving forces behind the physical manifestations of urbanity. These forces include the lack of infrastructure, global oil shortages, political unrest, etc. Proto-urban conditions have a direct impact and drive the emotion and behaviour of the city.

He describes these proto-urban conditions in the light of flotsam: only the symptoms are visible. "Flotsam is made up of fragmented bits and pieces that are apparently unrelated, but in fact belong to some larger whole, invisible but coherent, that links the parts that have emerged" (Bunchoten 2001: 24).

To design the city is also to manage the changes, orchestrate action, design programmes, suggest form, monitor qualities and stimulate self organization (Bunchoten 2001: 25).
The ability to live off the city is determined by the management of the city as a whole.

City design

A cohesive design approach for urban design is based on the methodological sequence of need, programme, idea and context (Dewar & Uytenbogaardt 1991: 15).

'Need' refers to the physical requirements of the community and the individual. The physical requirements for the community include the economic, social, cultural and recreational opportunities and also access to these activities or functions. On a smaller scale the social, sensory and psychological needs of the individual must be taken into consideration. Programme evolves from the compilation of these needs. Both 'need' and 'programme' have no form, but rather implications of form. 'Programme' consists of two levels: performance expectation, and the translation of urban growth into numbers. 'Idea' translates the programme into the ideal relationships to achieve the desirable urban qualities. The translation of generic ideas into specific forms define 'context'.

Functional requirement of city

Through balance, freedom, equity, complexity and integration true efficiency in a city's performance can be reached (Dewar & Uytenbogaardt 1991: 22). Balance can be established through the relationship between society and nature. Dewar describes it as the ability of people to be part of the totality of the place in which they live, through the ease of contact from any point in the city with the natural environment. A relational balance between the infrastructure of the city and the activities and events that define the urban life will ensure urban performance.

Freedom of action is the ability to choose to act or react and can stimulate complexity that contributes to richness of human experiences. The ability to choose can be enriched through the enabling and restricting of movement. Manipulating movement must be subject to ease of access for all people to the opportunities the city generate. Diversity and intensity of activities will create the necessary complexity for the unexpected to happen spontaneously.

Growth of the city

Through the ordering of relationships, and the production of structure through the creation of spatial geometry of settlements and the interpretation of these into meaningful forms, 'idea' gives the overall direction of growth of the urban fabric. Form includes the spontaneous development through the freedom of choice created by opportunity and constraint. This diversity of spontaneous and planned development is based on three generic types of actions:

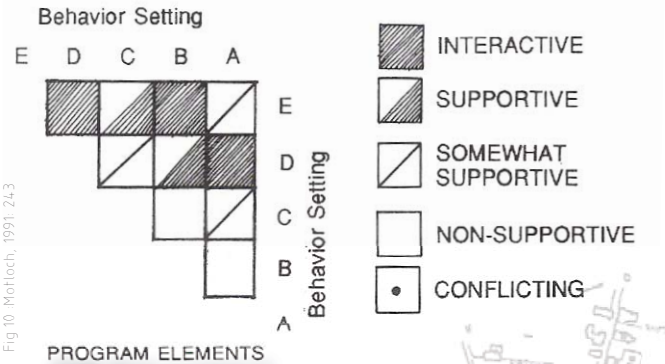


Fig 10 MoHoch, 1991: 243

PROGRAM ELEMENTS

SUN ROOM	(SR)- 180SF	STUDIO	(ST) - 145SF
LIVING ROOM	(LR)- 160SF	STUDIO BATH	(B3) - 45SF
DINING ROOM	(DR)- 115SF	CAR STORAGE	(CAR) - 250SF
KITCHEN	(K) - 90SF		
MASTER BEDROOM	(MBR) 190SF	Extensive Exterior Spaces to Support SR, LR, MBR and ST to Acheive Strorg Sense of Entry and Feeling of Outdoor Living	
MASTER BATH	(B1) - 60SF		
GUEST BATH	(B2) - 60SF		
GUEST BEDROOM	(BR2)- 180SF		

Fig 11 MoHoch, 1991: 245

Functional Relationship Diagrams: methodology for the translation from programme to idea.

1. Holding actions refers to residual land which falls outside the reserved land, of which use is not required in the short term;
2. Structural actions refer to positive actions that will create opportunities, for example movement routes and public spaces; and
3. Controlling actions are those actions that limit freedom of decision-making to preserve relationships or characteristics of perceived value.

(Dewar & Uytenbogaardt 1991: 27)

These actions must be applied with the intention of generating complexity. Complexity can be obtained through enabling structures such as variety and multiple uses of urban fabric, movement generators, public planting and social infrastructure. Another aspect of efficient systems is the result when the multi-functional use of urban elements is consciously promoted (Dewar & Uytenbogaardt 1991: 34).

The urban fabric

Urban fabric or urban pattern is the field within which the relationship between the solids and the voids are studied. The urban fabric is analysed through the use of the nollie maps of the Figure Ground Theory. These nollie maps are used to evaluate and analyse the textures and patterns of the urban fabric. The textures or patterns are formed through the relationship of solids and voids, where the voids are seen as "space-as-object". Through addition to, subtraction from or changing of the physical pattern of this urban fabric, the structure of the urban fabric is clarified with the objective to form a hierarchy in spaces through differences in sizes that are individually enclosed, but ordered directionally in relation to each other (Trancik 1986: 97). Landscapes can be seen as the "object" of this "space", the "void" as the "in-between" amongst the buildings, and the natural environment the canvas on which the different buildings and functions are bound together to a unity. The landscapes are also extensions of the inside rooms of each building and natural world of which the

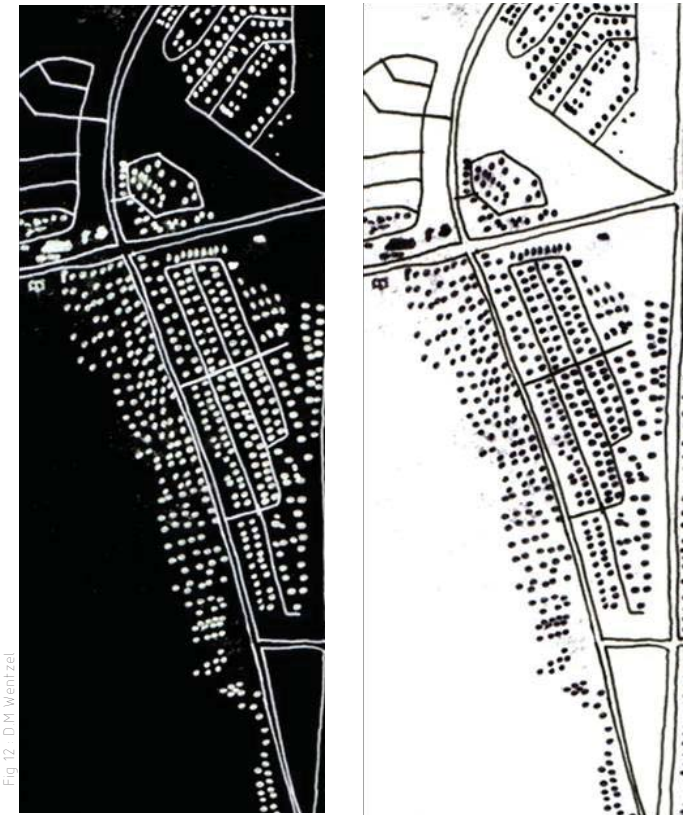


Fig 12. D M Wentzel

Nollie map of Soshanguve to study the relationship of solids and voids.

vegetation is the building material (Corner 1999: 35). The landscape is the gathering space of people, fauna and flora; the meeting place.

City growth must be directed according to its own dictates and logic, to prevent urban sprawl, to follow regional routes. Sprawl will lead to a coarse texture in urban fabric, while a fine-textured urban fabric has the benefits of working well on pedestrian scale. A fine-textured urban fabric also means a compacted local market that favours small entrepreneurs with a greater economic diversification and specialisation, reduces the need to travel, and lowers unit costs of social and other services.

Two main problems crop up in the planning of the city's new urban growth, namely, the question of how to accommodate it, and remedial problems, namely the inadequate performance of existing urban areas (Dewar & Uytenbogaardt 1991: 35). These two problems are either solved through a romantic approach, in which order is generated organically through social and site processes, or classical point of view, in which order is generated through geometry (Dewar & Uytenbogaardt 1991: 38). This discourse places more emphasis on the romantic point of view, where order is generated through the social and site processes and emphasis is placed on the relationship between the urban areas and the natural areas, as well as the relationship between the urban dwellers and the activities of the "city".

The open and natural areas are easily neglected and become dangerous areas to be avoided. Open spaces must be designed for ease of maintenance and the active movement of people through the space as much as possible.

Linking the parts

Continuity of the urban fabric promotes interdependence and blurs artificial boundaries (Dewar & Uytenbogaardt 1991: 48). Interconnectedness, and the directness of these connections, will ensure the economic and social efficiency of the city. A continual and direct pattern of accessibility is where the movement flows of people and good are seen as the "glue" which integrates the city as a whole (Dewar & Uytenbogaardt 1991: 53). Connector routes can be a structuring element of the city where the activities are located along the road to form an 'activity channel'. This promotes opportunities for the small businessman as well as freedom of action within the constraints of the urban system (Dewar & Uytenbogaardt 1991: 50).

Fig 13 : Corner,1999: 88

The city of Berlin in 1737, G. Dusableau. The Leipziger Platz was constructed- (the octagon west of the fortified city).

Fig 14 : Corner,1999: 93

Russian tanks quell the worker revolt in the spring 1953, here seen at the limits of their authority, at the border of the allied city by the gates to Leipziger Platz.

Placemaking

People need an identifiable spatial unit to which to belong (Alexander 1977: 81).

Seeing is a cognitive rather than a retinal phenomenon. Seeing involves identifying, understanding properties and usages, and follows from learning (Le Corbusier, as quoted in Tzonis 2001: 12).

Placemaking in the city is about celebrating the collective living from within and happens in the open spaces where the public meets or moves through. It is in these spaces that human intention and even beauty are conveyed through the conscious and unconscious shaping of spaces by the urban dwellers. Time and the character of the city are manifested through cultural and individual expression in physical elements, such as sculptures, or even the form of the space. “The memory of place, historic sites and the objectives of art assist in creating special places in the built environment” (Harris 1992: 8).

Culture

Cultures are expressed through their art, as stated above, that manifests in the architecture and designed landscapes. The influence that culture has on the landscape or environment is reflective of the view that the culture has or has not on politics and social influences. Politics and social history also leave their footprints behind. Change is part of culture, and the expression of these dynamics is the identity of the present, and the memory of the future, generations. These memories will inform the people from where they come and prepare them for the future. For the tourist it will be part of his exploration of the identity of the unknown culture.

In his essay about Recovering Landscapes, Alan Balfour tells the story of the Leipziger

The Wall at Leipziger Platz and Potsdamer Platz, late 1960’s.

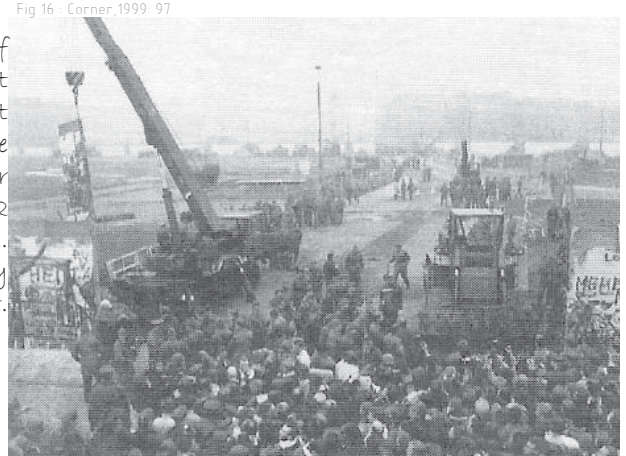
Fig 15 : Corner,1999: 95

Platz, the park that was constructed in 1736. Leipziger Platz outlived the Napoleon wars, and took part in the Berlin wall story when the wall was first built on the periphery of the park. Later when the wall was knocked down the two mayors of the two Berlins walked from east and west to meet in the middle of this park on 12 November 1989 (Corner 1999: 96). This octagonal park was a park for the nation, “volkspark”, not as such in the tangible and visual aspect of the meaning, but in the sense that it was the direct place of activities throughout the history of the “volk” of Berlin.

Mark Treib stresses that we would do well to treat the designed landscape as “poetic meditation(s) on existence” (in Corner 1999: 40).

Fig 16 : Corner,1999: 97

The mayors of East and West Berlin meet n the middle of Leipziger Platz, 12 November 1989. Photograph by Alan Balfour.



Time: change and cycles

Landscapes require time for the growth of trees and for plants to be established and to flower (Corner 1999: 37).
Change is the direct byproduct of time. Landscapes cannot successfully be planned if the mindset of an unchanging image is held (Corner 1999; 70). Landscapes are fully bound to the effects of nature and time, the cycle of seasons and the passage of time, processes of hydrology, weathering, and succession, and the alternation of day and night, sun and moon (Sebastien Marot in Corner 1999: 51). According to Marot, the study and understanding of these processes will enable us as designers to restore and prepare the site for the unforeseeable future (Corner 1999: 51). But the mere idea of designing for change invokes an idea of incompleteness: rather than building a solution, seeds are sown, questions raised, and potential structured (Corner 1999: 51). Marot takes the element of time in the landscape further and proposes the design of phases made visible for the user. The visibility will enable the reading and interpretation of time by others who use and invest their time in such places. These cycles of change impact on the perceived idea of space. Darkness makes the space smaller, the loss of leaves reveals what was hidden and opens the enclosed space. Colour changes: the whole composition can change through the use of annual plants. Landscapes give us a sense of our relation to time: “Landscapes designed in conscience with the annual cycles resonate with their connection to the place and reflect the life within it” (Corner 1999: 39).

Georges Descombes said, designed landscapes must not only make the passing of time visible, but also make this passage effecting of further potential visible (in Corner 1999: 79).

It is not only the landscape that changes, but the way people perceive the landscape (Corner 1999: 80). And it is this inherent quality of change within the landscape that Descombes wants to reveal through making the paths, routes, traces and possibilities present.

In a project of pathways he saw the path as a way of researching the landscape, of experimenting with alternately big and little things with the often overlooked and neglected: blades of grass, flowers, stones, tree roots, small streams, and so forth (Corner 1999: 81). To reveal the landscape, rather than to be pretentious in adding materials, the walker will be able to interpret his experience within his own perceived ideas. Thus, we seek to clarify the landscape, to amplify its character through subtraction and modest – though highly calculated – intervention (Corner 1999: 82). Corner summarised this as:

1. Add nothing new to the existing confusion of the site;
2. Amplify certain potentials of the place; and
3. Respond economically to functional requirements.

Precedent studies

Precedent studies are presented to explore the theme of the discourse and must show innovative ways for problem solving in connection with problems associated with this thesis.

Downsview Park, Toronto, Canada

Downsview Park is the first-created national park in Canada, and was built on the site of the former Canadian Forces Base in Toronto. The objective of the design is to be responsive to the social and natural history of the site and also to develop its potential as a new landscape. This new landscape must be capable of sustaining new ecologies and an evolving array of public uses and events (including ones of national and international distinction). The design intention is to structure the transformation of the site and remain open to change and growth over time.

A design competition was held in two stages: the first phase was about the expression of interest, from which five teams were chosen for the second stage. For the second stage, the design teams were asked to prepare a schematic design of the park to include the green spaces, cultural campus and perimeter. The design proposal should cover the entire site and include strategic implementation within three phases, of which the first phase must be designed in detail. The three phases must be individually coherent, with its own integrity and stand-alone character. The teams were provided with a program that was composed through the consultation of the people and included park elements and themes.

Tree City was the winning design team and concept. The concept was brilliant and was able to link the current living conditions to the reality of a twenty-first century park, and, through the phase planning, change the appearance from former Canadian Forces Base to modern parkland. Tree City creates a special personality for itself and its surrounding community. The first phase begins with the preparation of the soil, path making and planting. Through the growth of old

vegetation and the increase of new vegetation over a period of 15 years, the physical site will develop. Eventually the site will be covered with 25% forest, in addition to meadows, playing fields and gardens.

Tree City will become a self-sustaining park in every sense and its natural network will appreciate as the park matures. Future development on the site, as well as gradual renovations of existing structures, will add value to the park, while providing income for its continued maintenance. One thousand crossing paths for cyclists, joggers, rollerbladers and pedestrians will complement the park and add to its accessibility.

By continuing its landscape clusters and extensive pedestrian pathways into adjacent areas, Tree City can link up with the Black Creek and West Don river systems and ravines, integrating Downsview into the system of wooded river valleys, parks and public paths currently existing in Toronto's urban domain.

The Relevance of the Precedent:

Design must be responsive to the social and natural history of the site while establishing its present identity and openness to future change. Downsview Park also manages the transformation through phases where vegetation and movement form the first phase and the structure for the other phases. Movement also creates the link between internal parts and adjacent areas.

Fig 17 www.pdp.ca/International_Design_Competition 413 0.html

Fig 18 www.pdp.ca/International_Design_Competition 413 0.html

The tree city as a selfsustaining park

Fig 14 : http://time.mystiek.net/

La Tourette is an architectural masterpiece where different shapes and identities are brought together with a contrast between the horizontal layered monastery and the vertical church mass.

La Tourette - Le Corbusier

"To dwell in the silence of men of prayer and study and to construct a church for them –this was the program proposed to Le Corbusier in 1952 [...], by the Provincial chapter of the Dominicans of Lyons [...]" (time.mystiek.net).
Le Corbusier's inspiration for the design of La Tourette was influenced by the Charterhouse of Ema in Tuscany, Italy. This building has great influence on both of his later architecture and urban theories. At Ema, his idea about humane architecture arose. This he defined as harmony, resulting from the interplay of the individual and the collective. He was driven by communistic ideas and therefore didn't believe in God. The reason why he designed La Tourette is explained by the author of the website as the wish to examine new architectural problems, and especially for Tourette, it was the opportunity to build a "micro community"; to express his urban ideas in an actually built plan for the first time. He built a closed city of the spirit.

La Tourette was built as a Dominican priest's school.

This meant to Le Corbusier that he had to design a machine to enable one hundred men to live together in a community with strict rules – men who are preparing for their priesthood through study and meditation. Dominican rules and daily routines had to be the basis for the program. There is a balance between work and prayer, solitude and gathering. Le Corbusier successfully created a silent place of meditation, study and peace. The simplicity and "poverty" of the place seems to match the monastic ideals perfectly.
La Tourette is located on a lonely site on a hillside, because of the function of the place as a monastic college, a place of study and prayer. The silent location seems to serve these needs perfectly.

The building

In its basic shape, La Tourette recalls the typical Christian monastery with its rectangular "U" circulating around the courtyard and the church on the open side. The shape is punctured by glazed walkways, skylights and prismatic objects. Private cells for the monks and students circulate on the two top floors with windows to the outside

A play of solid mass punctured by glazed walkways, skylights and prismatic objects.

Fig 19 : http://time.mystiek.net/

The inside impression

The monastery is designed using traditional church elements to relate to the identity of the place, but through the use of light, solids and voids, Le Corbusier designed spaces that stimulate the activities and movement of people in the building. The entrance area is designed to remind a visitor of the dignity of the place which he is entering, but also to have an inviting character, since Tourette is a teaching institution and one would not want to cut it off from the surrounding world. La Tourette is standing open on a hill and symbolises these aspects together with the bridge behind it. Within this entrance area Le Corbusier

The heavy masses and careful use of light create a mystic atmosphere with total devotion

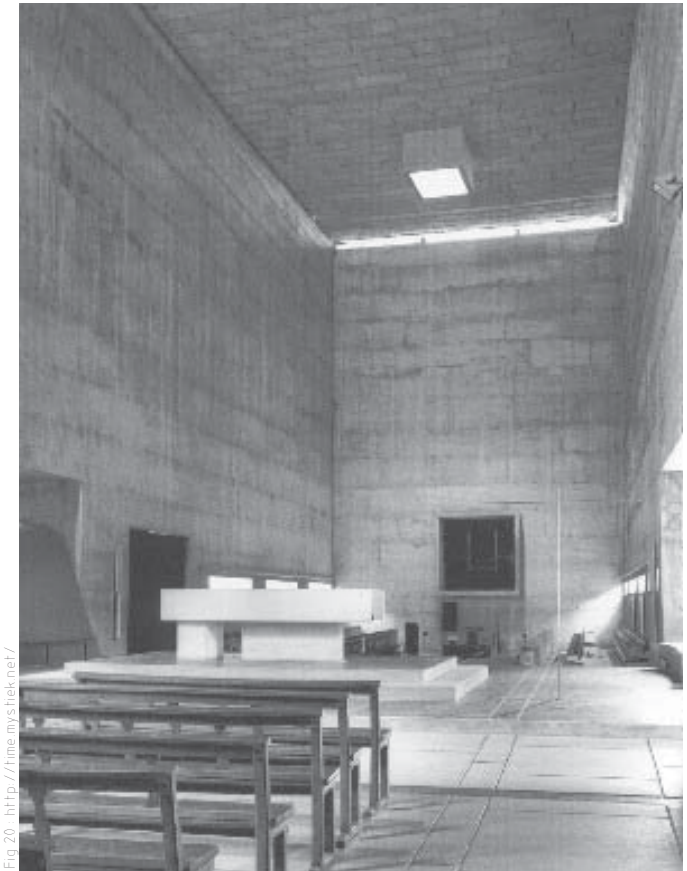


Fig 20 : http://time.mystiek.net/

placed four conversation cells. Uncomfortable benches and the dark atmosphere inside convey a temporary impression that discourages visitors from staying any longer than they need to. These rooms are needed because the monks are not allowed to take visitors into the monastery or even to their cells. The entrance area seems to be outside of the monastic district, but is the first step in the transition from the normal world to a spiritual place. Le Corbusier lets this transition progress in a long, narrow corridor that leads into an even narrower corridor with both of them ending in a blank concrete wall. They circulate around the outside of the building. These halls give a cold impression and are, again, meant to remind one of the dignity of the place one is entering. All of the college functions and the oratory are on the entrance level. The oratory is a cubic form on a cross-shaped support topped with a pyramid roof. It has an important position in the courtyard in order to show its importance in the life of the young Dominicans. It is the room of private prayer and its form is meant to help the student concentrate his mind on prayer exclusively. By positioning the oratory as a solitary form in the courtyard, Le Corbusier points out its special importance and also recalls the traditional positioning.

The simplicity and austerity of the place successfully creates a silent place for meditation, study and peace.

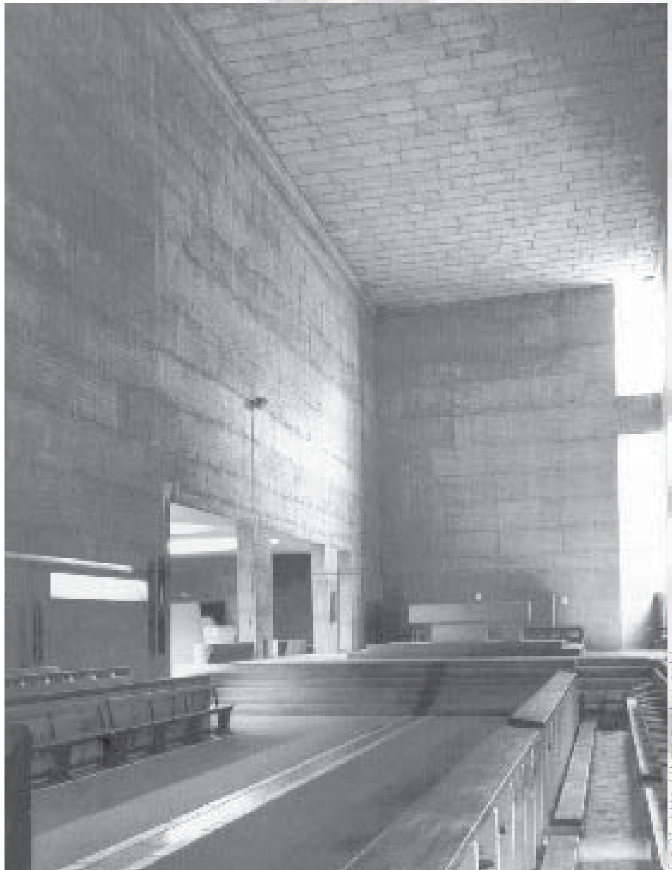


Fig 21 : http://time.mystiek.net/

Le Corbusier created a mystic atmosphere of total discipline and devotion with the heavy wall masses and the careful use of light, which comes in through low slots by the stalls, and through cracks between the wall and the ceiling.

The Relevance of the Precedent:

La Tourette shows the play of materials, light and spaces to express feeling movement, character and identity that is imprinted on the user to stimulate activities and movement of people.

The Conservation and Development of Genadendal

The mission station in the Western Cape, Genadendal is established as a Moravian mission settlement in 1737. The picturesque village of Genadendal is located about 140km east of Cape Town, nestled in a fertile, water-rich valley at the foothills of the Riveirsonderend mountain range. George Schmidt, a Moravian priest from Herrenhut, Germany, was the initiator of this mission which soon developed rapidly to the largest settlement in the old Cape Colony, after Cape Town. Its pioneering spirit and unique advances in important fields of human endeavour soon distinguished it from other rural settlements in the country.

Genadendal's earliest achievements were remarkable. The little town led with several firsts since its establishment: The first solid bridge in South Africa, first teacher's training college, first formal school and crèche in the interior, to name a few. Completely self-sufficient at the time with a number of inter-related crafts and industries such as the manufacturing of clothes, leather articles and unique pieces of furniture, as well as the cultivation of agricultural produce. Today, over two centuries later, it is an impoverished rural community, rooted in traditional values, rich in hidden treasures and ripe for development.

A development framework was establish with the main focus on the restoring of the historical buildings, landscape and environmental features to act as a catalyst for the attraction of tourists, which is a very important aspect of the economy of the Western Cape. This included:

1. Establish workshops for the training of local people in the necessary skills such as traditional 'Genadendal' chairs and Herrenhuter knives, the building of new development, management of nature conservation and tourist related activities.
2. Establishing infrastructure (roads, storm water drainage, water supply, waste disposal and street lighting)
3. Urban development:
    a. cultivation of its natural heritage

Fig 22: Papendorp et al

   b. Promotion of its cultural richness
   c. Development of its musical heritage
   d. Beautification programme to establish a character and image for Genadendal
   e. Provision of more facilities to accommodate visitors.
4. Architectural restoration
5. Urban environmental conservation of original character.
6. Nature experience through hiking trails, mountain bike trails and picnic areas.

The Relevance of the Precedent:

The Mission station, Genadendal, flourished in the Cape Colonial times, but due to a few problems the economical and social situation eroded to only a shadow of the once successful settlement. The character and identity of the “Golden days” are identified and the opportunities of the present age are recognized. These two aspects are combined to find the path of successful and sustainable development for the future. These principles of recognizing the development opportunities of the existing site within its regional context are important for the development on Kwasizabantu. Then the importance of the history as part of the identity of the present is emphasized and must be recognized on the Kwasizabantu mission. Others aspects of the precedent to be used are the holistic approach in the development of the site: the natural, economical and social aspects to be addressed.

Fig 23 Papendorp et al

Fig 24 Papendorp et al

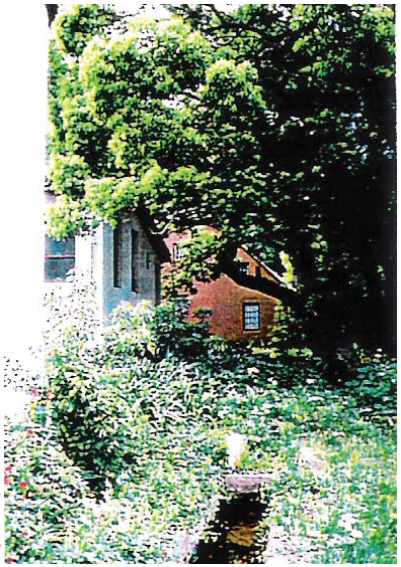


Fig 25 Papendorp et al

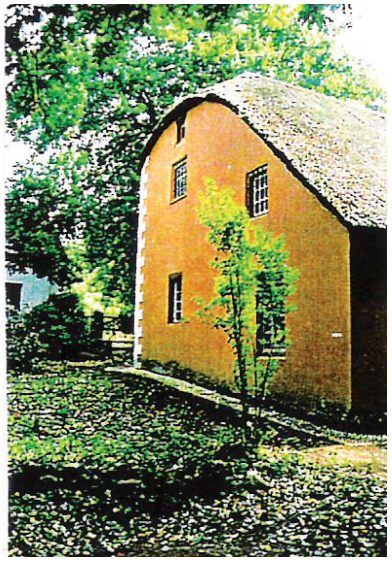


Fig 26 Papendorp et al

Historic buildings on mission werf

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Photo 1. D.M. Wentzel

Photo 2. D.M. Wentzel

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Development Framework

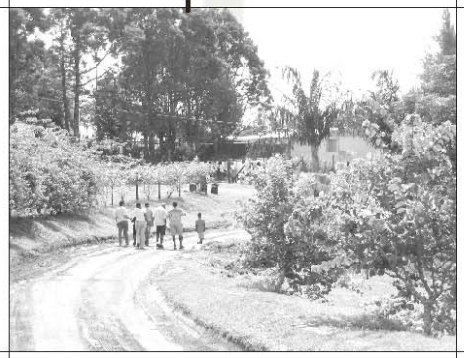


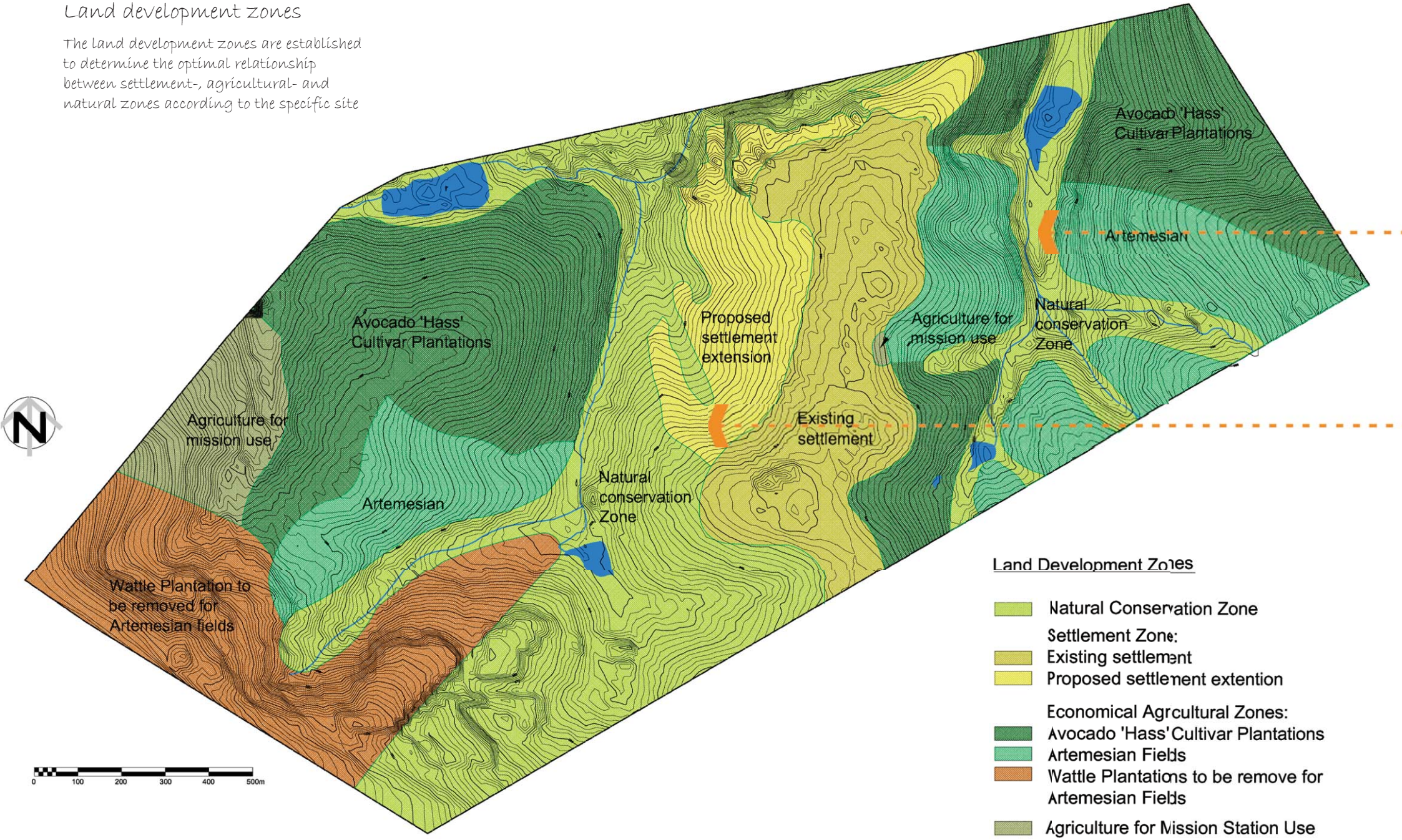
Photo 4. D.M. Wentzel

Photo 5. D.M. Wentzel

Photo 6. D.M. Wentzel

Land development zones

The land development zones are established to determine the optimal relationship between settlement-, agricultural- and natural zones according to the specific site

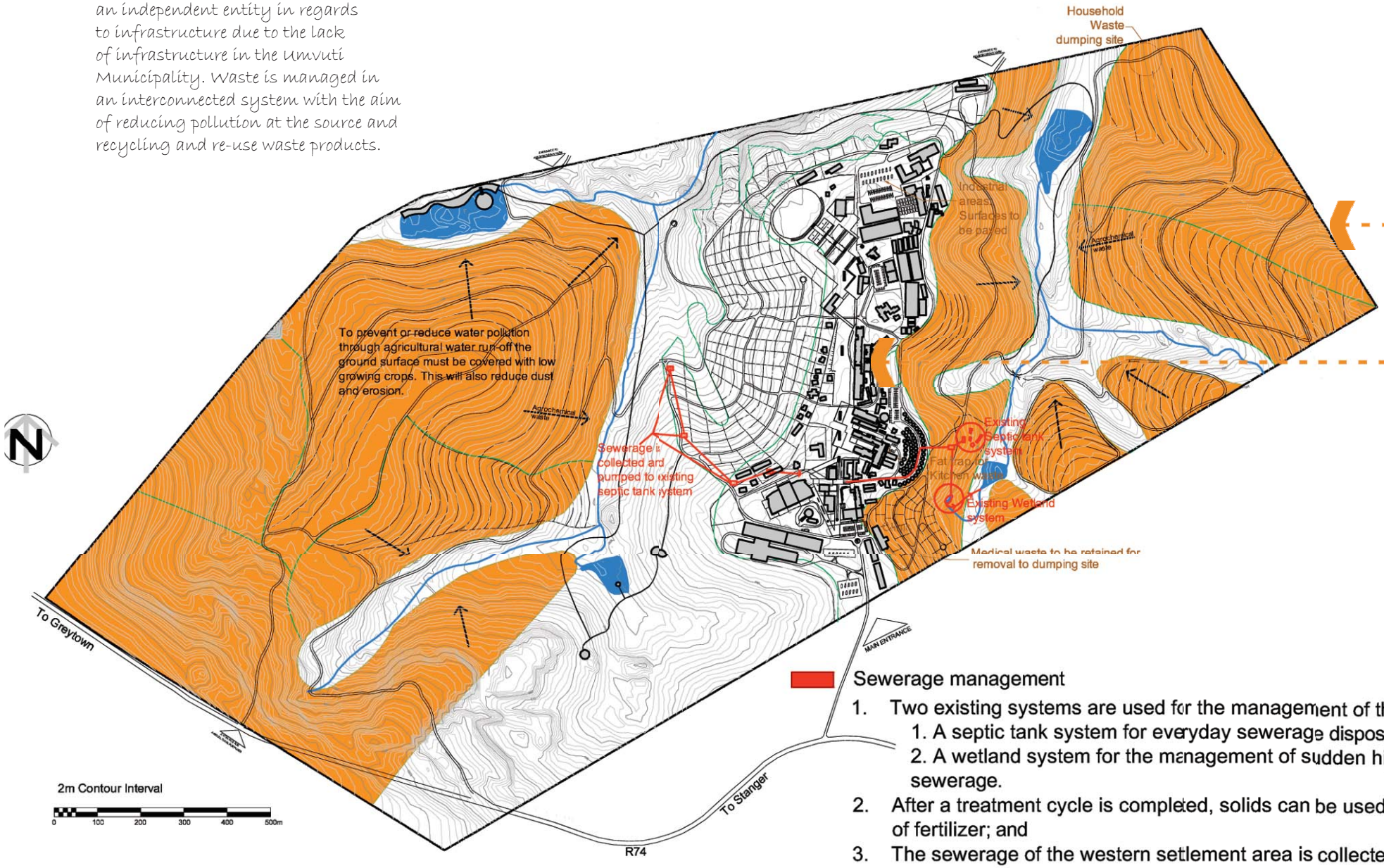


Approximately 30% of the site is to be rehabilitated to represent the Mist Belt Grass Biome. 60% of these 30% will be used for a game and bird sanctuary.

Proposed extension of residential area of settlement in previous kikuyu fields.

Waste management

Kwasizabantu must function as an independent entity in regards to infrastructure due to the lack of infrastructure in the Umvuti Municipality. Waste is managed in an interconnected system with the aim of reducing pollution at the source and recycling and re-use waste products.



Sewerage management

1. Two existing systems are used for the management of the sewerage:
   1. A septic tank system for everyday sewerage disposal; and
   2. A wetland system for the management of sudden high volumes of sewerage.
2. After a treatment cycle is completed, solids can be used in the production of fertilizer; and
3. The sewerage of the western settlement area is collected at specific points and pumped to the eastern side of the settlement where it flows down with the natural slope to the existing septic tank.

All soil surfaces must be covered either with hard landscaping or vegetation to prevent dust pollution or the disposal of sediment in water coarses.

Settlement should be designed for the ease of pedestrian movement. This will reduce the use of vehicles and the associated air pollution.

Agricultural waste management

Agricultural sources recognised for waste management:

1. Agrochemicals in soil fertilizers and insecticides, as well as runoff from farm lands results in the pollution of water resources; and
2. Dust due to agricultural activities contributes to the air pollution.

Source-based control for the reduction of waste:

1. Slope stabilisation through tillage parallel with contours;
2. Road surfaces must be paved or covered to prevent soil erosion;
3. All natural areas must be covered with planting; and
4. Agrochemicals must be reduced to the absolute minimum.

Settlement waste management

(An existing household waste-dumping site, in accordance to SABS standards, can be found at the north-eastern boundary of site)

Industrial waste

1. Areas to be paved to prevent chemicals seeping through to the soil;
2. Storm-water runoff to be retained in detention pond and purified according to special requirements for industrial waste; and
3. Separate waste dumping point according to SABS standards.

Kitchen waste

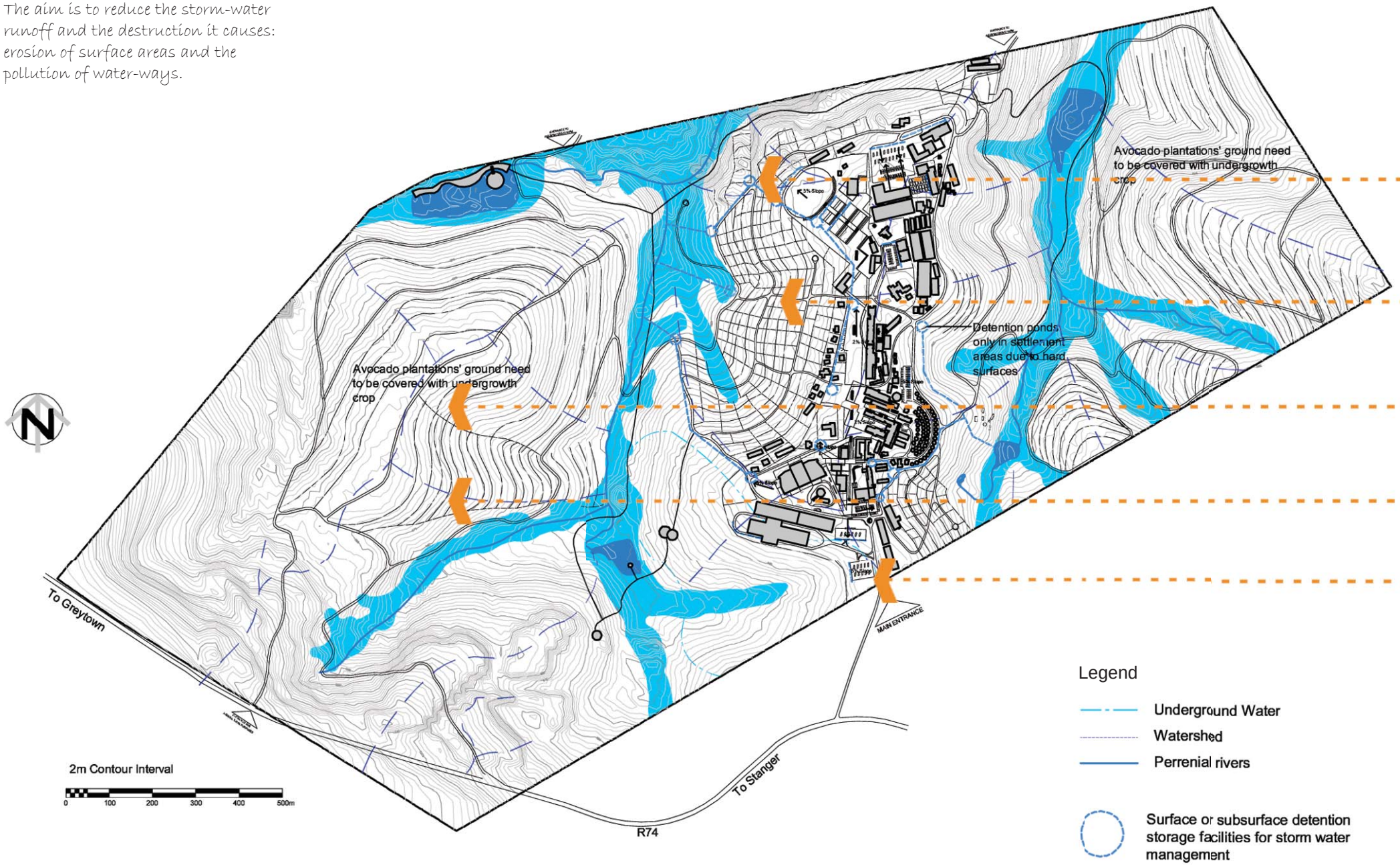
1. Kitchen waste water runs through a fat trap before entering the main system; and
2. Kitchen solid waste to be used for the poultry farm as far as possible.

Medical waste of AIDS care centre

1. Solid waste to be retained for the removal to closest specified medical dumping site; and
2. Sewerage system to be connected to main system, with emphasis placed on no chemicals being thrown into the sewerage system.

Drainage management

The aim is to reduce the storm-water runoff and the destruction it causes: erosion of surface areas and the pollution of water-ways.



Detention ponds are located only in settlement areas, due to the vast amount of water run-off accumulated because of hard surfaces.

Streets to be used as storm water conveyance channels to the retention ponds, where water must be treated before it is channeled to the four different dams for disposal. This is to ensure water quality suitable for the environment. For road design refer to Figure 1.

Avocado plantations must be covered with undergrowth crops such as: velvet beans, soya-beans, ration beans, cowpeas, medics, wheat, rye, barley, teff, vetches, desmodiums or groundnuts, to reduce storm-water runoff

Artemesian fields are terraced and plowed parallel with contours which are ideal for storm-water runoff reduction.

Parking areas must be of solid robust materials to reduce polluted water (due to oil leakage) entering natural systems. This water must be collected at a central point and treated before entering the natural systems.

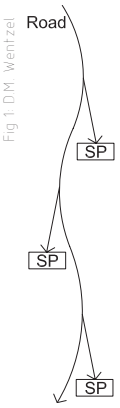


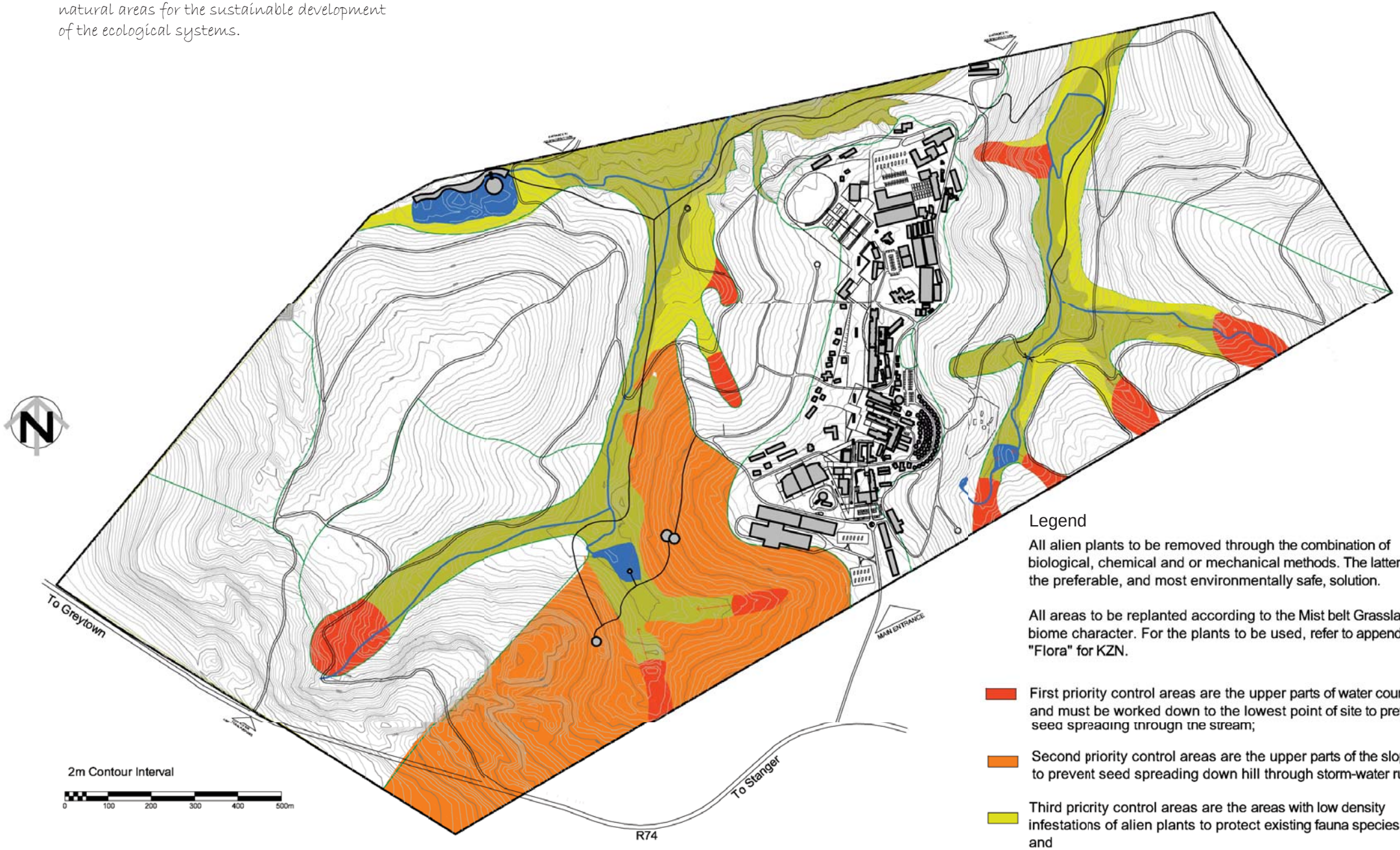
Fig 1 D.M. Wentzel

SP - Seepage Points

Seepage points on the outside turning circle of all road bends. Seepage points are connected with perforated 100mm dia pvc pipes to detention ponds.

Natural conservation management

Natural Conservation Management is for the rehabilitation and conservation of the natural areas for the sustainable development of the ecological systems.



Legend

All alien plants to be removed through the combination of biological, chemical and or mechanical methods. The latter is the preferable, and most environmentally safe, solution.

All areas to be replanted according to the Mist belt Grassland biome character. For the plants to be used, refer to appendix "Flora" for KZN.

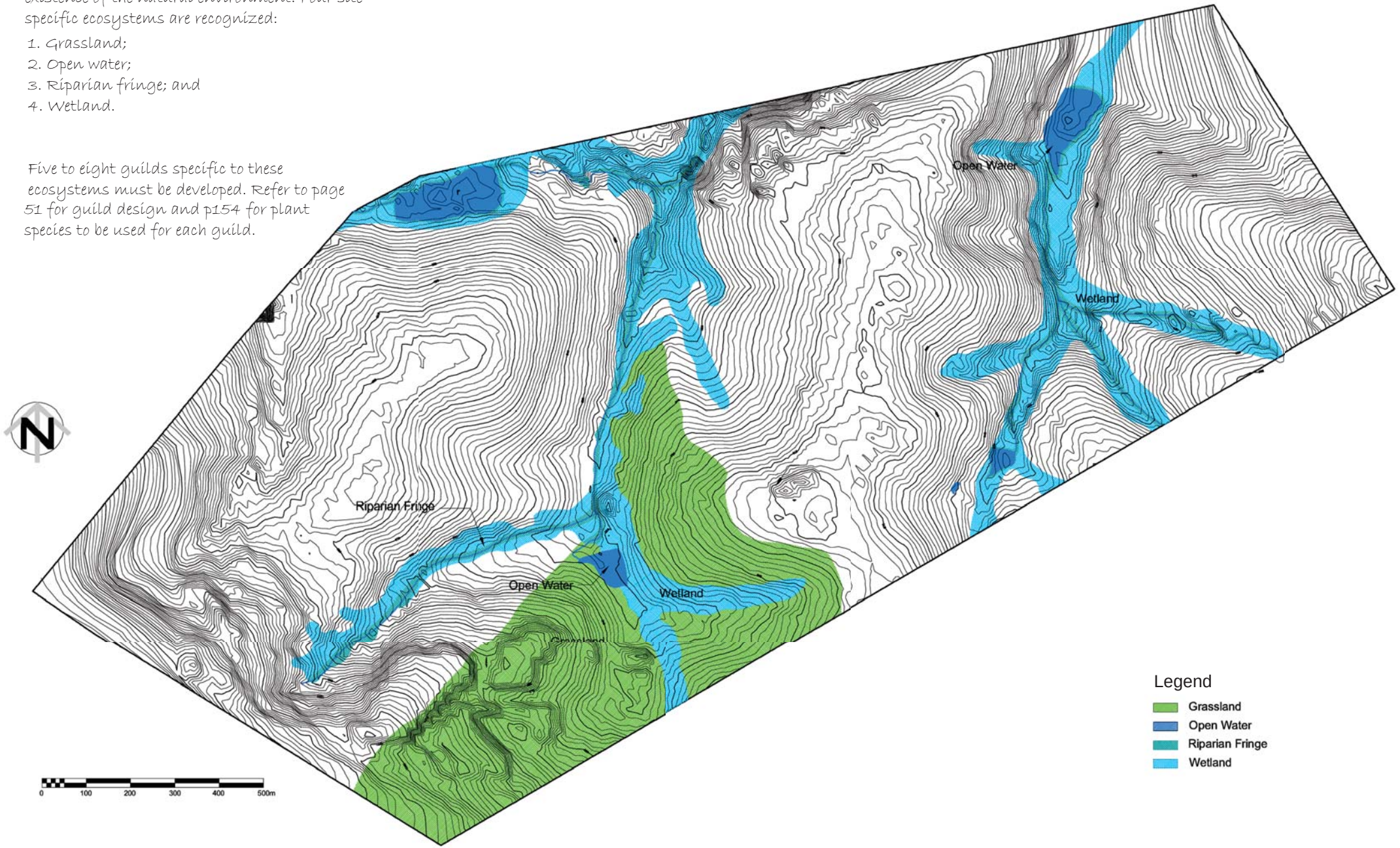
- First priority control areas are the upper parts of water courses and must be worked down to the lowest point of site to prevent seed spreading through the stream;
- Second priority control areas are the upper parts of the slopes, to prevent seed spreading down hill through storm-water runoff;
- Third pricrity control areas are the areas with low density infestations of alien plants to protect existing fauna species; and
- Remaining areas

Function-base habitat design

The rehabilitated areas' Mist Belt Grassland Biome character must be established for the sustainable existence of the natural environment. Four site-specific ecosystems are recognized:

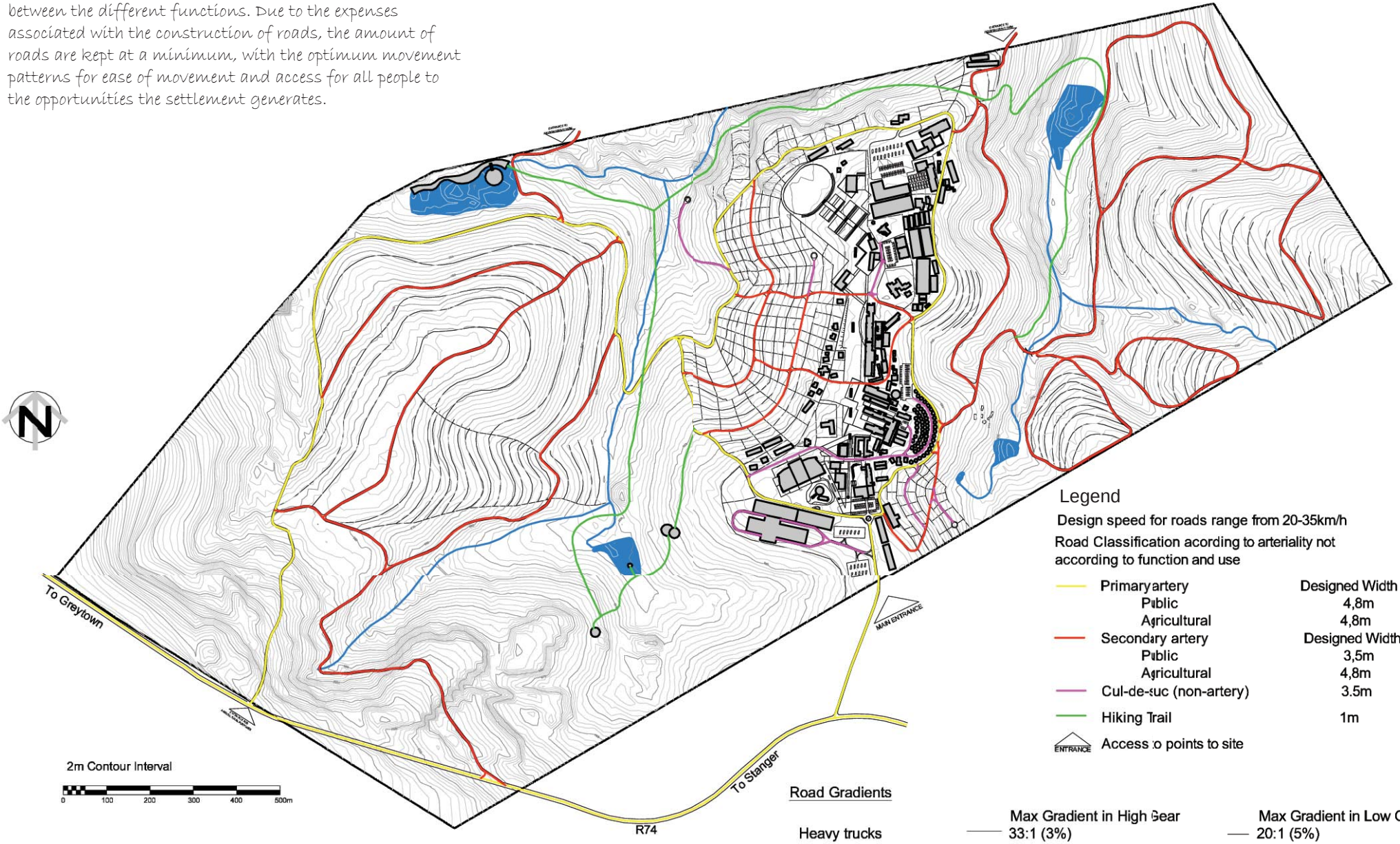
1. Grassland;
2. Open water;
3. Riparian fringe; and
4. Wetland.

Five to eight guilds specific to these ecosystems must be developed. Refer to page 51 for guild design and p154 for plant species to be used for each guild.

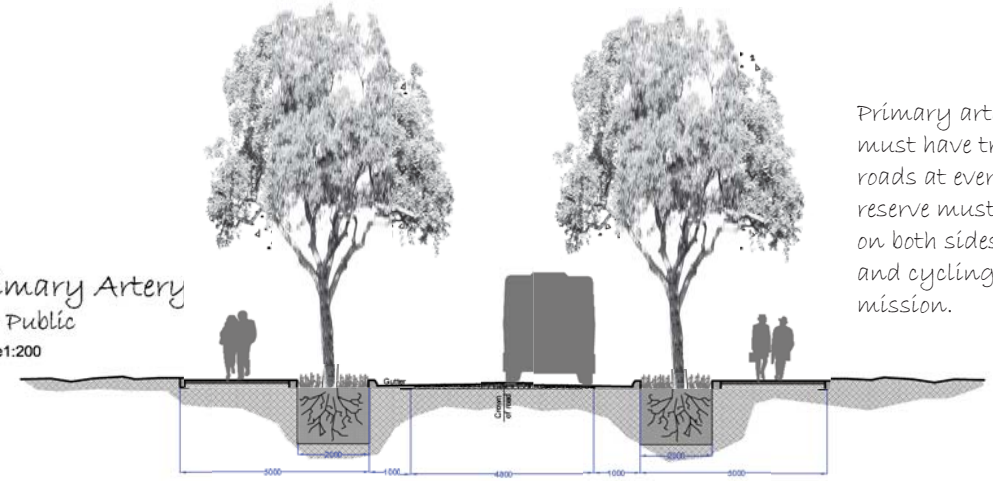


Circulation design

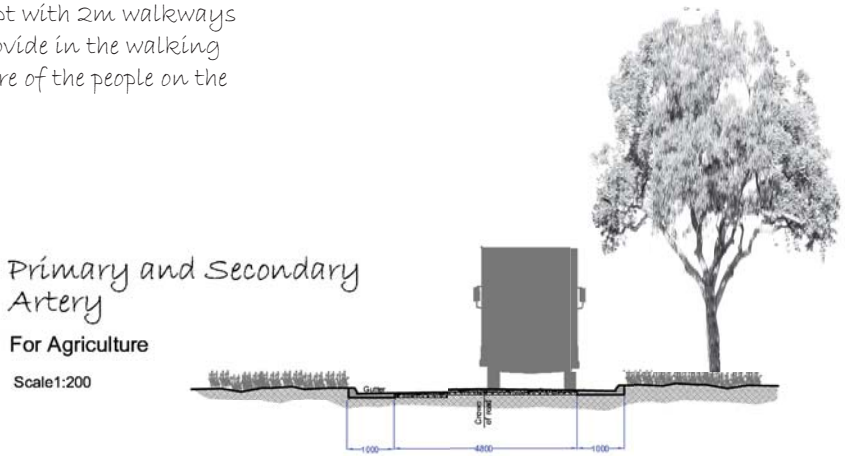
Roads form the structuring mechanism in the proposed development area and form a network of connections between the different functions. Due to the expenses associated with the construction of roads, the amount of roads are kept at a minimum, with the optimum movement patterns for ease of movement and access for all people to the opportunities the settlement generates.



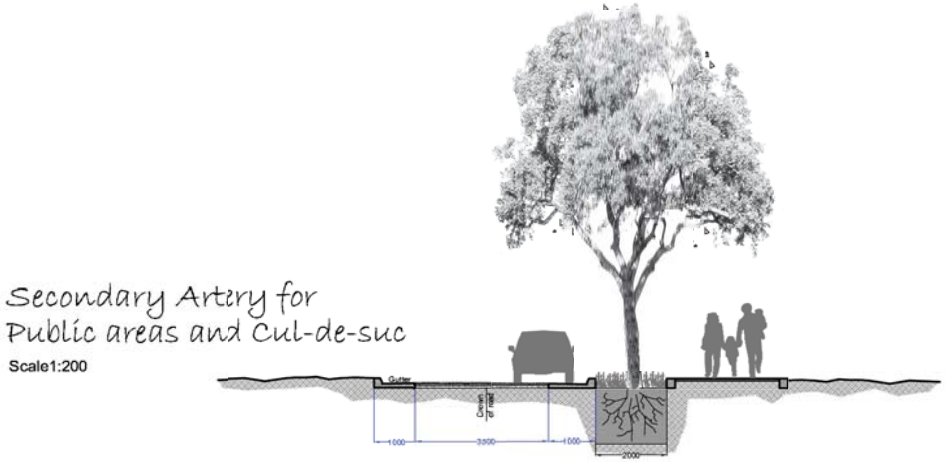
Design proposals for different street types



Primary artery roads for public areas must have trees on both sides of the roads at every 7m interval. A 5m road reserve must be kept with 2m walkways on both sides to provide in the walking and cycling culture of the people on the mission.



Primary and secondary artery roads for agricultural areas must consist of only the constructed roads laid out in the landscape. All vegetation next to the road must be either natural or part of the agricultural production. No provision for walkways are made due to the low volumes of traffic on the roads.



Secondary arteries for public areas and cul-de-sac roads form the movement system within the residential areas. These roads are only 3,5m wide with an additional 1m open gutter a both sides. The width is determined according to the low volumes of traffic. Traveling on site is predominantly pedestrian, or by bicycle and motorbike.

Hiking trails are 1,2m wide, and elevated 400mm above ground. This prevents the erosion of walkways due to constant movement over uncovered surfaces.

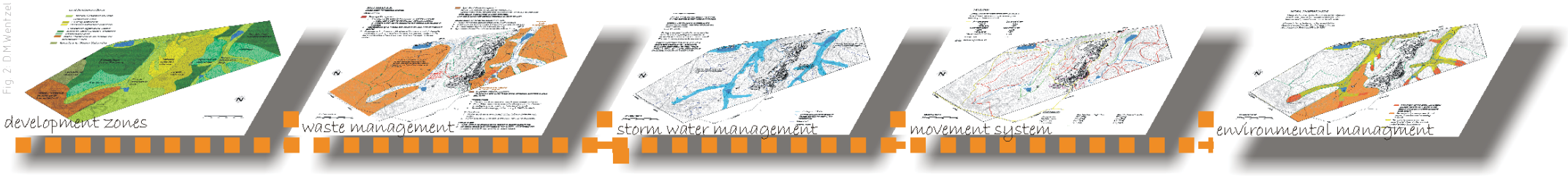
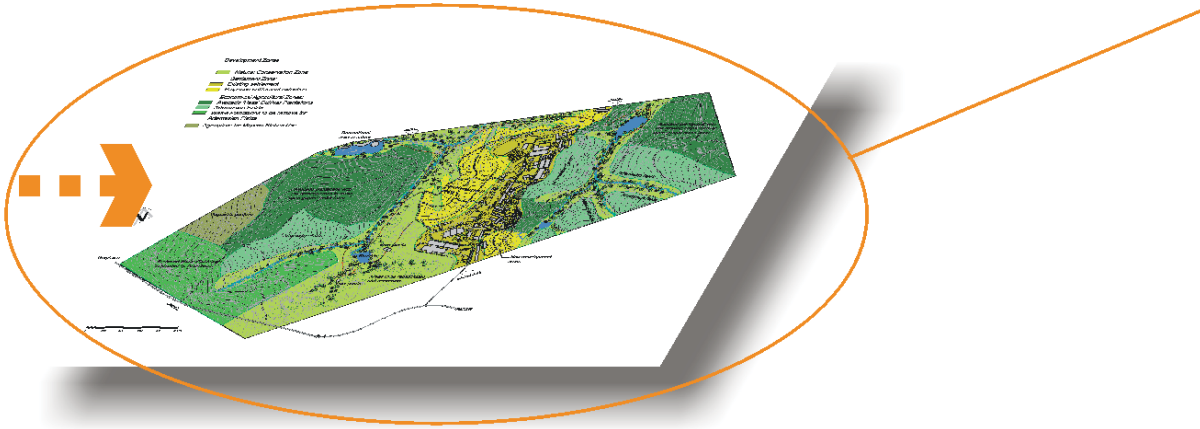


Fig. 2 D M Wentzel

The development framework as a synergy of these layers and the design of the site as a whole.



Site development framework

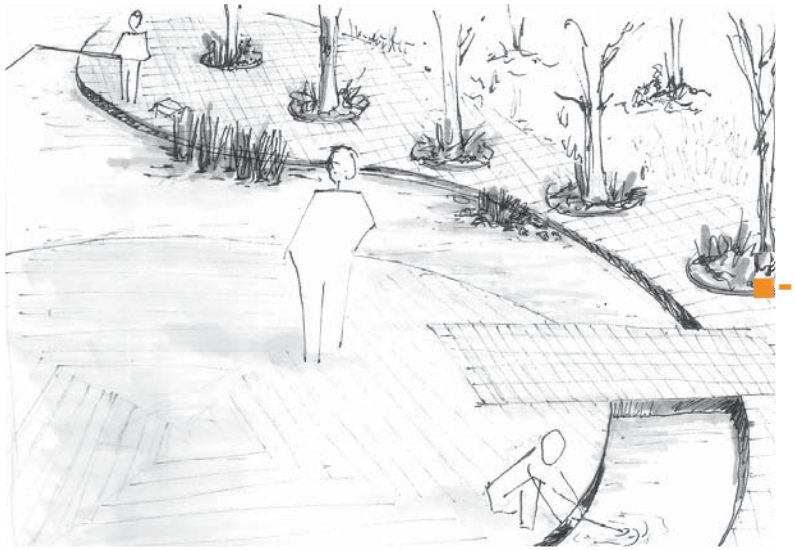


Fig. 3. D M Wentzel

Recreational area at the dam for relaxation and the social gathering of the community.

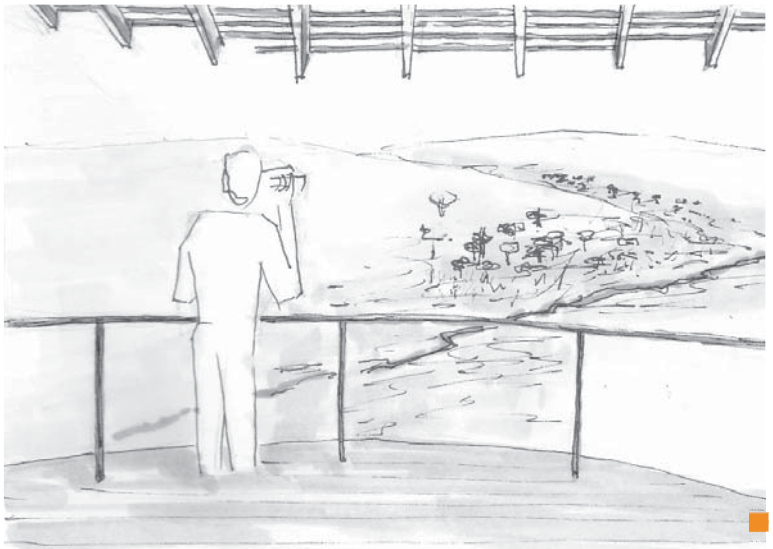


Fig. 4. D M Wentzel

View points on the hiking trail enables the people to enjoy a view over the valley and animals of the game reserve.

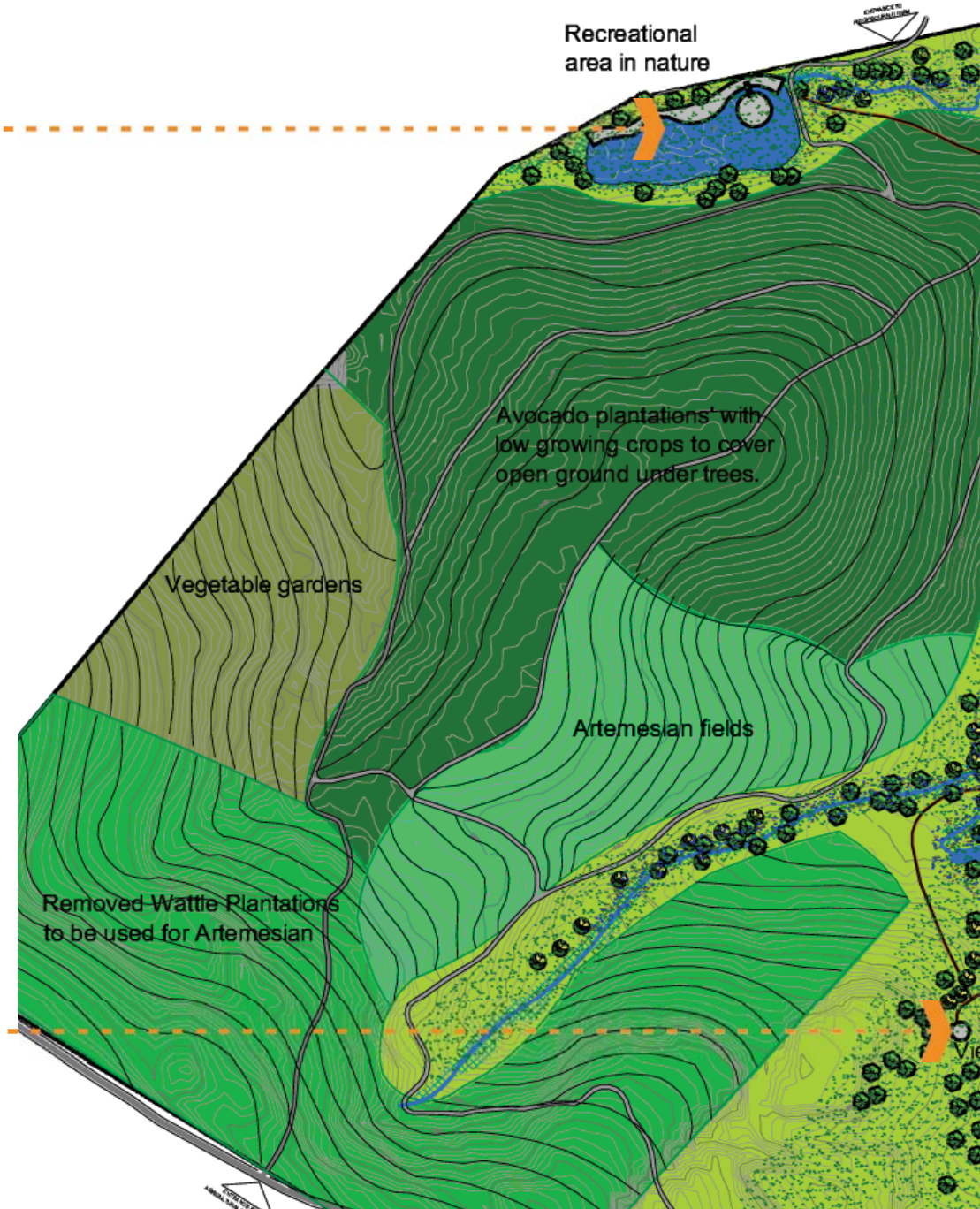


Fig. 5. D.M.Wentzel

Hiking trail, the extension of the settlement into the natural valley.

Fig. 6. D.M.Wentzel

Bird Hide: Through interaction with nature people will learn to appreciate the natural environment and will be able to act as stewards of nature.

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Photo 1: D.Wunderlich

Photo 2: D.Wunderlich

Photo 3: D.M. Wentzel

Master Plan

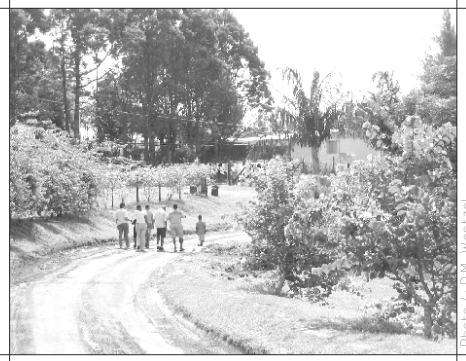


Photo 4: D.M. Wentzel

Photo 5: D.Wunderlich

Photo 6: D.M. Wentzel

Functional groups for ordering the village

1. EDU - SCHOOL
   - CRECHE
   - PRE-PRIMARY
   - PRIMARY
   - SECONDARY
2. EDU - TERTIARY
   - TEACHER'S COLLEGE
3. EDU - ADULT
4. RADIO STATION
5. HEALTH CARE - CLINIC
6. AIDS CARE
7. PSYCHOLOGIC
   - PSYCHIATRIC ILLNESSES
   - DRUG REHABILITATION
   - EMOTIONAL CARE
8. TRAINING
   - TRAINING OF COMMUNITY VOLUNTEERS IN HEALTH CARE
9. ARTS + CRAFTS
   - WEAVING
   - POTTERY
10. AGRICULTURE
    - VEGETABLES
    - GREEN PEPPERS
    - AVOCADOS
    - ARTEMESIAN
    - NURSERY
    - POULTRY
11. FOOD PROCESSING
    - DIARY
    - aQUELLÉ
    - PASTA
    - JAM
    - BAKERY
12. WORKSHOPS TECHNICAL
    - TECHNICAL
    - ELECTRICAL
    - CARPENTRY
    - SAW MILL
13. BUILD SERVICES
    - MATERIAL FACTORY
    - PLUMBING
    - BOILER
14. COMMUNICATION
    - SWITCH BOARD
    - RECEPTION
    - INTERNET SERVER
    - TELEPHONE TOWER
15. COMMUNITY SERVICES
    - ATM - STANDARD BANK
    - LAUNDRY
    - LIBRARY
    - FUEL PUMPS
    - DINING HALL
    - PUBLIC PHONES
    - POST BOXES
    - AUDITORIUM
    - TAPE ROOM
16. RES. PERMANENT
    - FAMILIES
    - INDIVIDUAL MEN
    - INDIVIDUAL WOMEN
17. RES. VISITORS
    - BACK PACKERS
    - TEMPORARILY STAYING
    - HELPERS
    - V.I.P
    - DAY VISITORS
18. CEMETRY
19. DUMPING AREA FOR WASTE
20. SEWERAGE
21. LOCAL COMMUNITY
22. OPEN GREEN SPACES
    - PUBLIC GATHERING SPACE
    - NEIGHBOURHOOD PARK
    - PLAYLOT
    - SPORTSFIELD

Fig. 1: D.M. Wentzel

According to the needs of the individual and community, the programme is established. The elements of the programme are grouped into functional groups, where certain activities have spatial and functional communalities. The relationships between these functional groups are determined with the use of a matrix. Out of this relationship matrix the spatial implications are ideally established through the use of relationship diagrams.

Functional relationships

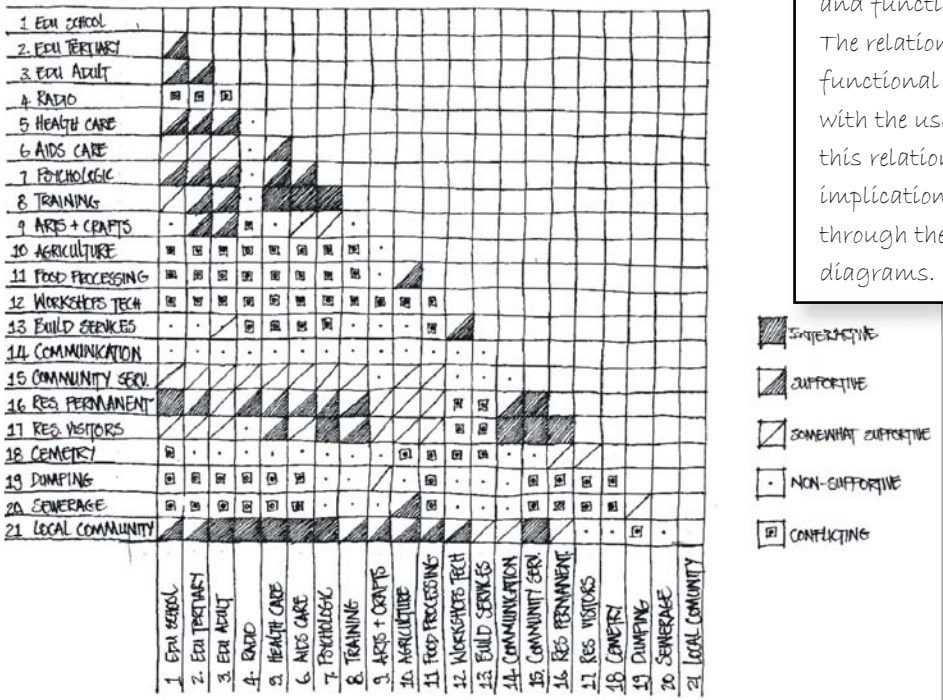


Fig. 2: D.M. Wentzel

Spatial implications of functional relationships

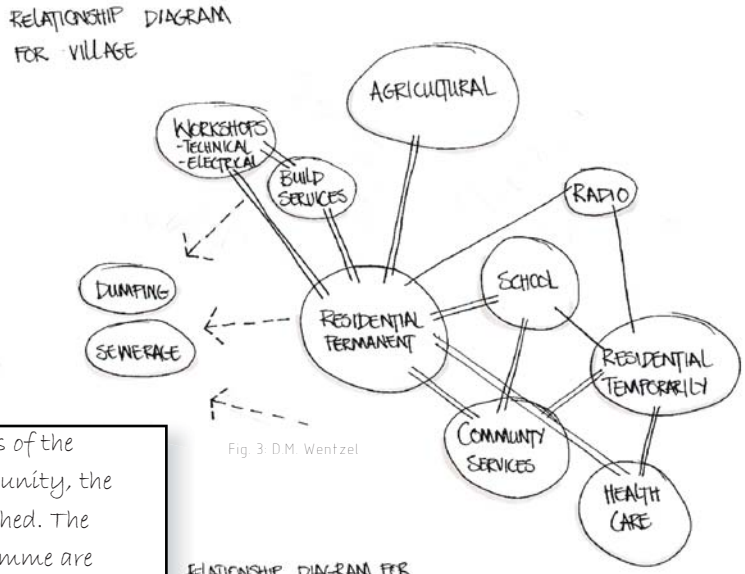


Fig. 3: D.M. Wentzel

Fig. 4: D.M. Wentzel

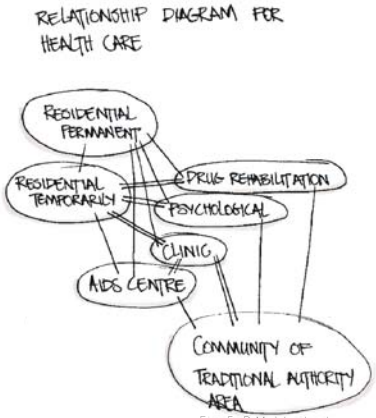


Fig. 5: D.M. Wentzel

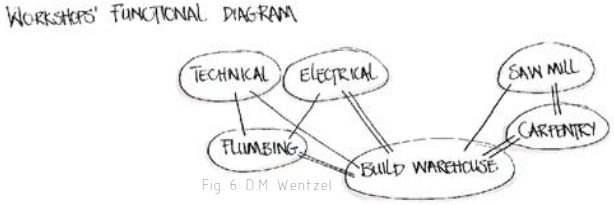


Fig. 6: D.M. Wentzel

RELATIONSHIP DIAGRAM FOR
COMMUNITY SERVICES
COMMUNICATION, FOOD PROCESSING

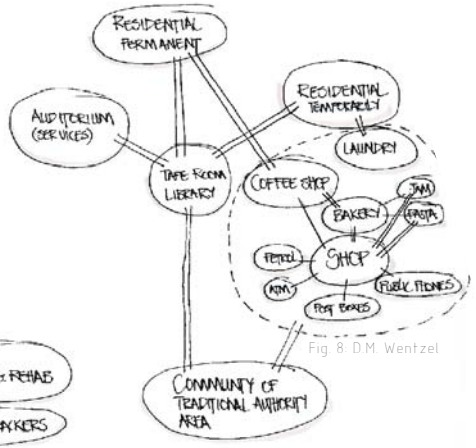


Fig. 8: D.M. Wentzel

RELATIONSHIP DIAGRAM FOR
RESIDENTIAL AREAS

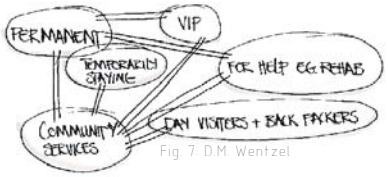


Fig. 7: D.M. Wentzel

Summery of relationship diagrams:

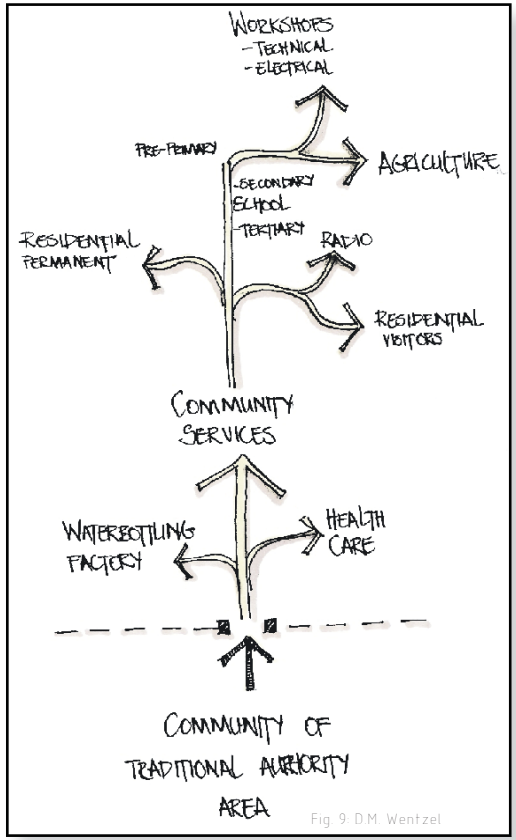
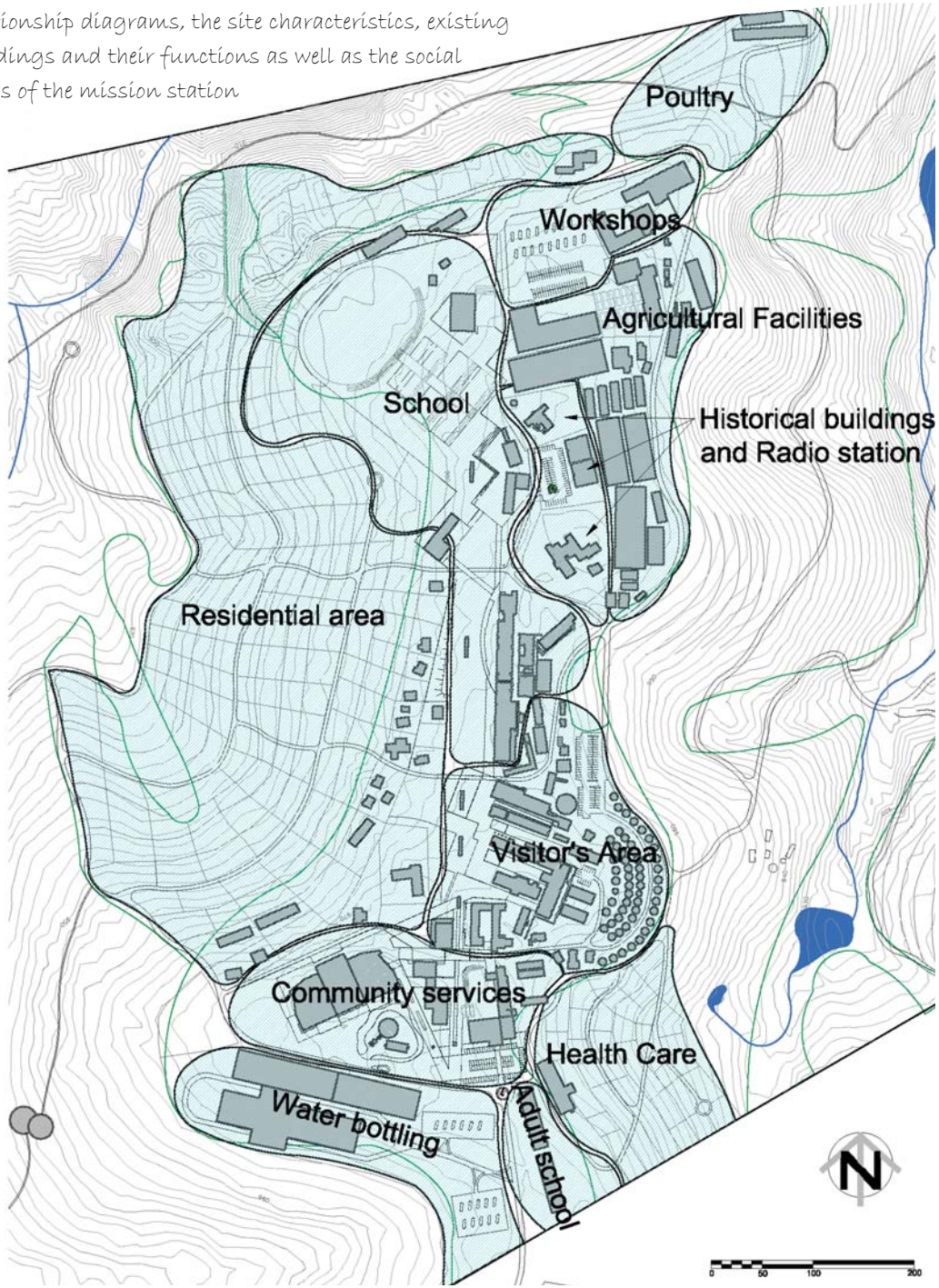


Fig. 9: D.M. Wentzel

Functional Zones:

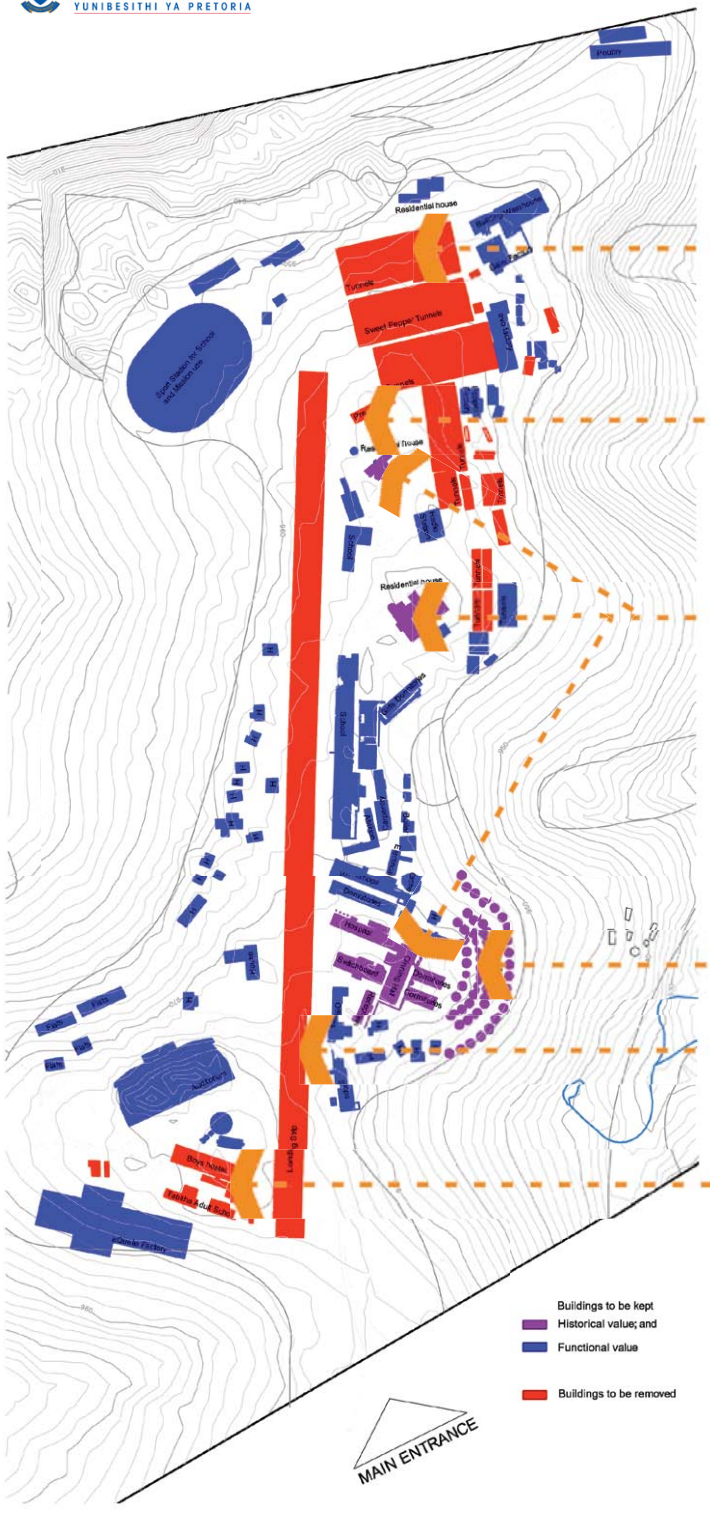
Functional zones are determined through the use of relationship diagrams, the site characteristics, existing buildings and their functions as well as the social needs of the mission station



Remedial actions

Existing building

Buildings to be kept/removed



The tunnels are to be removed due to a number of reasons.

1. Tunnels can be replaced while avocados and Artemisian are more difficult to replace.
2. The need for additional tunnels and the lack of suitable slopes (refer to appendix "Historical development" for the extension of tunnels).
3. There are possible farms available for the mission for the sweet pepper production.

Pre-primary school building removed to make provision for the expansion of industrial buildings.

Some of the first buildings of the mission.

The rondavels form part of the character of the mission.

Landing strip to be remove (Refer to settlement fabric analyses)

The boy's hostel, as well as the Tabitha Adult School, is replaced to accommodate the extension of the aQuellé factory (refer to appendix "Historical development" for the extension of buildings).

Proposed building development (Refer to functional zones)

Additional amphitheater, tennis courts and hockey fields with a clubhouse.

Pre-primary school building (refer to functional zones, p85)

Extension of aQuellé factory

Tabitha Adult School, placed close to the entrance for ease of access for people that do not live on the mission

Workshops are located at the north where it is combined with the parking area of all the vehicles used in the functioning and working of the mission station. This is done to facilitate the servicing the vehicles.

Agricultural buildings are re-organized to provide in the extension and functional needs of the diary-, avocado- and Artemesian factory.

The radio station is expanded (refer to appendix "Historical development" for the extension of buildings).

Tunnels for mission use

Workshops are taken out of the visitor's zone (refer to functional zones, p85). The workshop buildings are to be used for dormitories or any function that will provide in the needs of the visitors.

Additional buildings are added at the 'community service' zone (refer to functional zones, p85) for the provision of all community services to take place at this centralised area for the people of the mission station, and the local people who do not live on the mission station.

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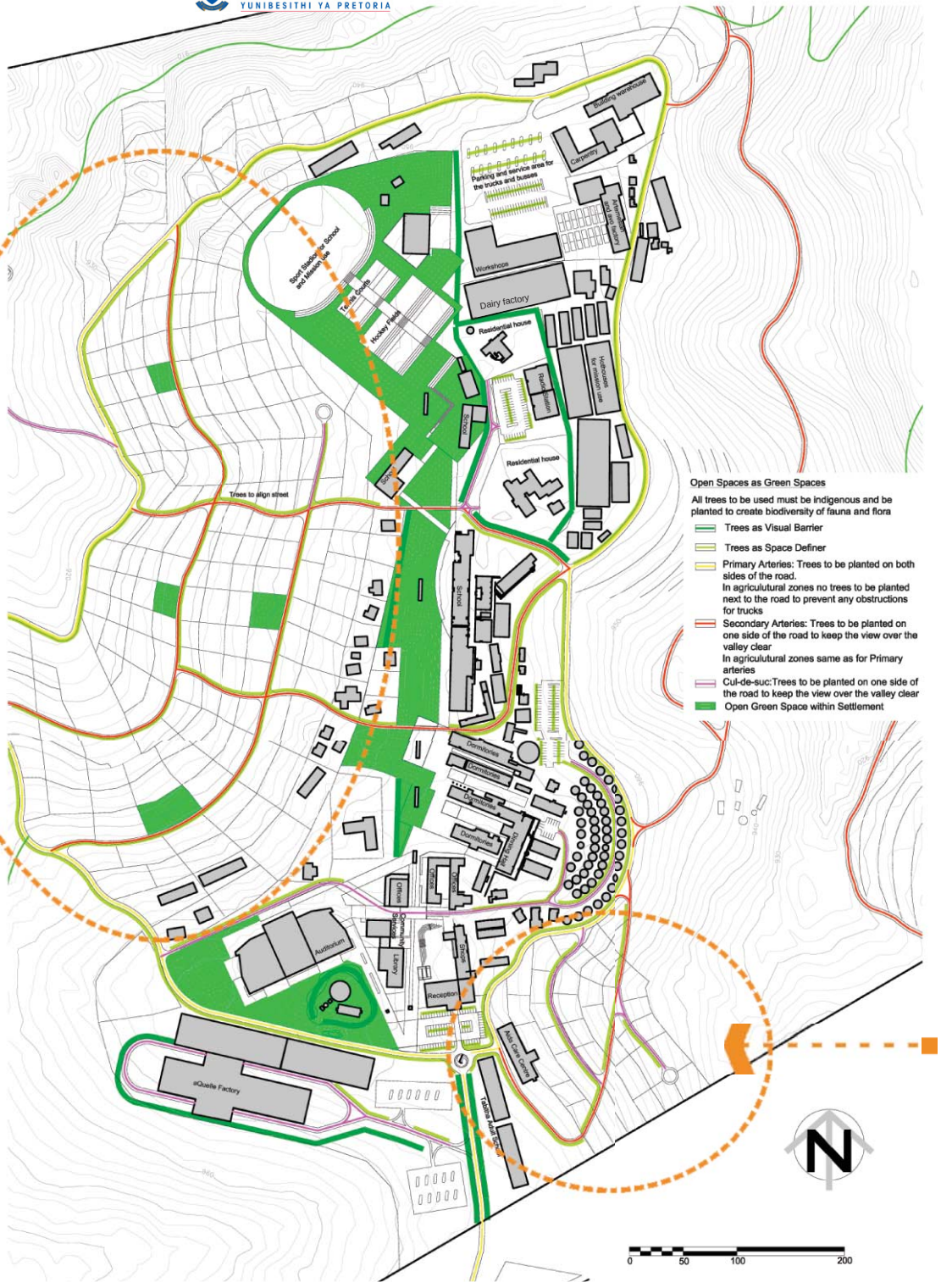
Development planning

Holding actions

Residential area



HIV/AIDS centre and houses

Structuring actions

Trees as a visual separator between work areas and sport fields.

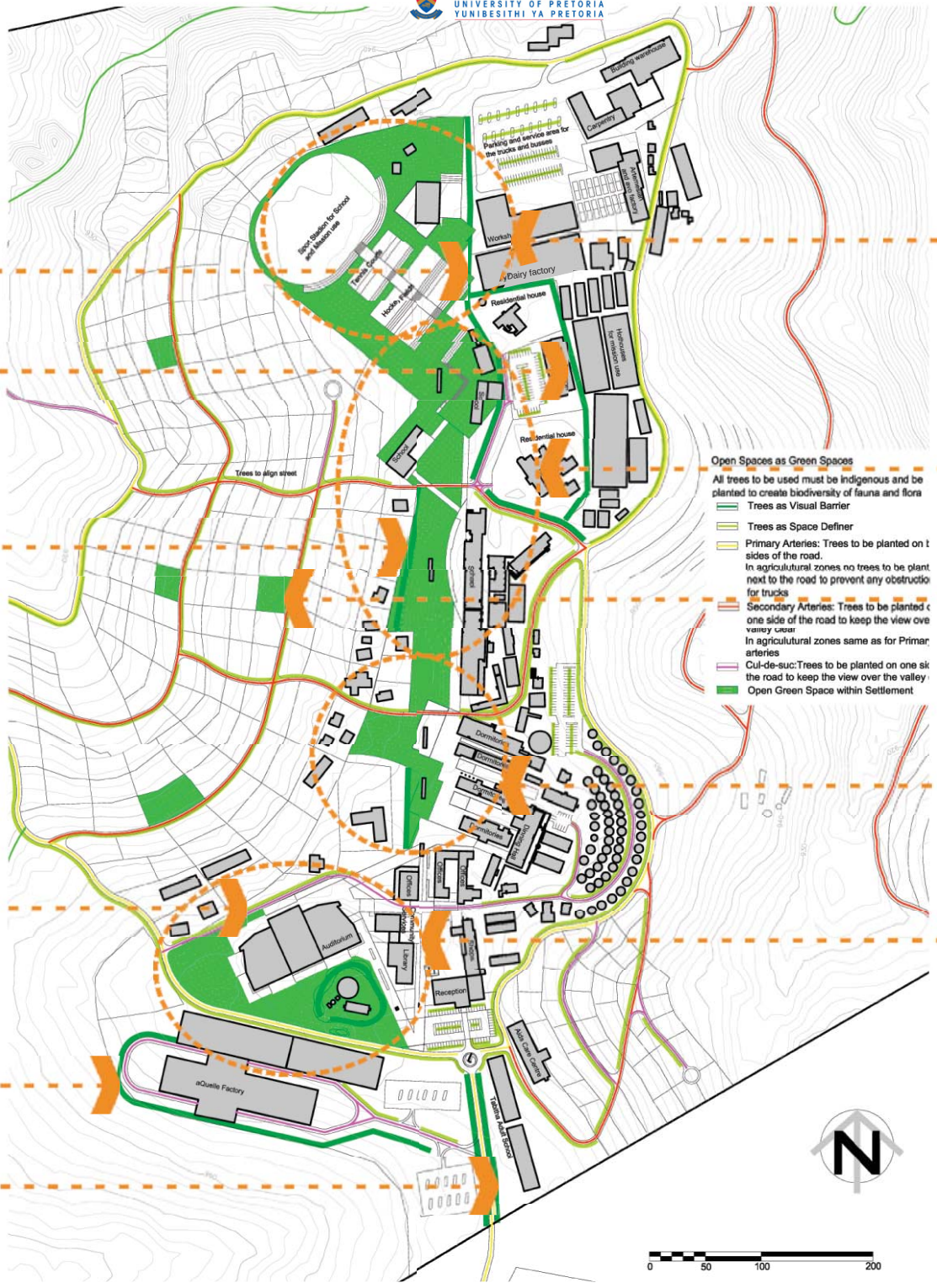
Separator between radio station and tunnels.

Trees to define the public spaces.

To define the boundary between public and residential areas.

Trees to hide the aQuelle bottling factory from the entrance area.

Here trees are used to emphasise the movement to the reception area.



Sport fields and overflow area.

Play area for school children or settlement children after school hours.

Residential parks.

Gathering and recreational space for visitors.

Auditorium overflow area.

It is important for people to be part of the totality of the place in which they live, through the ease of contact from any point in the city with the natural environment. This is established through roads that link the natural valleys with the settlement and using the roads as green corridors. Public parks carefully placed in the inner parts of the settlement create green islands for the meeting place of people and nature. These parks are to be designed to provide in the feeding, breeding, nesting and resting needs of animals.

Master plan

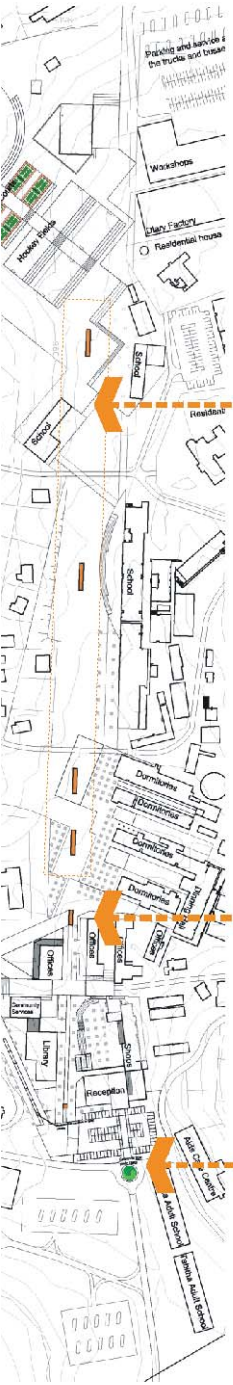
The master plan consists out of the planning and design layers for the settlement.

Planning and design for the settlement:
1. Determine the ideal relationship of settlement functions with functional zones;
2. Remedial work of existing fabric; and
3. Determine the growth direction through structuring and holding actions.

Fig. 10. D.M. Wenfzel


Master Plan
N
0 50 100 200
Sport Station for School and Mission use
Workshops
Dairy Factory
Residential house
Radio station
Residential house
School
Dormitories
Offices
Auditorium
Library
Reception
aQuelle Factory
MAIN ENTRANCE

Placemaking: Design as an expression of culture and time



These sculpture must be made by local artists, for the expression of the time and character of the mission station. These sculptures must be informative for the visitor and a reminder for the resident.

Scupture as landmark and signage at the cross road between market square, aditorium, offices and visitors dormitories

Sculptures to invite the visitor from the parking area to the Auditorium and Market square, the main attractions.

Grass sculpture that spiral vertical must be a introduction for the visitor of the identity of the community of using what is available in innovative ways for the honour and glory of God.

The trees chosen for the site is to emphasize the change in seasons that will be an expression of time in the
landscape, through contrast in flower colours, time of flowering and the contrast of deciduous vs. evergreen.

In the school area Erythrina lysistemon and Acacia xanthophloea are combined to contrast in colour and texture that will create subtle focal zones against the open lawn areas and Acacia sp planted on the periphery of the residential areas.

The Erythrina lysistemon contrast with the Acacia xanthoploea in dense vs fine texture and dark vs light colour. The Calodendrum capense create the evergreen constant boulevard against the changeable market square

The Entrance boulevard is a play of deciduous Erythrina lysistemon with red flowers in spring versus

Placemaking: Meeting places

Residential parks for the family

Small amphitheater for outside classes

Visitors meeting and relational park

Auditorium overflow space

School playgrounds and community park

Market square

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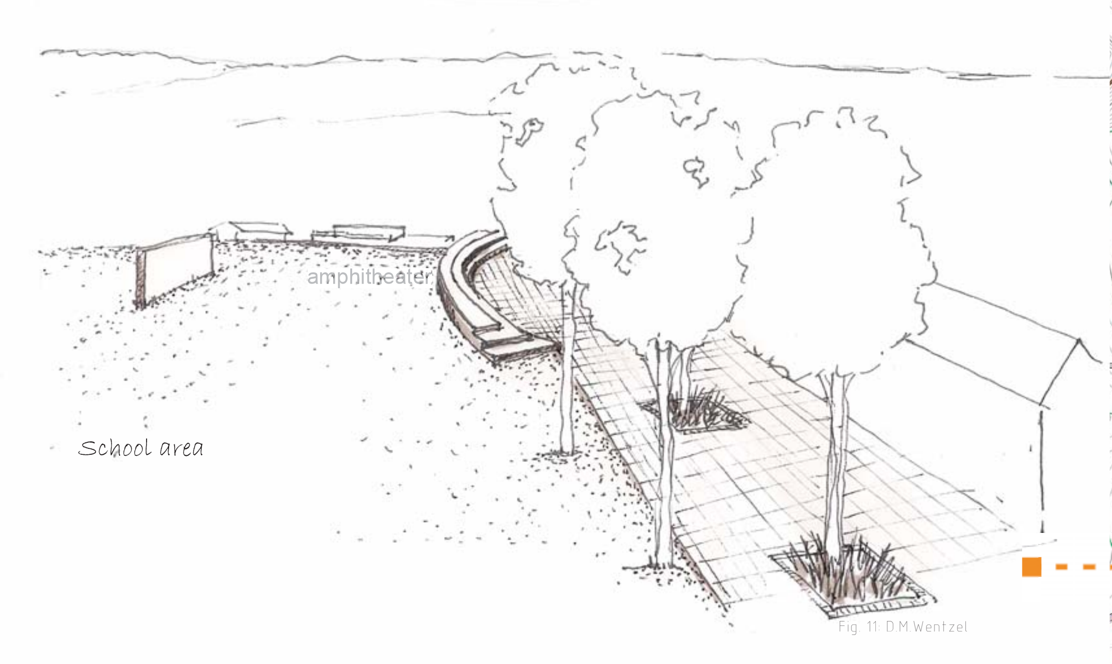


School area

Fig. 11 D.M.Wentzel

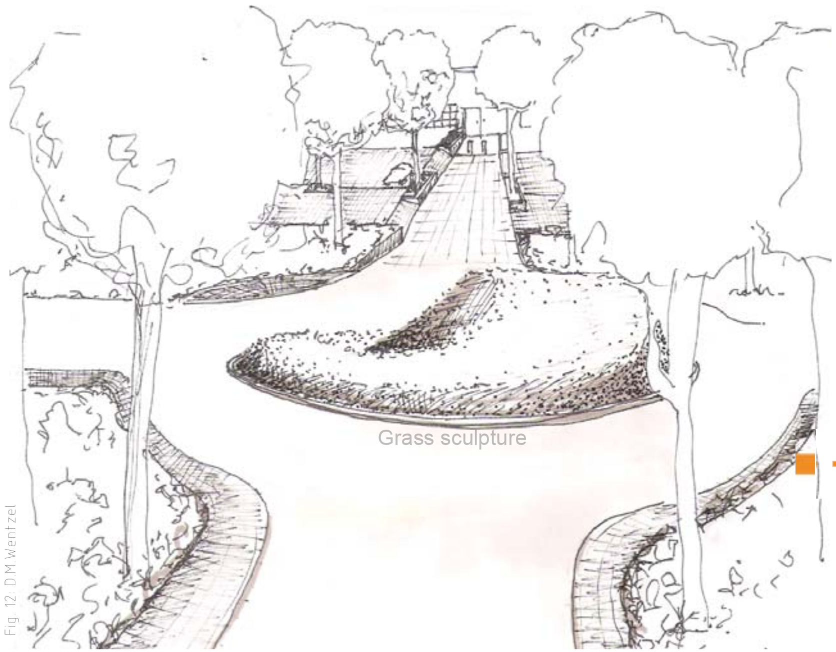
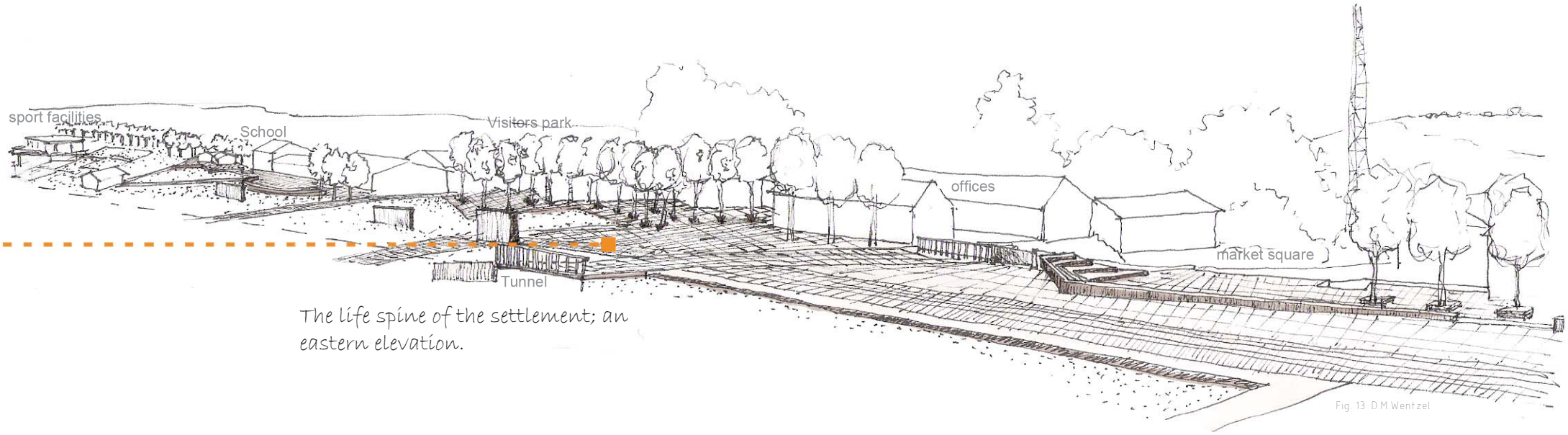


Fig. 12 D.M.Wentzel

Entrance to settlement area



The life spine of the settlement; an eastern elevation.

Fig. 13: D.M.Wentzel

Visitors park

Fig. 14: D.M.Wentzel

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Photo 1: D.M. Wentzel

Photo 2: D.M. Wentzel

Photo 3: D.M. Wentzel

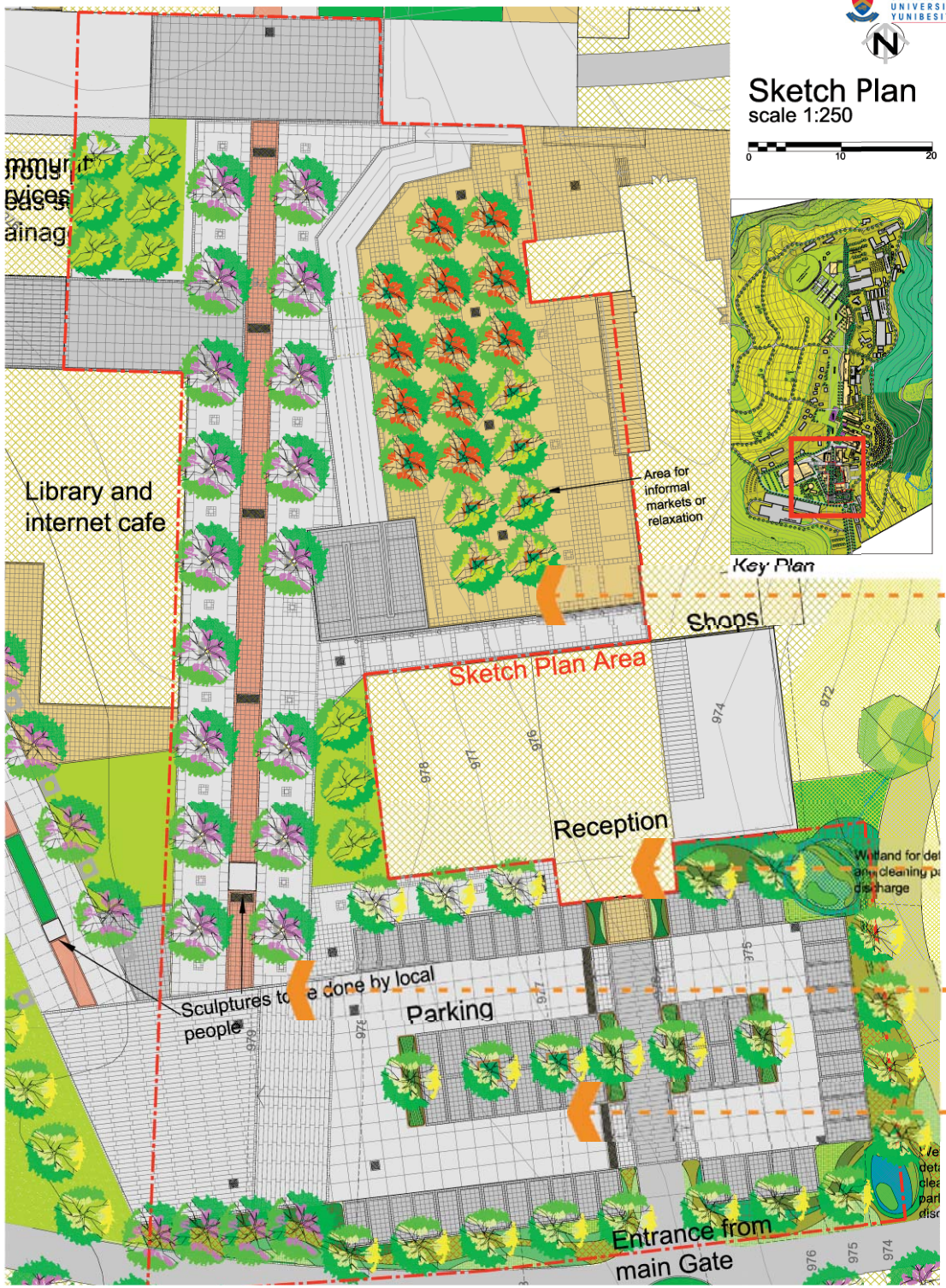
Sketch Plan

Photo 4: D.M. Wentzel

Photo 5: D. Wunderlich

Photo 6: D. Wunderlich

Sketch plan of a part of the community services zone



All public activities happen in this area as well as in the area around the auditorium that is directly linked with this public zone.

Reception area for visitors

Collecting space of pedestrians before dispersement to market place or auditorium

Parking area for visitors

Visual axis

View towards the eastern and western valleys

Visual connection between market square and auditorium

From the entrance area of this public hub, the user will have a view towards the northern valley

The first view of the visitor will be of the reception building to give them a sense of arrival and security of where to start.

Circulation

One of the main connections between east and west of the settlement.

Movement connection between market square and auditorium

Access points to market square

Entering options to public area

Circulation zones

- Vehicle movement pass the pedestrian area through a tunnel.
- Pedestrian zone only.
- Pedestrian dominant zone, but vehicle crossing is possible to the overflow area for parking on the lawn.
- Vehicle parking

Sketch plan model

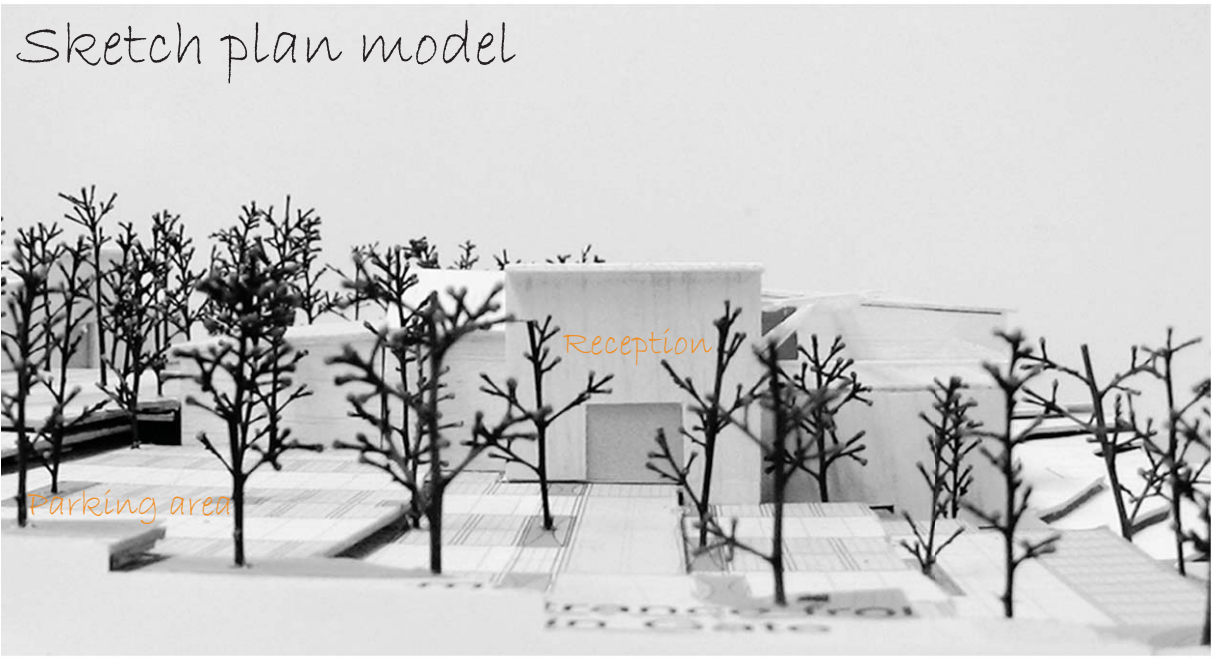


Photo 7: D.M. Wentzel

Entrance road to parking and reception building.

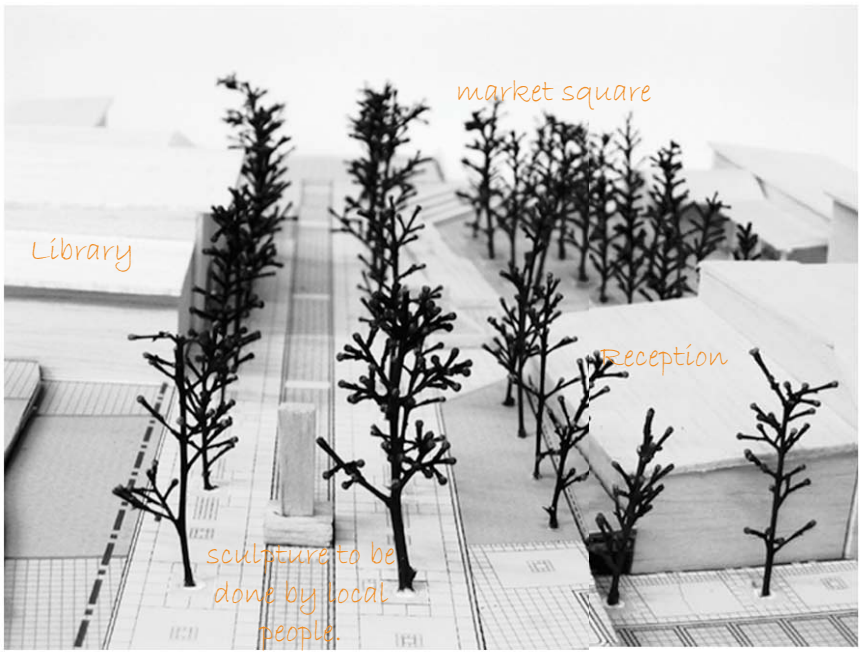


Photo 8: D.M. Wentzel

Visual axis towards settlement and northern valley; the main pedestrian spine.

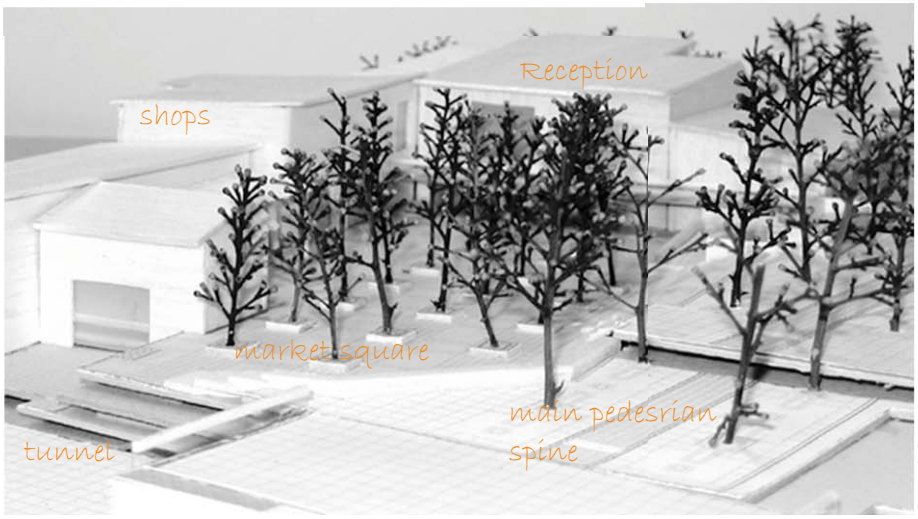
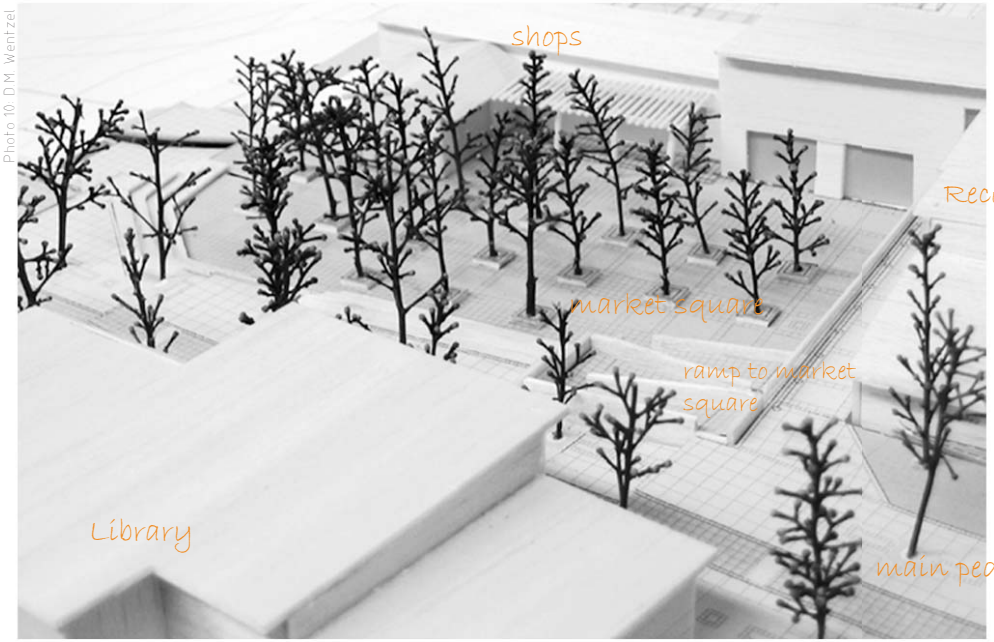


Photo 9: D.M. Wentzel

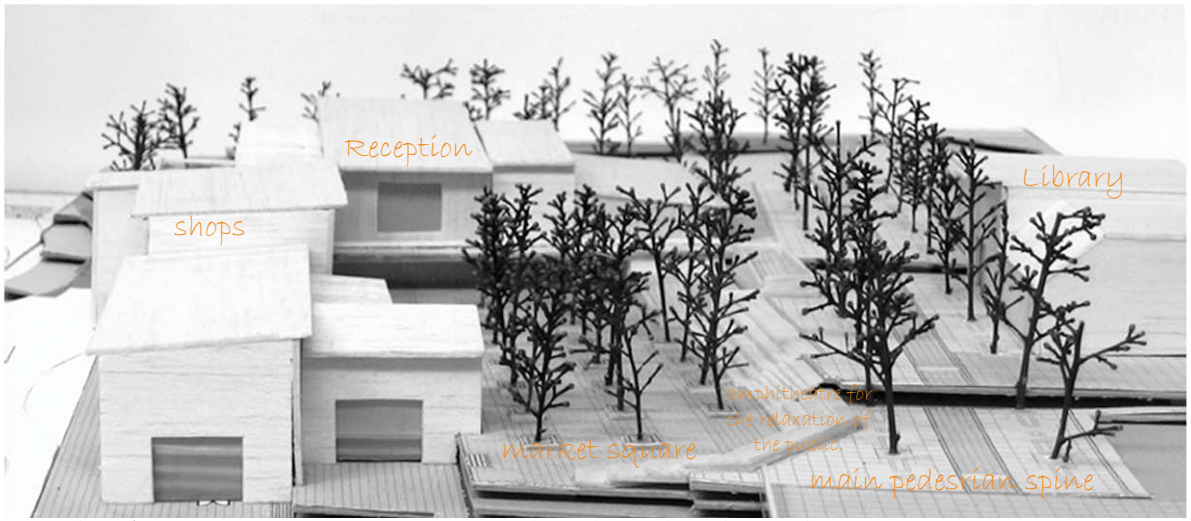
View of the market square from the tunnel.

Photo 10: D.M. Wentzel



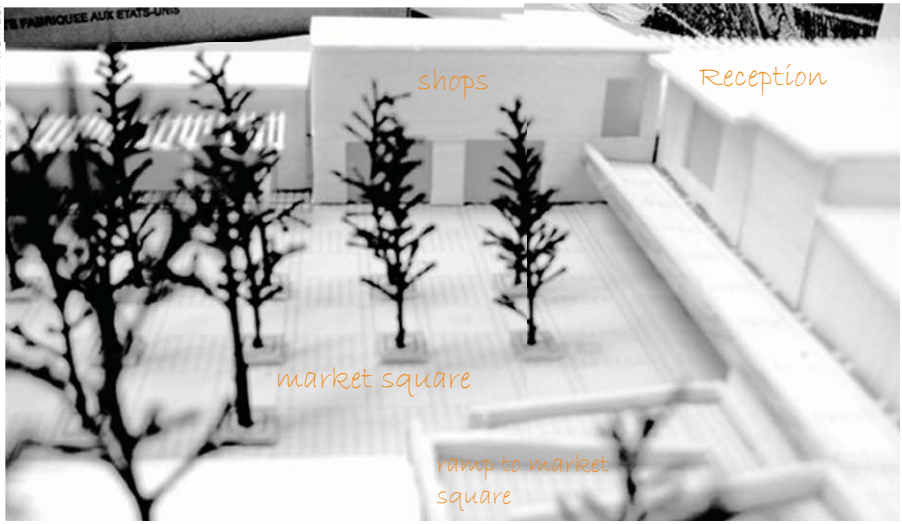
Birds-eyeview of market square

Photo 11: D.M. Wentzel



Looking back to the market square and main pedestrian spine.

Photo 12: D.M. Wentzel



Market square from the main pedestrian spine.

Birds-eyeview from the east.

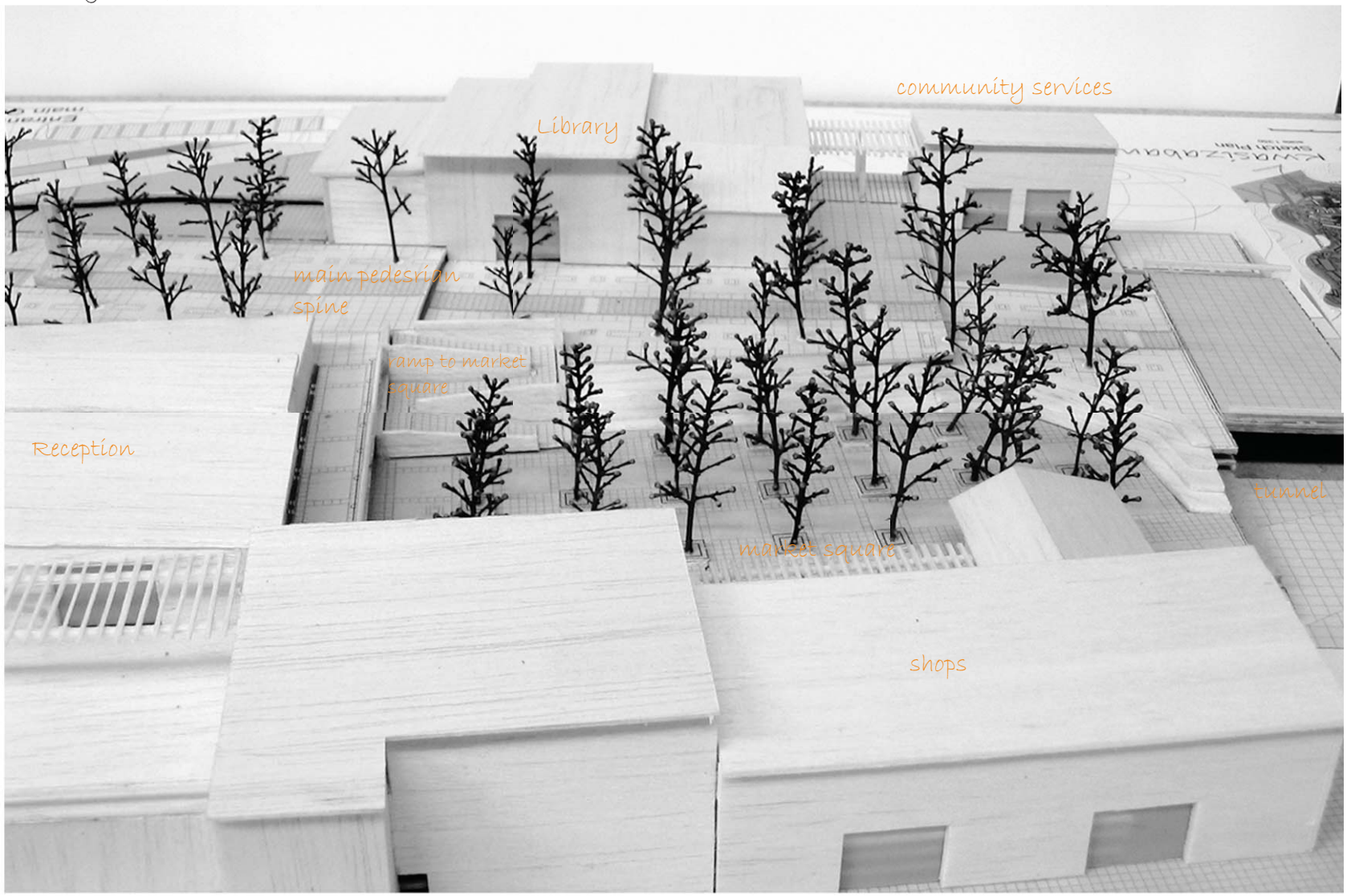


Photo 13: D M Wentzel

Birds-eyeview from the west.

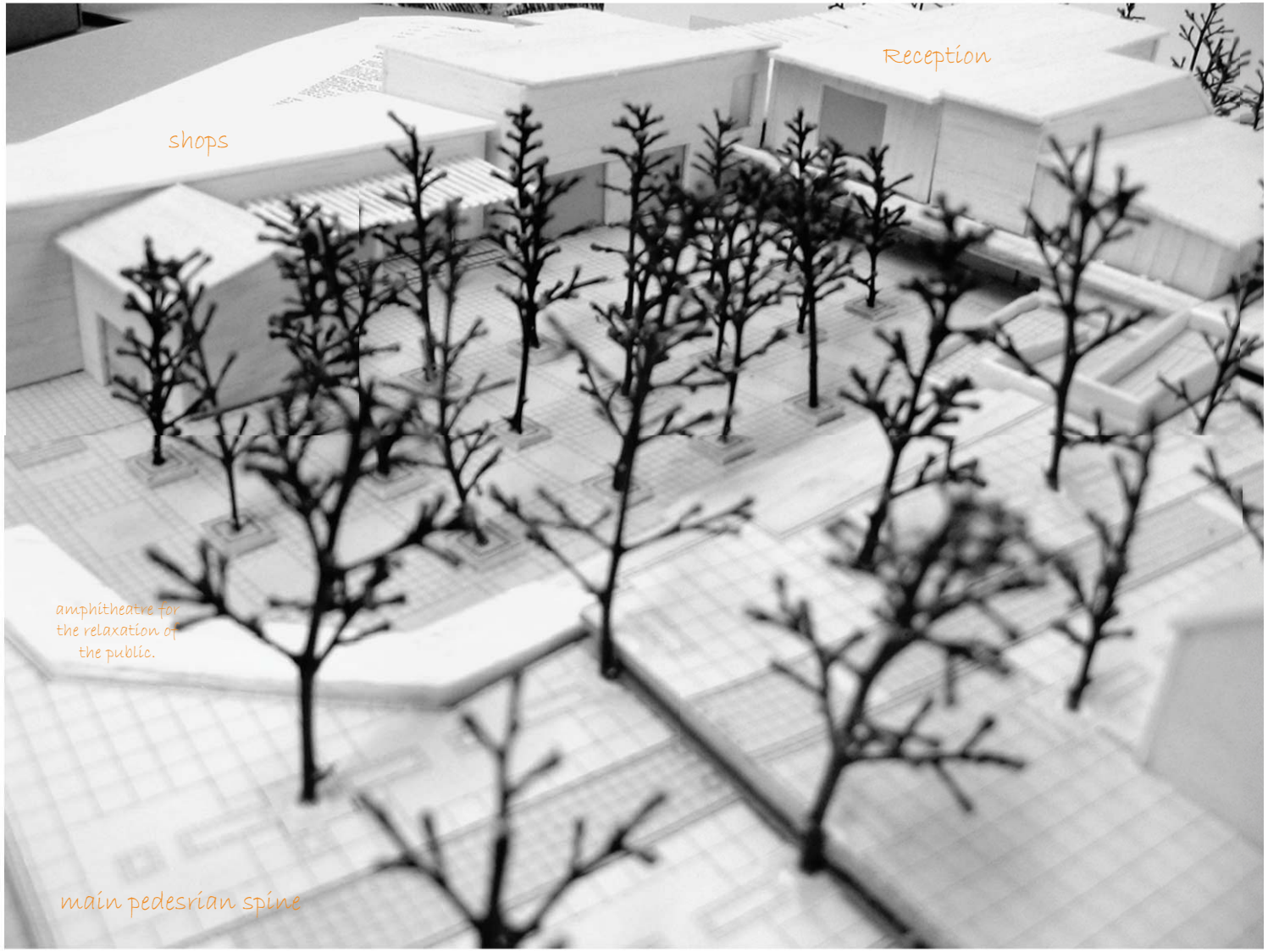


Photo 14: D M Wentzel

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Photo 1: D.Wunderlich

Photo 2: D.Wunderlich

Photo 3: D.Wunderlich

Technical

Photo 4: D.Wunderlich

Photo 5: D.Wunderlich

Photo 6: D. Wunderlich


Grading Sketch Plan
scale 1:500
0
10
20
1m Contour Interval
Existing contours changed
brary and
ternet cafe
Shops
Sketch Plan Area
Reception
Parking
Entrance from
main Gate
Wetland for
detaining
and
cleaning
parking
discharge
Wetland for detaining
and cleaning parking
discharge
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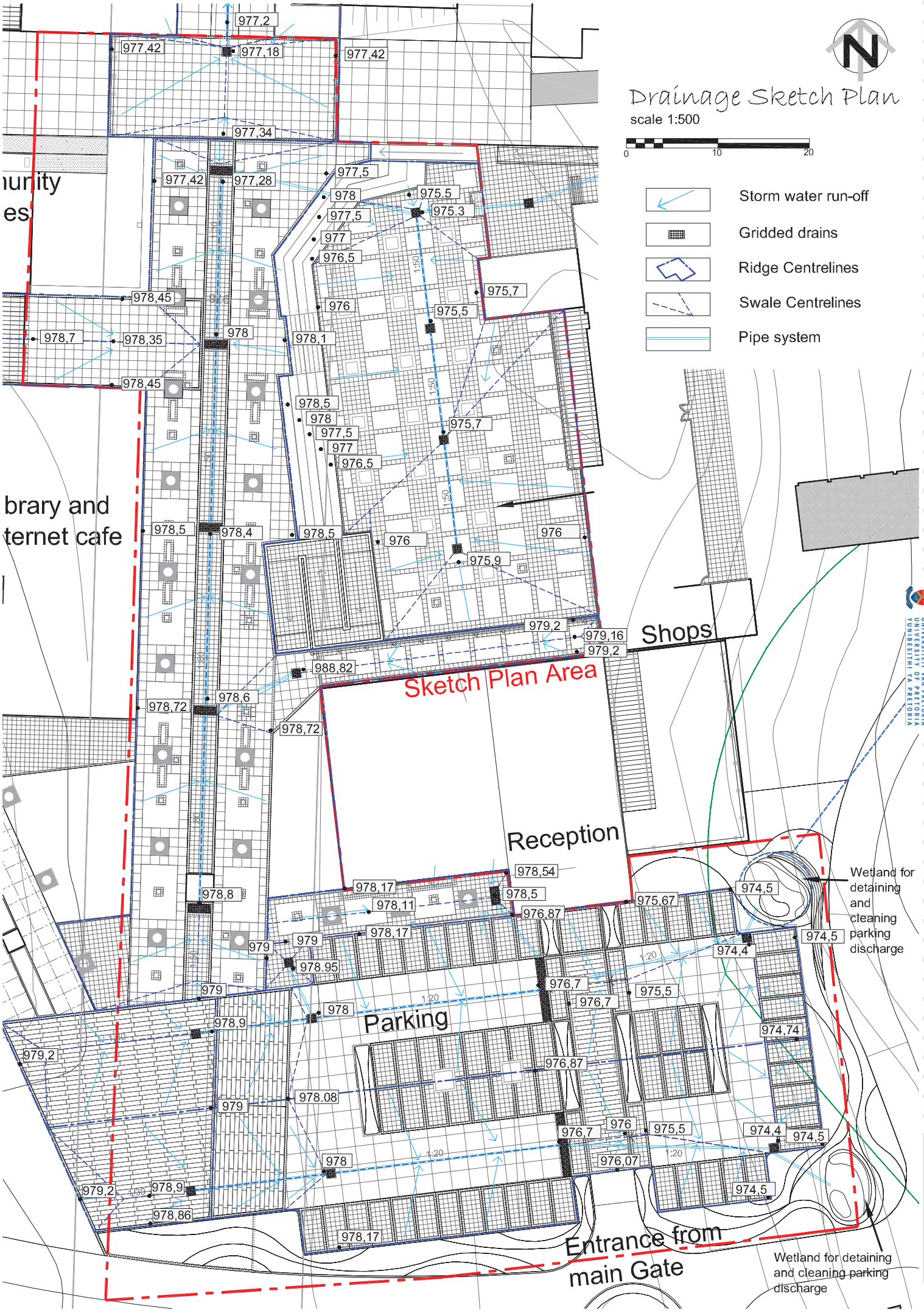
Drainage Sketch Plan
scale 1:500
0
10
20
Storm water run-off
Gridded drains
Ridge Centrelines
Swale Centrelines
Pipe system
Sketch Plan Area
Shops
Reception
Parking
Entrance from main Gate
Wetland for detaining and cleaning parking discharge
Wetland for detaining and cleaning parking discharge
brary and
ternet cafe
977,2
977,42
977,18
977,42
977,34
977,42
977,28
977,5
978
975,5
975.3
977,5
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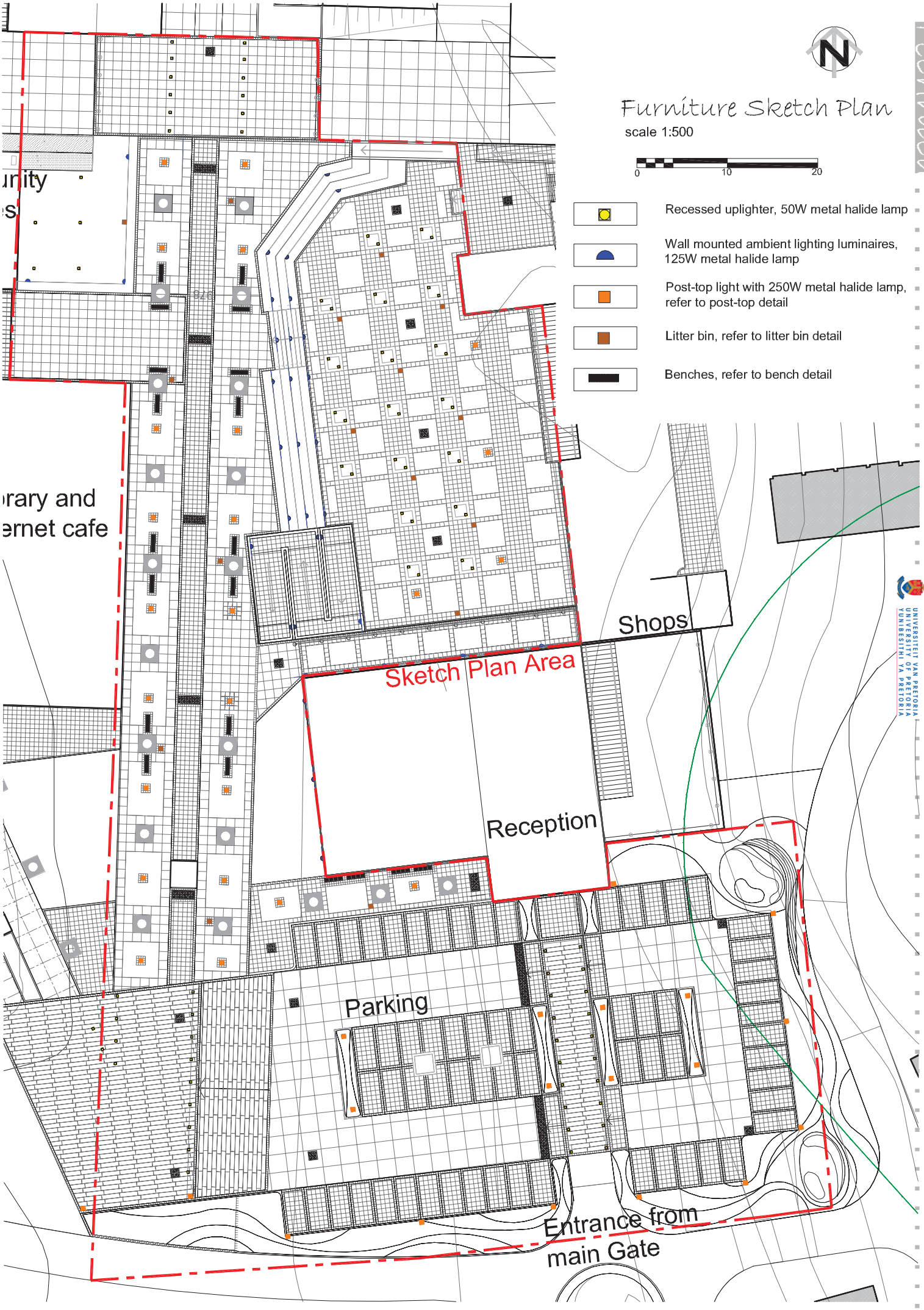
976,7
975,5
976,87
976
976,7
975,5
976,07
974,5
974,5
974,4
974,74
974,4
974,5
974,5
975,67
1:20
1:30
1:50
1:100

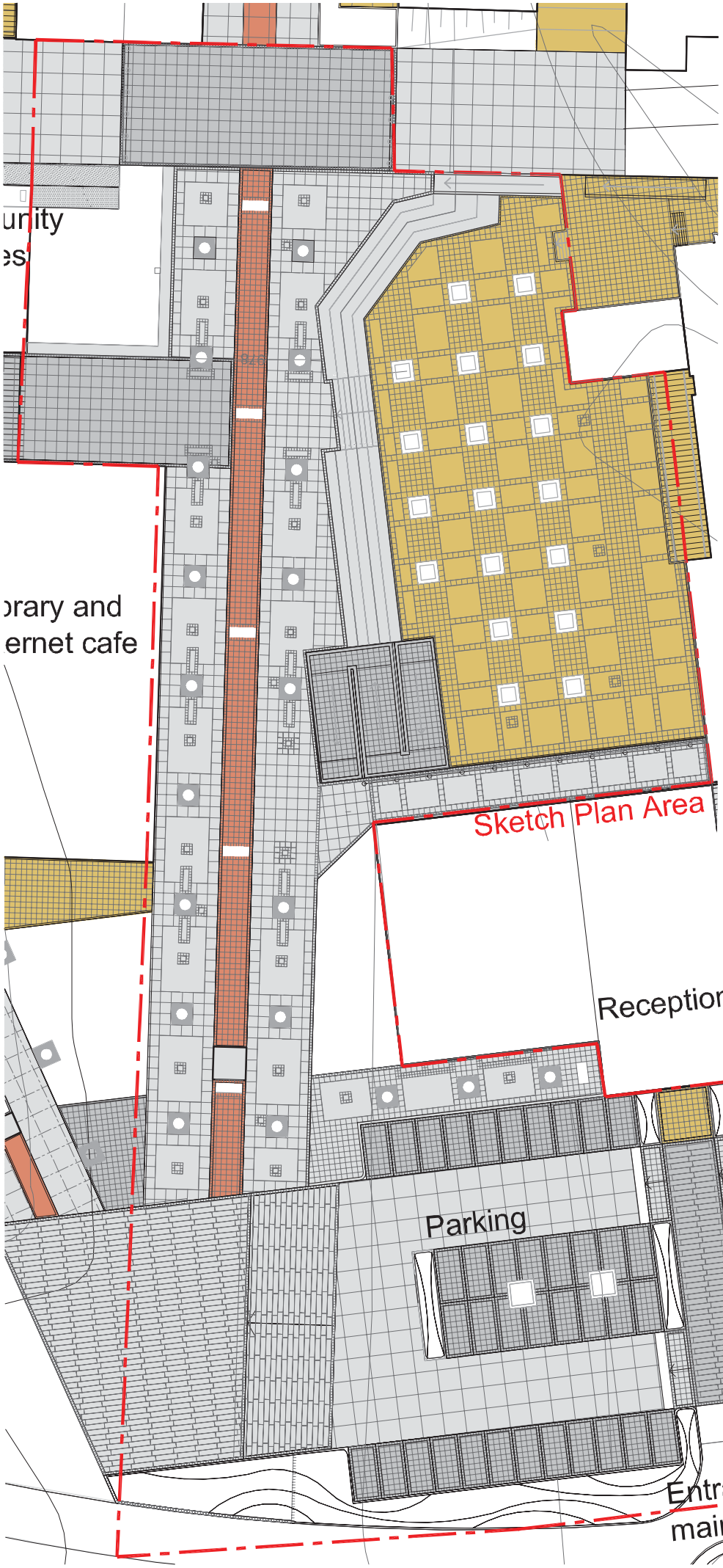
Furniture Sketch Plan

scale 1:500

0 10 20

- Recessed uplighter, 50W metal halide lamp
- Wall mounted ambient lighting luminaires, 125W metal halide lamp
- Post-top light with 250W metal halide lamp, refer to post-top detail
- Litter bin, refer to litter bin detail
- Benches, refer to bench detail





Paving Sketch Plan

scale 1:500

0 10 20

Paving blocks manufactured on site to conform to specified sizes.

Colour pigments to be added to concrete mix for the manufacturing of paving blocks, pre-cast or insitu.

- Charcoal
- Natural concrete colour
- Terra Cotta colour
- Sandstone colour

Heavy Duty Paving Blocks for Parking Area

- 250x250x100mm Pre-cast concrete paving
- 500x500x100mm Pre-cast concrete paving

Medium Duty Paving Blocks for Pedestrian Walkways and Public Square

- 250x250x50mm Pre-cast concrete paving
- 500x500x50mm Pre-cast concrete paving

In-situ cast concrete blocks

- 2000x2000x100mm In-situ cast concrete paving
- 2000x500x100mm In-situ cast concrete paving
- 1000x1000x100mm In-situ cast concrete paving

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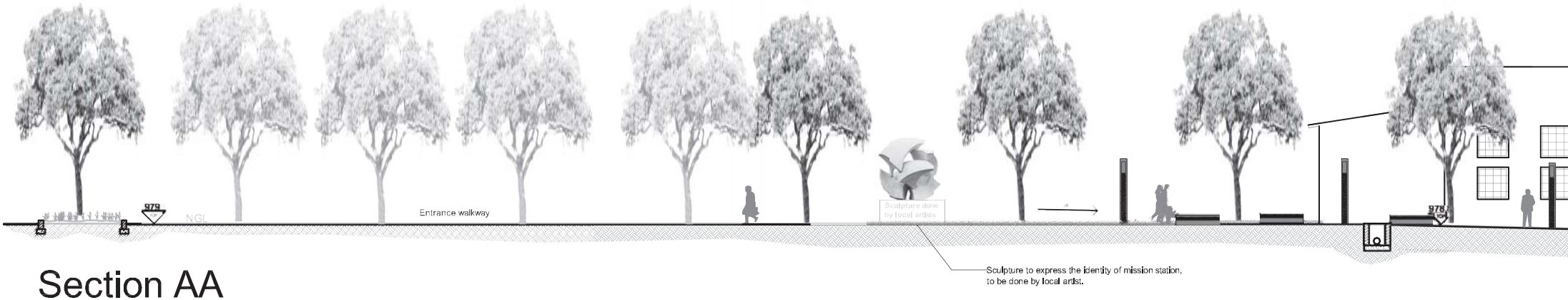
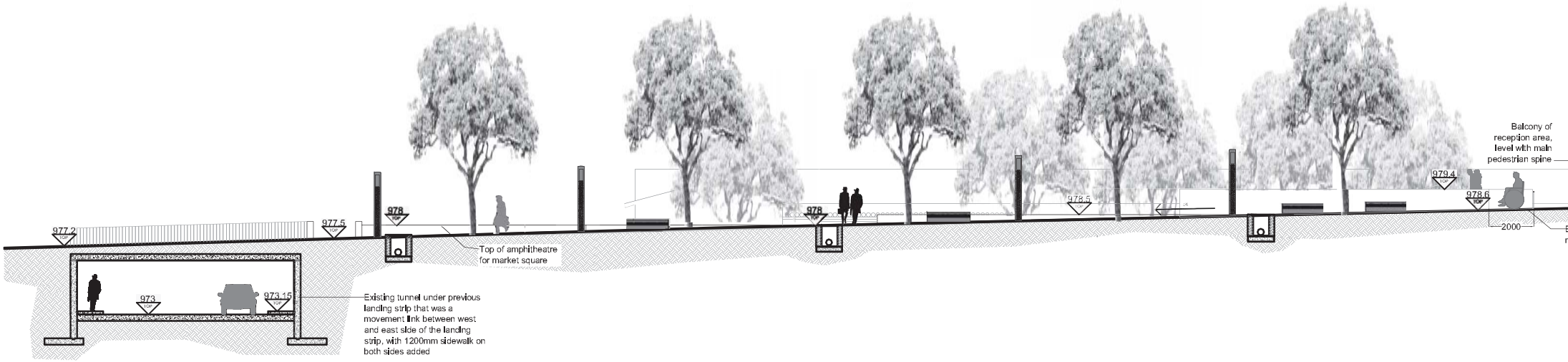
Plant Sketch Plan
Shrubs and Groundcovers
scale 1:500
0
10
20
Shrubs
Bb Burchellia bubalina, 1/m²
Da Duvernoia adhatodoides, 1/m²
Tc Tecoma capensis, 1/m²
Groundcovers
Aa Agapanthus africanus 'alba', 7/m²
Ad Asparagus densiflorus 'Meyersii', 9/m²
Cm Carissa marcocarpa 'Green Carpet', 7/m²
Cl Clivia miniata, 7/m²
Eu Eucomis autumnalis, 9m²
Pl Plectranthus verticillatus, 11m²
Pt Pteris vittata, 5/m²
Lawn
Cynodon dactylon
Reception
Parking
See wetland detail
Entrance from main Gate
rary and
ernet cafe

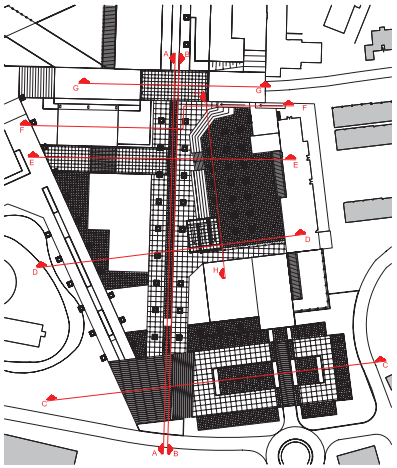

Plant Sketch Plan
Trees
scale 1:500
0
10
20
Trees
Erythrina lysistemon
Calodendrum capense
Ptaeroxylon obliquum
Acacia xanthoploea
brary and
ternet cafe
Shops
Reception
Parking
Entrance from
main Gate

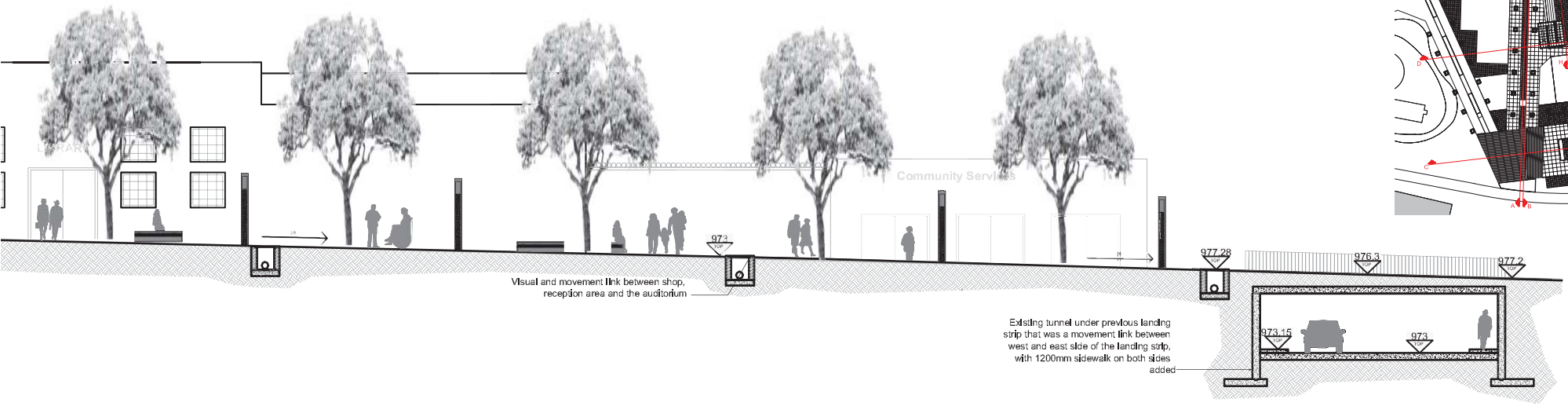


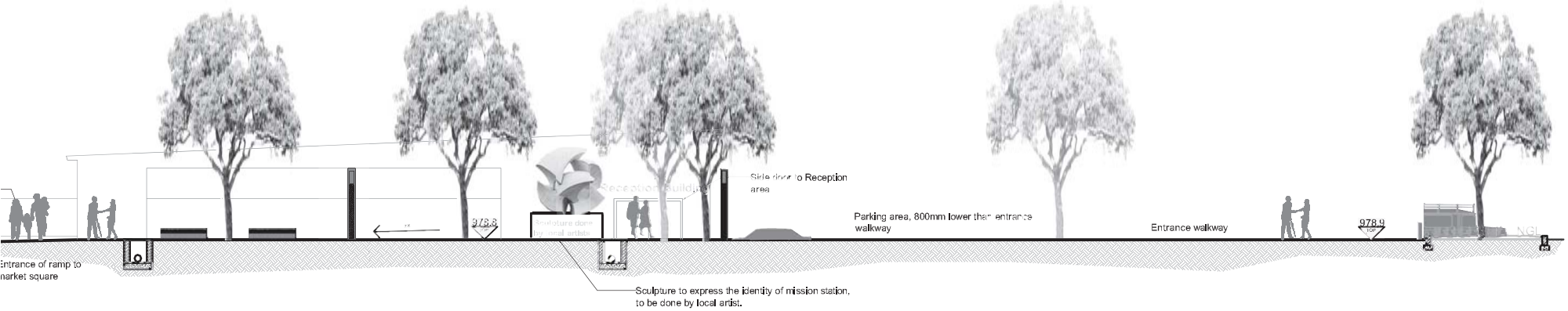
Section AA
scale 1:250

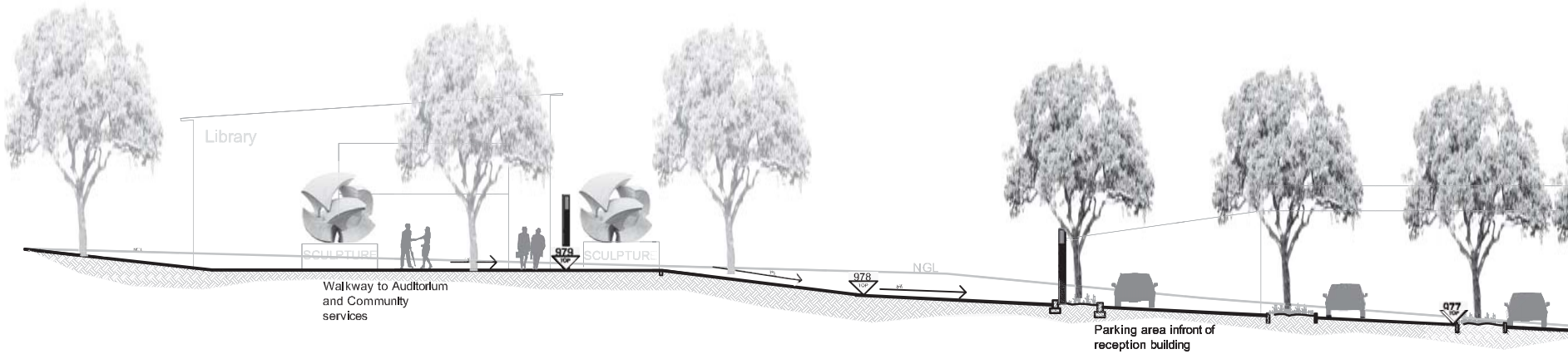


Section BB
scale 1:250

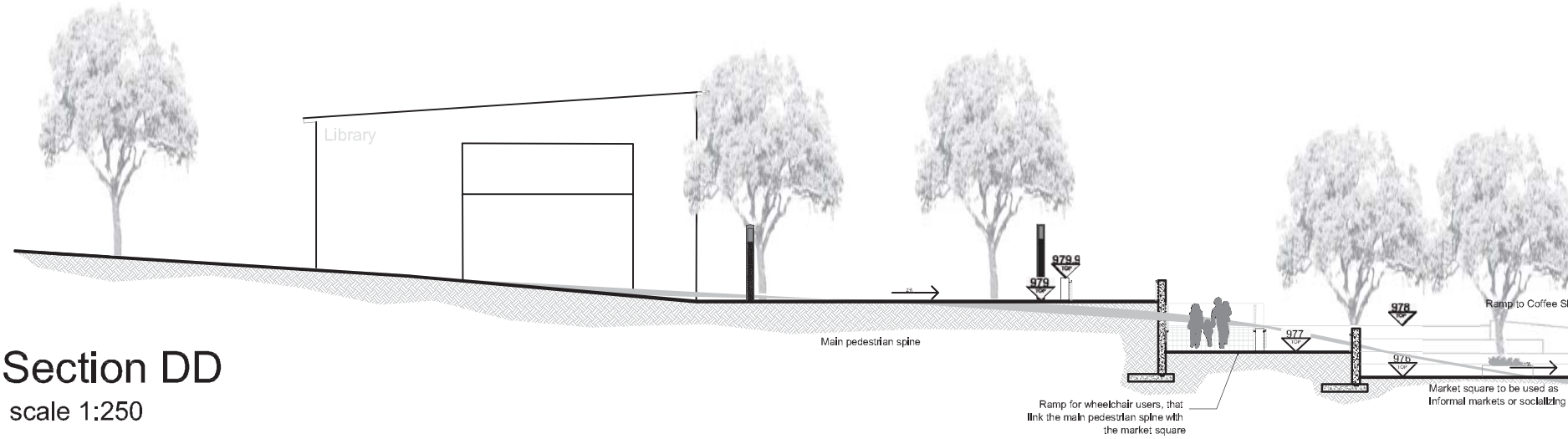

Key plan


Community Services
973
977.28
976.3
977.2
973.15
973
Visual and movement link between shop, reception area and the auditorium
Existing tunnel under previous landing strip that was a movement link between west and east side of the landing strip, with 1200mm sidewalk on both sides added


978.8
Side door to Reception area
Parking area, 800mm lower than entrance walkway
Entrance walkway
978.9
NGL
Entrance of ramp to market square
Sculpture to express the identity of mission station, to be done by local artist.

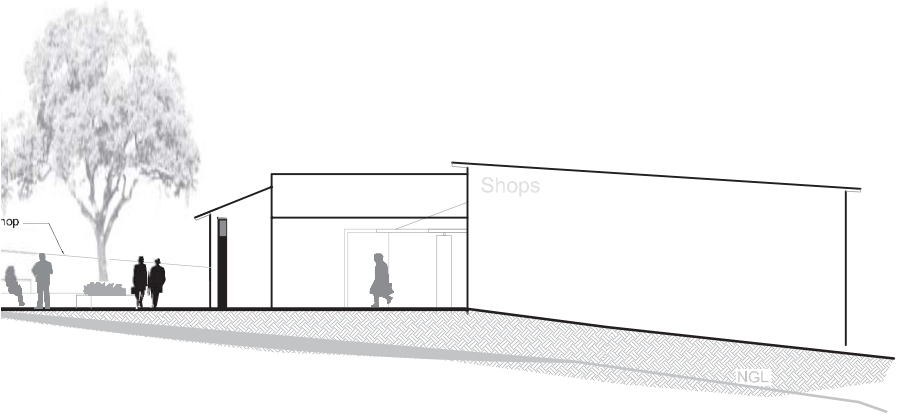


Section CC
scale 1:250

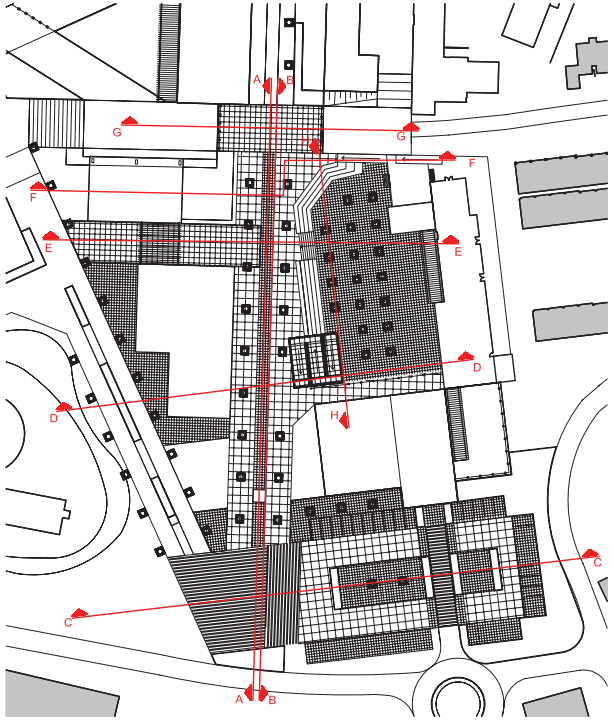


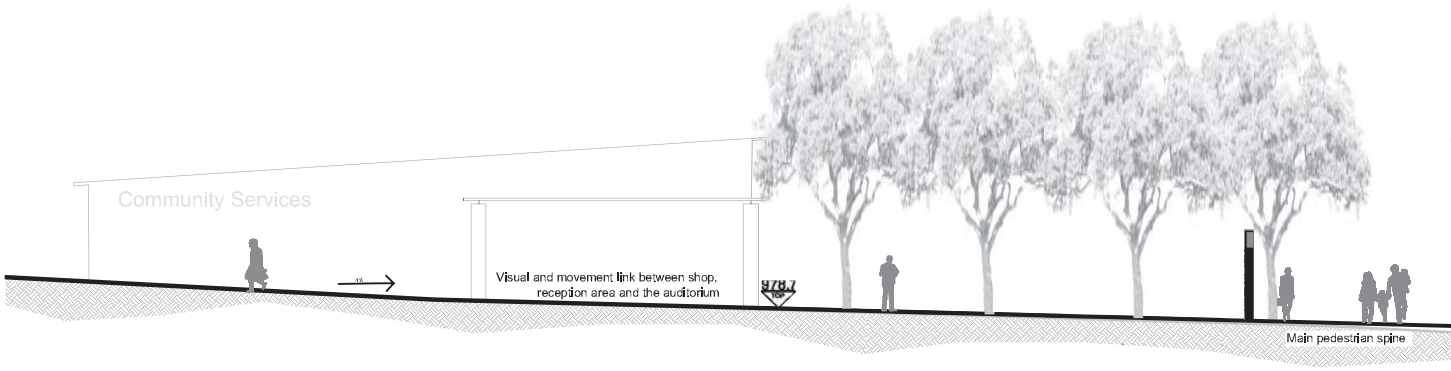
Section DD
scale 1:250


Socializing space on the roof of the reception area, with a beautiful view over eastern valley
976.7
976
975.5
974.5


Shops
NGL

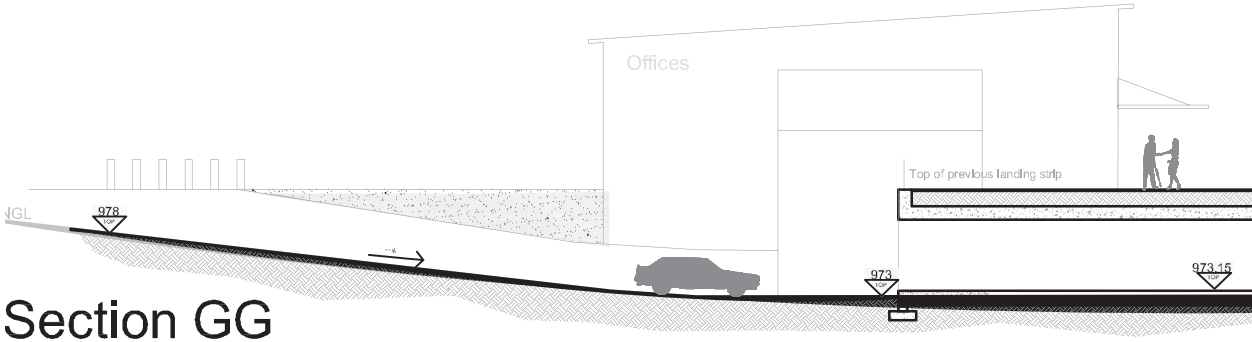
Key plan


A
B
G
F
E
D
H
C



Section EE

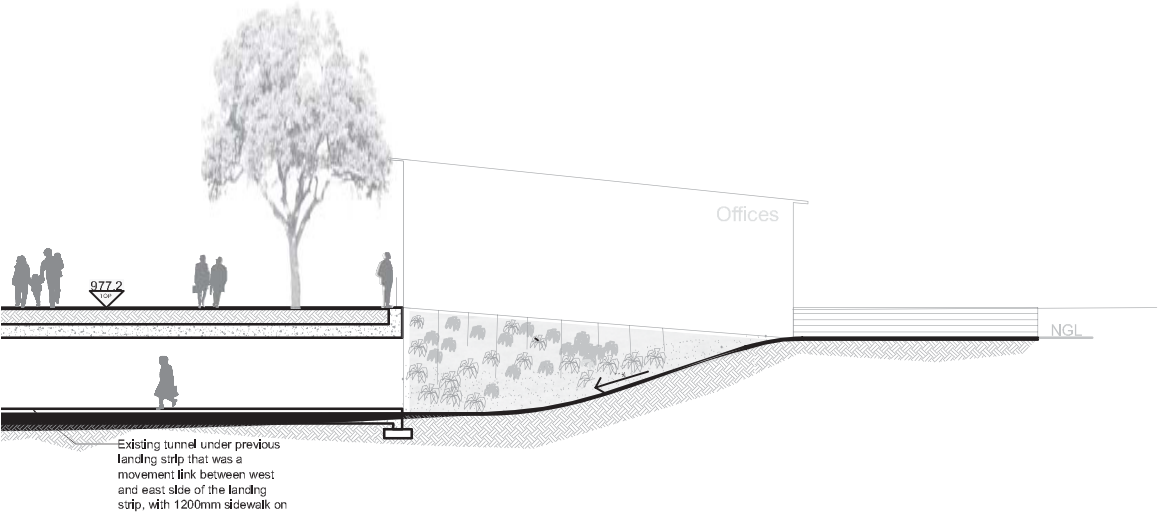
scale 1:250



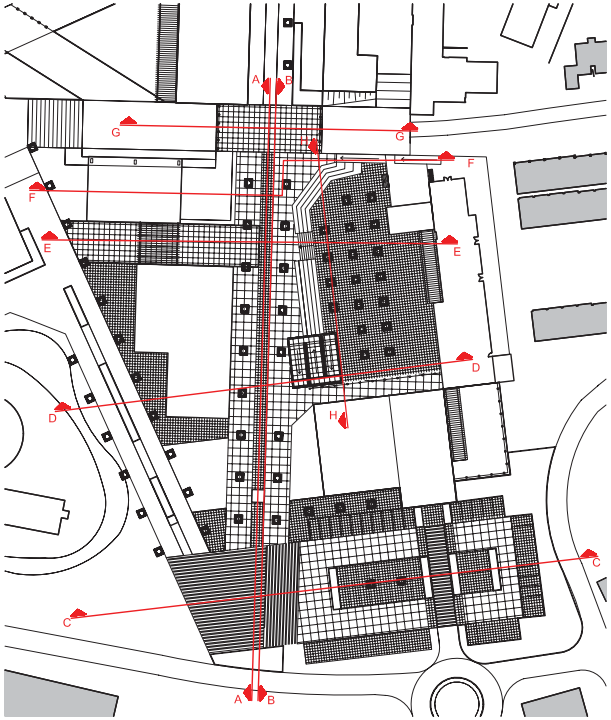
Section GG

scale 1:250


978
976
Ramp from pedestrian
spine to Coffee Shop
Shops
NGL
Market square to be used as
Informal markets or socializing


977.2
Offices
NGL
Existing tunnel under previous
landing strip that was a
movement link between west
and east side of the landing
strip, with 1200mm sidewalk on

Key plan


A
B
G
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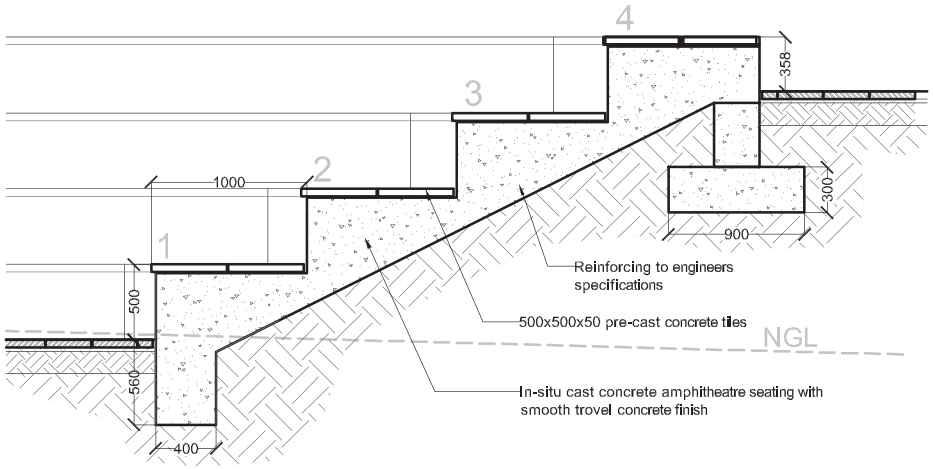
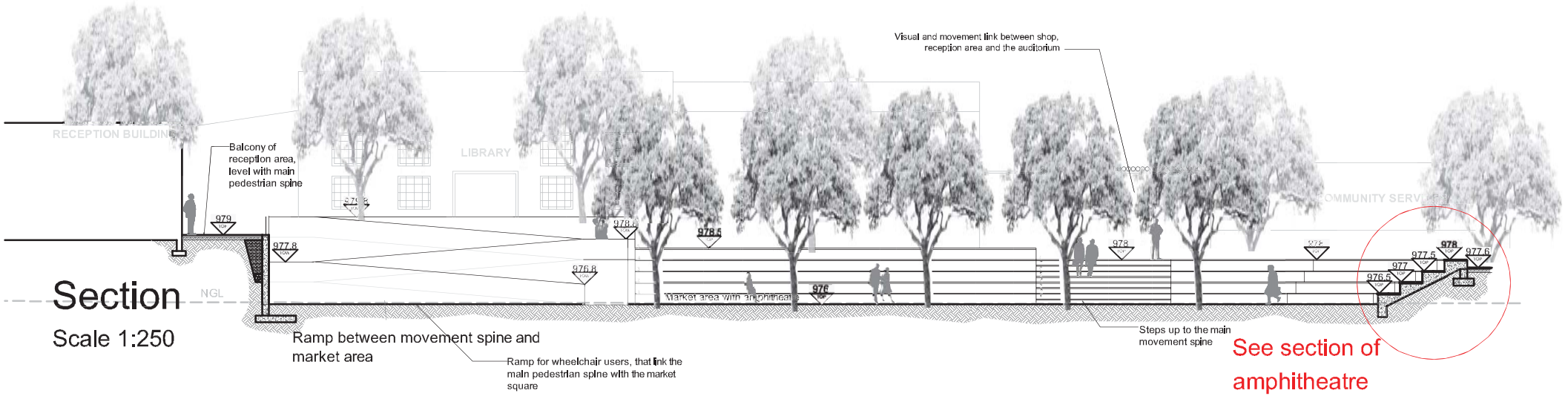
E
E
D
D
H
C
C
A
B

amphitheatre



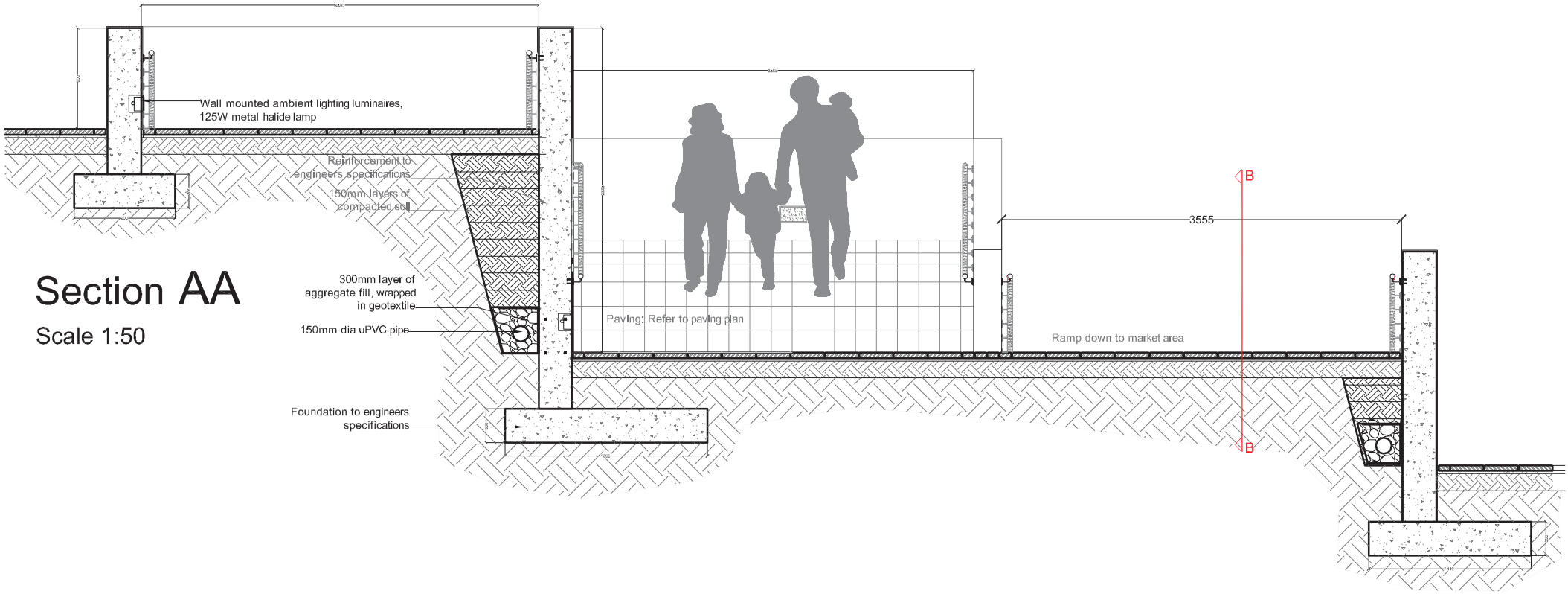
Section of Amphitheatre

Scale 1:20



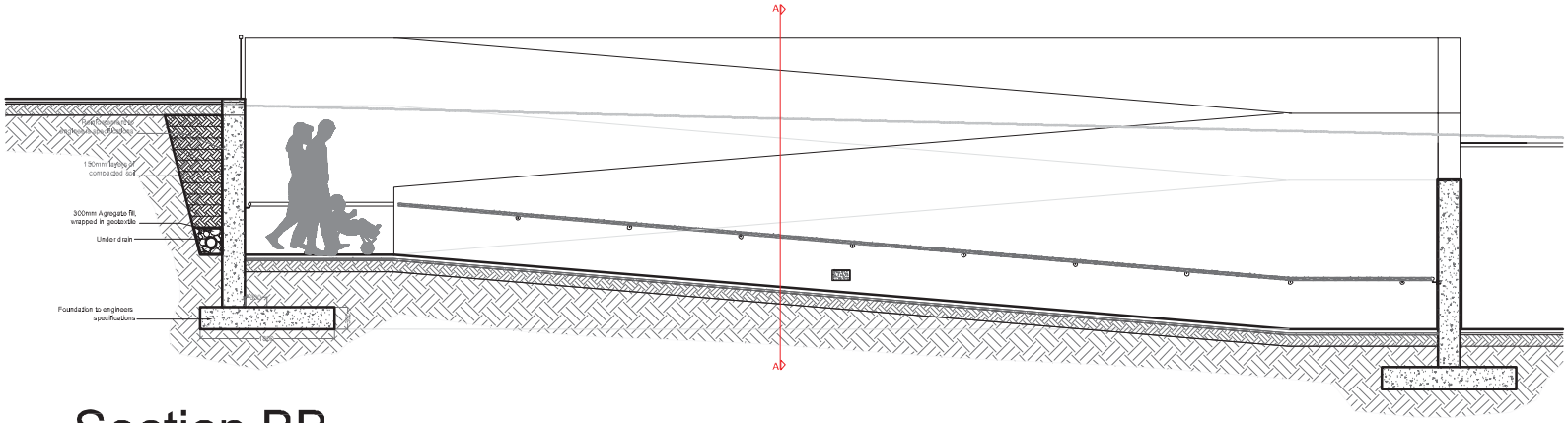
Section

Scale 1:250



Section AA

Scale 1:50

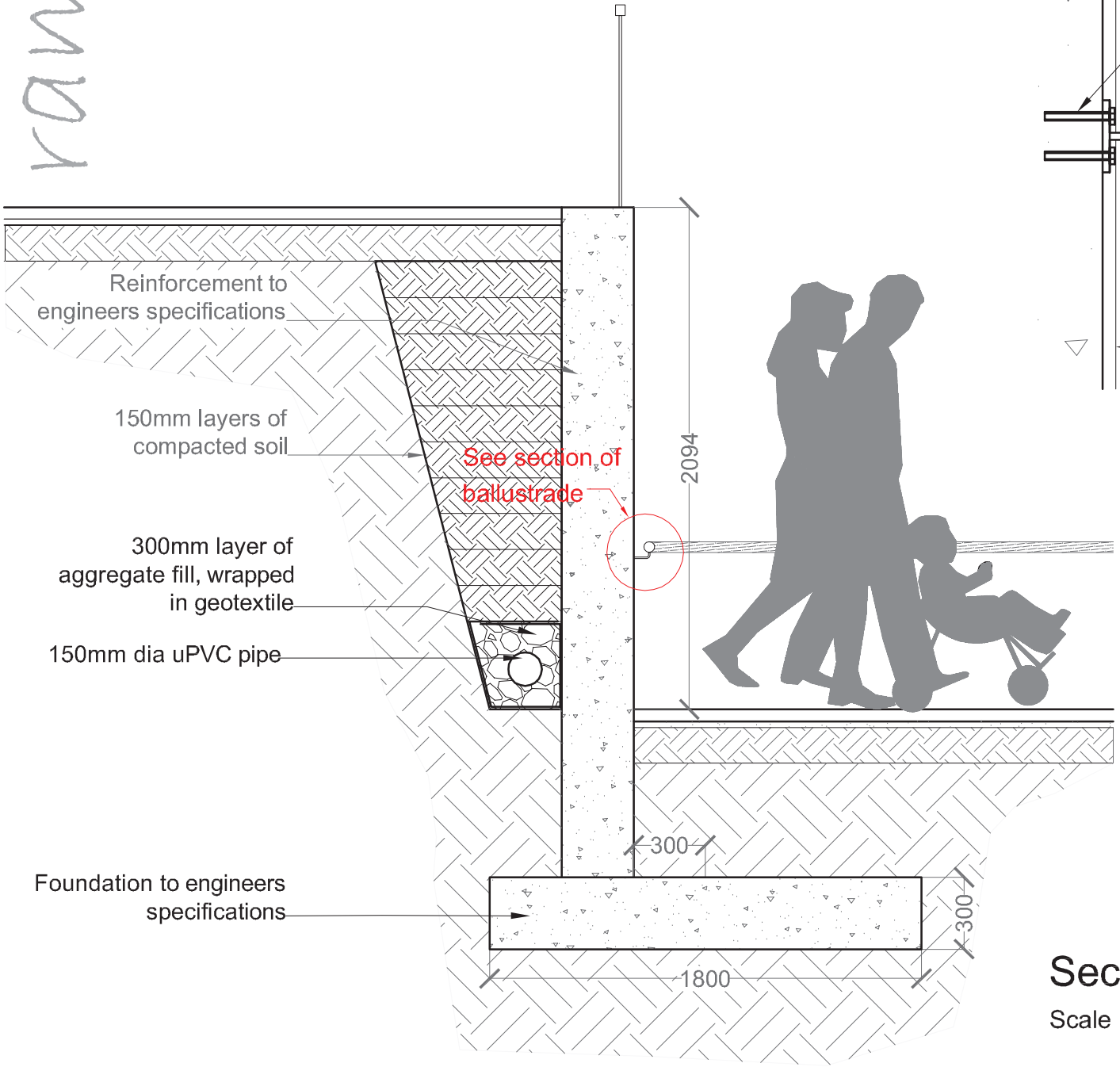


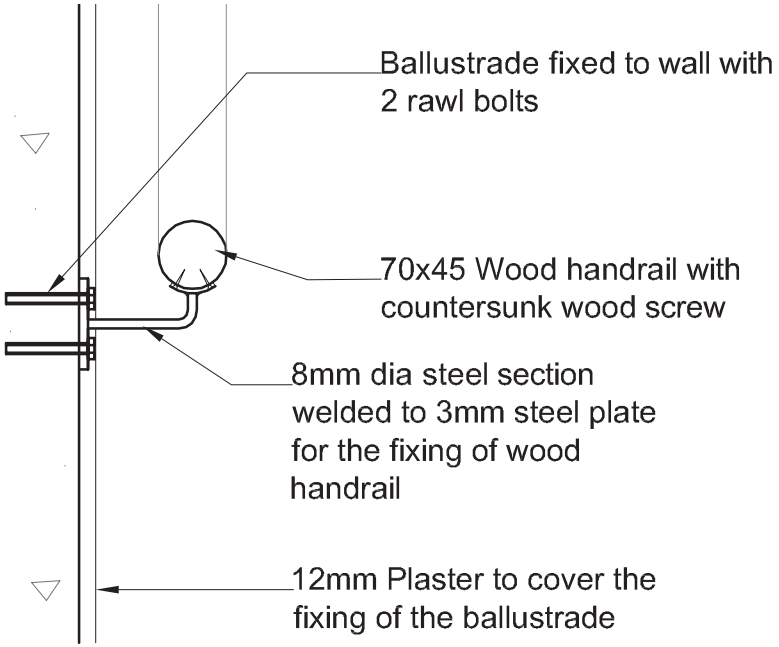
Section BB

Scale 1:100

ramp

ramp



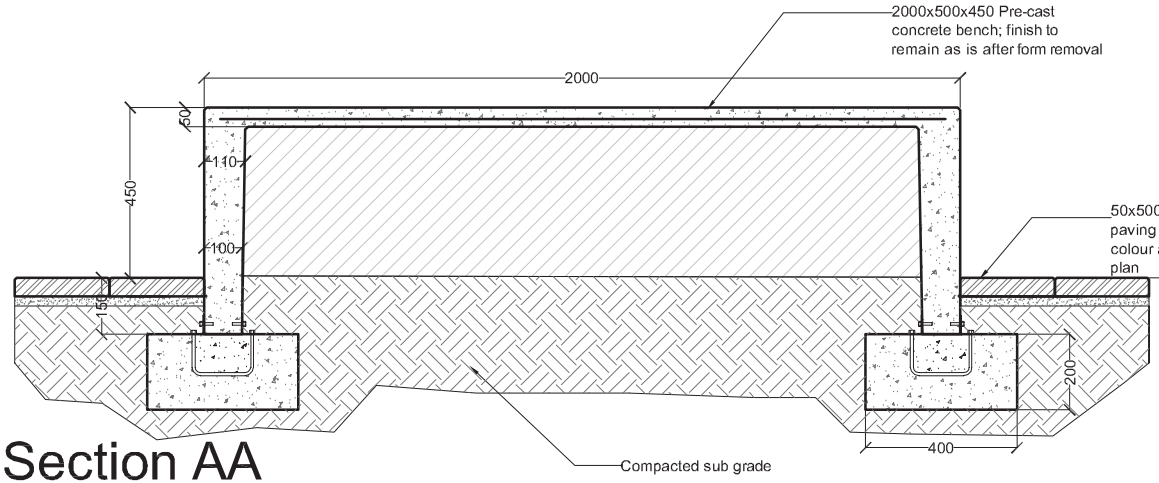


Section of ballustrade

Scale 1:25

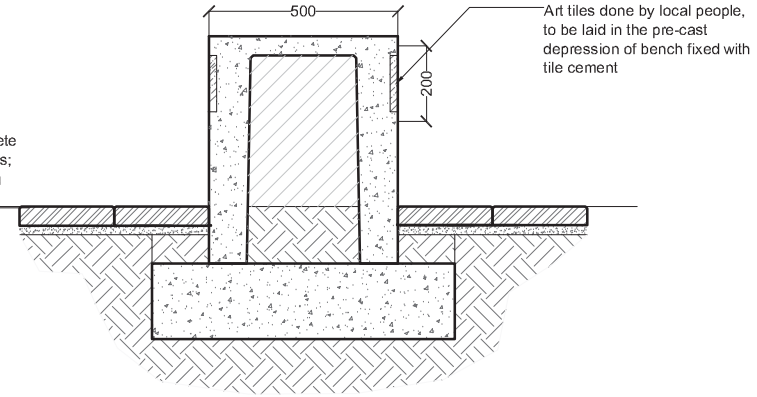
Section of retaining wall

Scale 1:25



Section AA

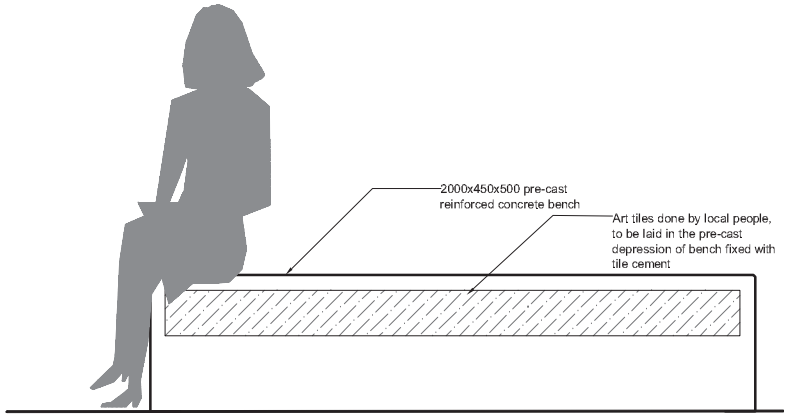
Scale 1:20



Section BB

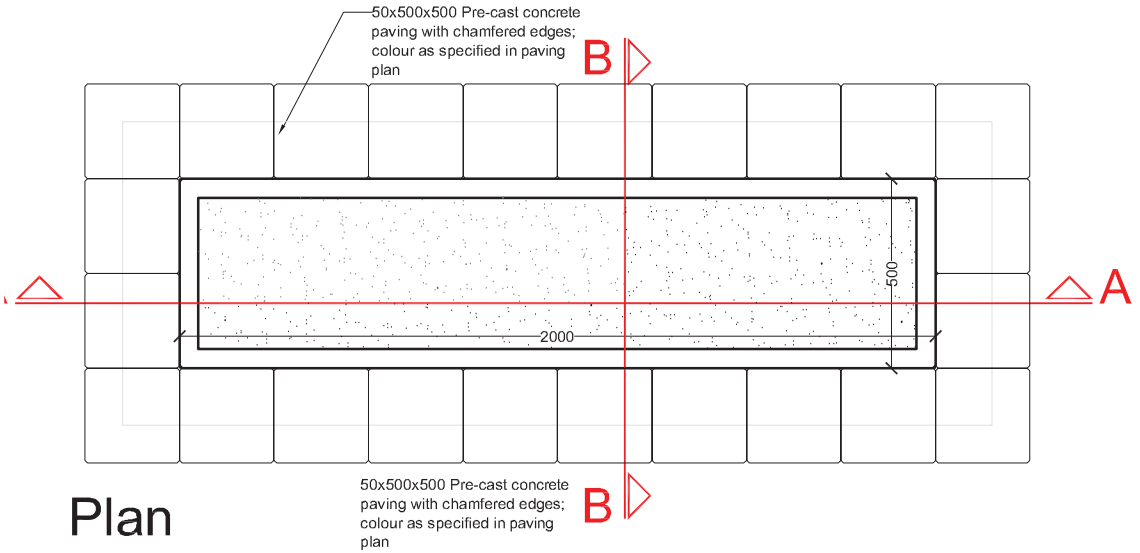
Scale 1:20

bench



Front elevation

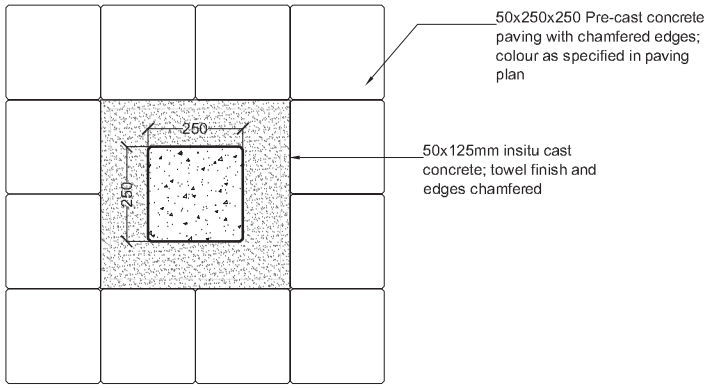
Scale 1:25



Plan

Scale 1:20

bollard



Plan
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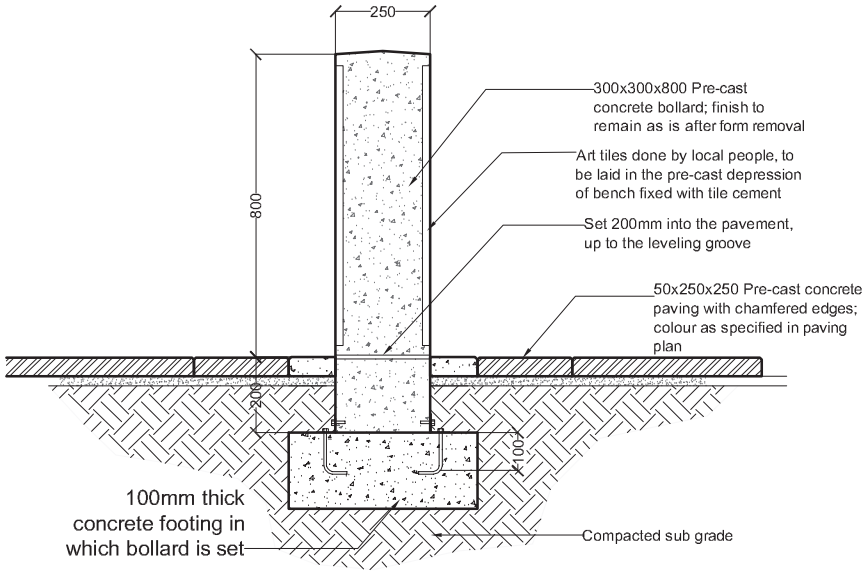

Section
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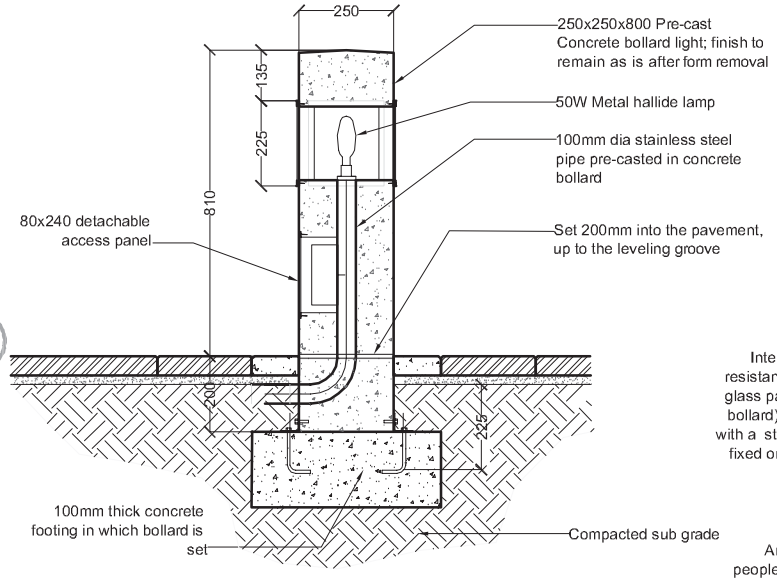
bollard light



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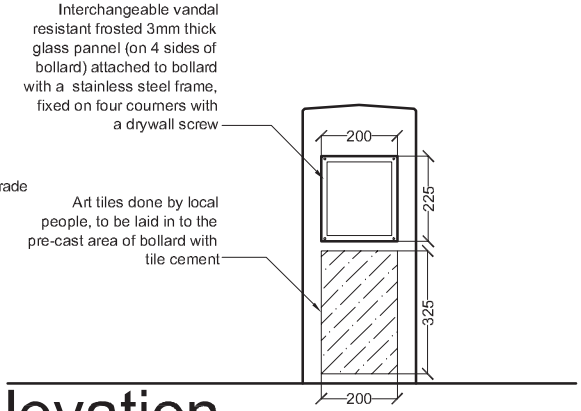

Elevation
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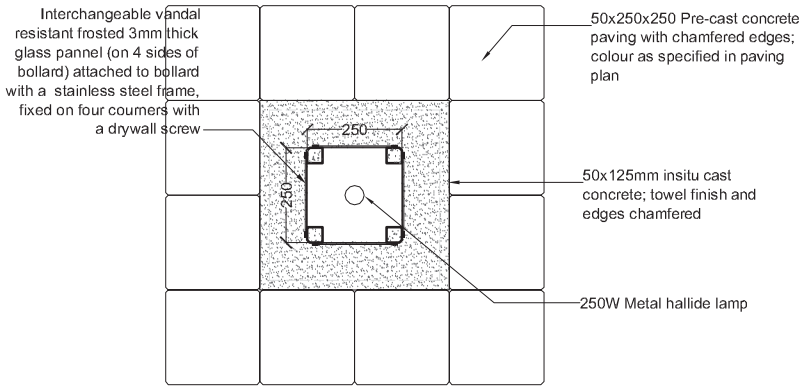
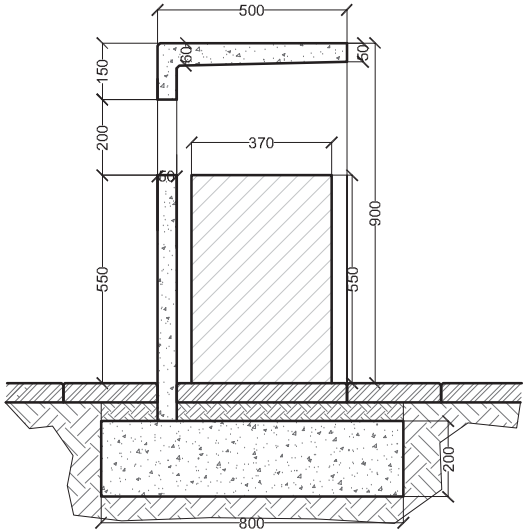


Plan
Scale 1:20

litter bin



Section AA

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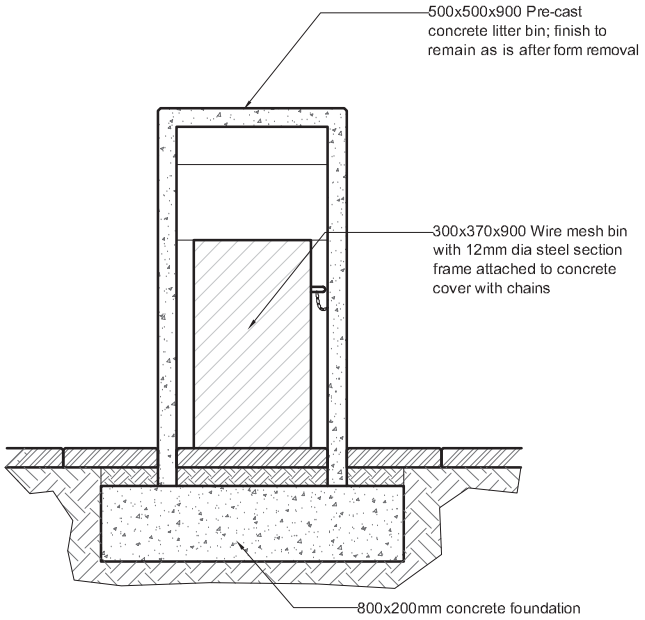

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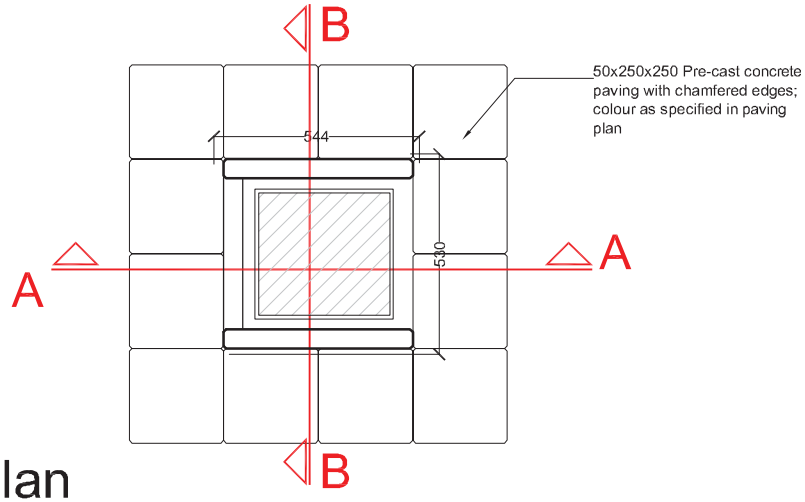

Plan

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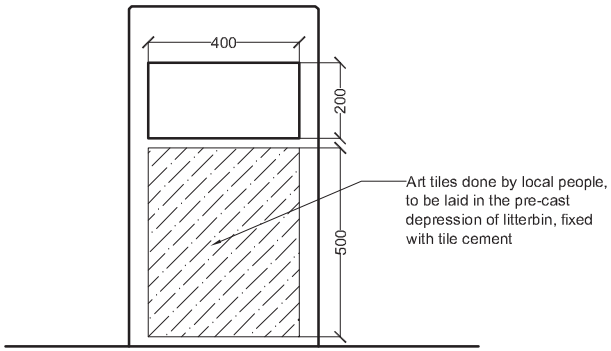
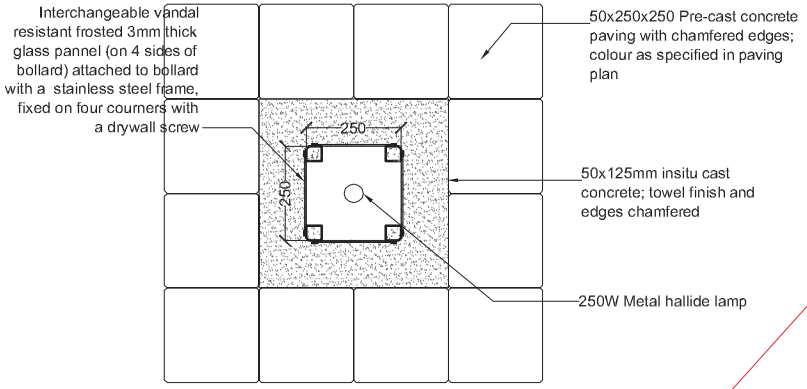


Elevation

Scale 1:20

post-top light



Plan

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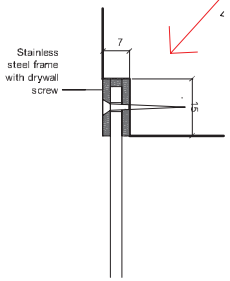
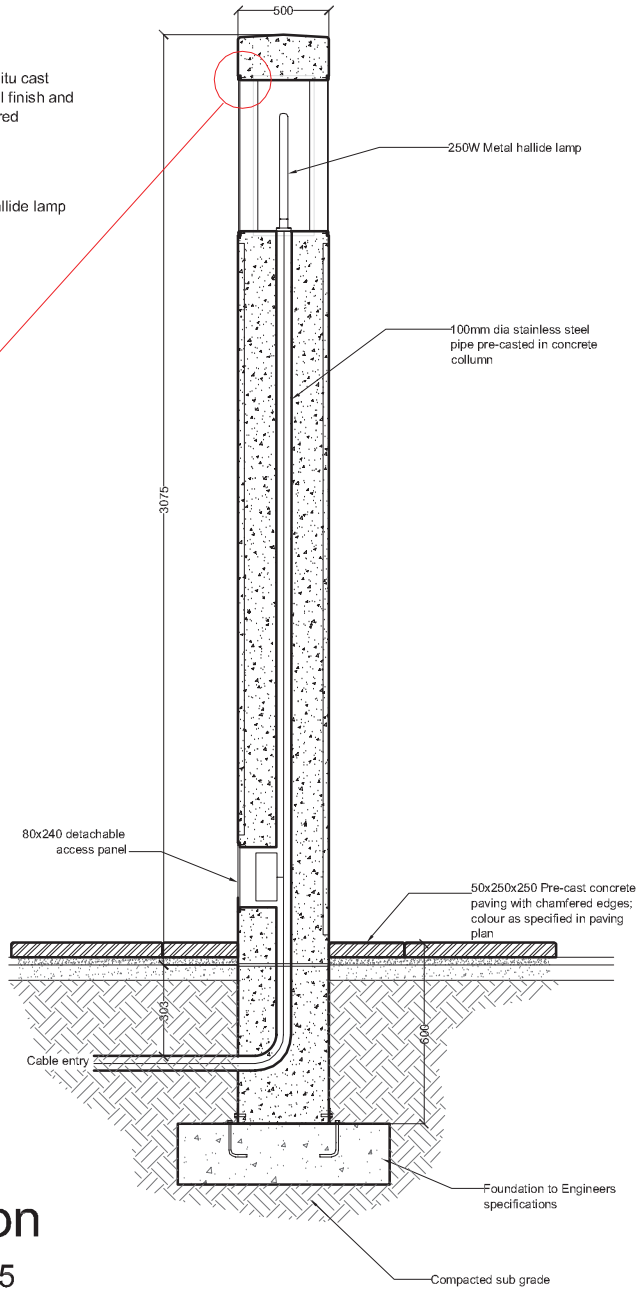


Detail of stainless steel frame

Scale 1:25



Section

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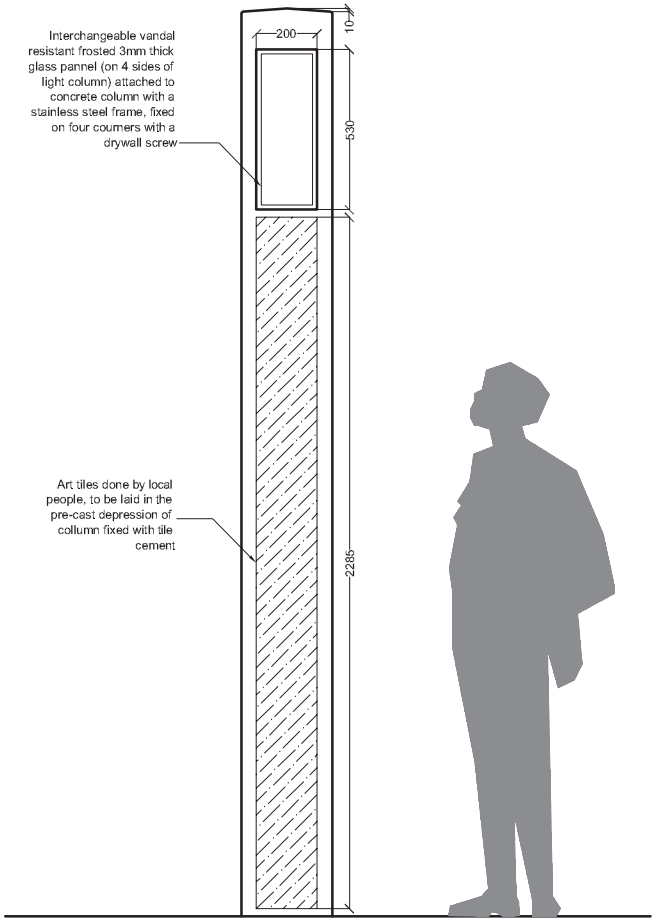
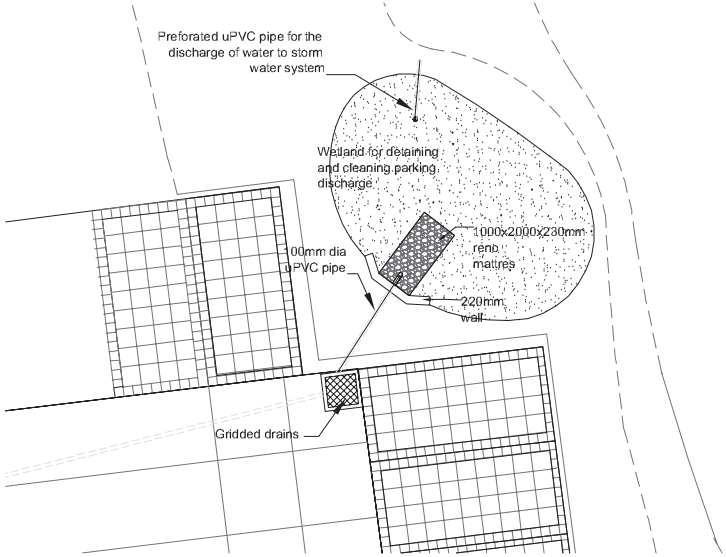


Elevation

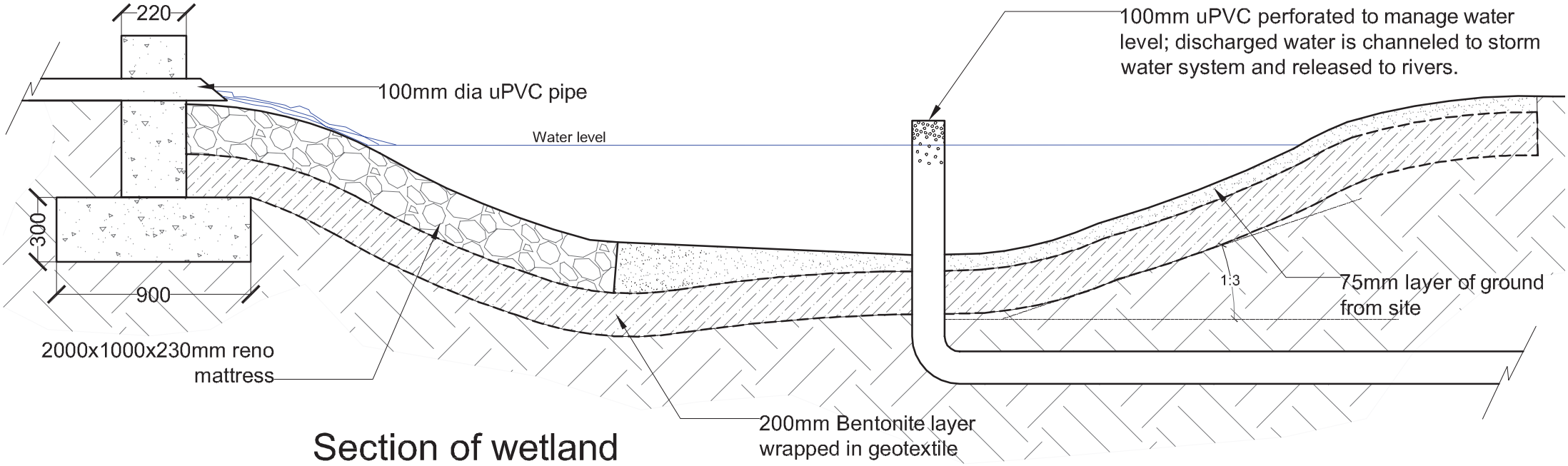
Scale 1:25

wetland



Plan of wetland

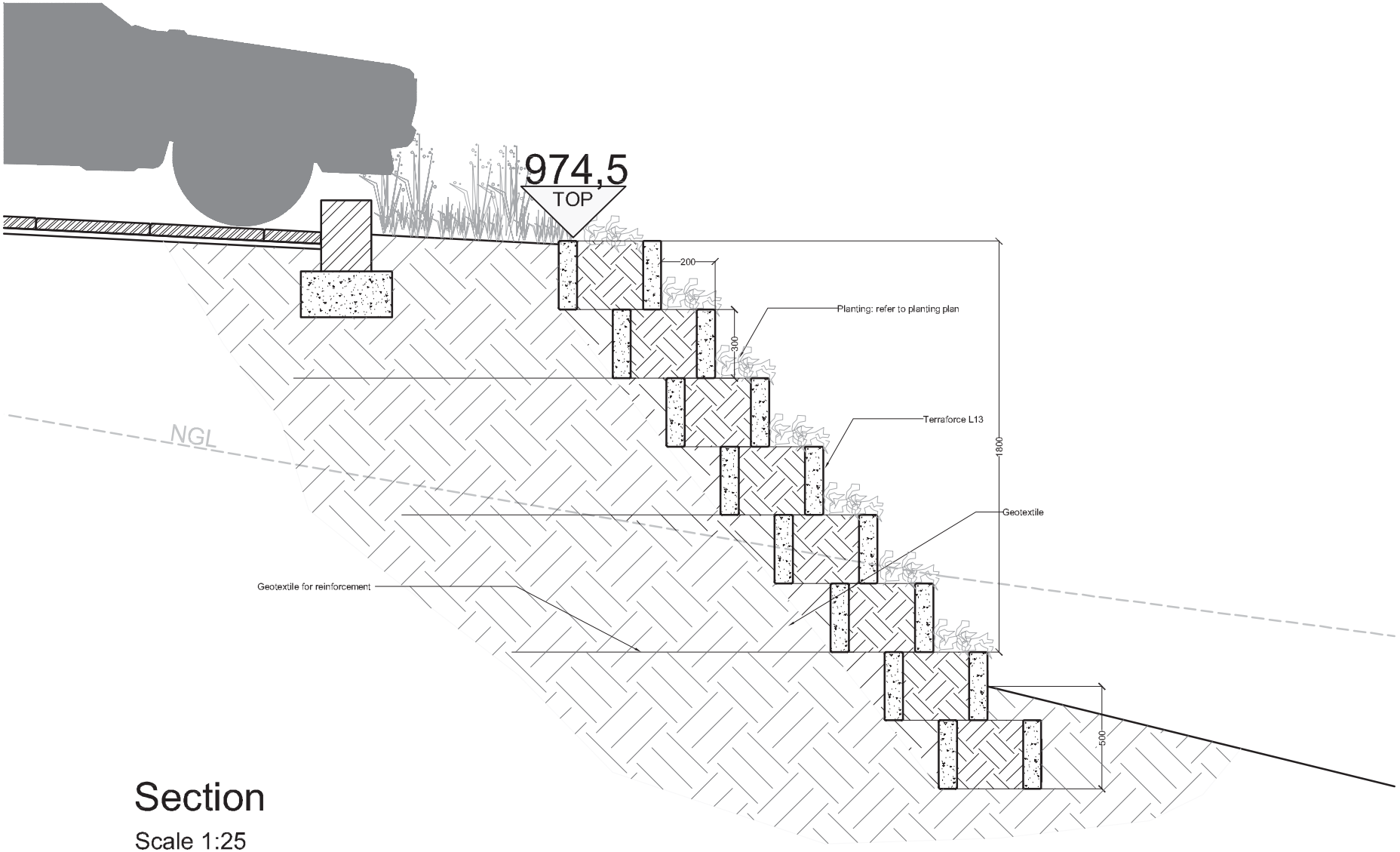
Scale 1:200



Section of wetland

Scale 1:25

Retaining wall



Section

Scale 1:25

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Photo 1: D.Wunderlich

Photo 3: D.Wunderlich

Photo 2: D.Wunderlich

Finé

Photo 4: D.Wunderlich

Photo 5: D.Wunderlich

Photo 6: D. Wunderlich

Conclusion

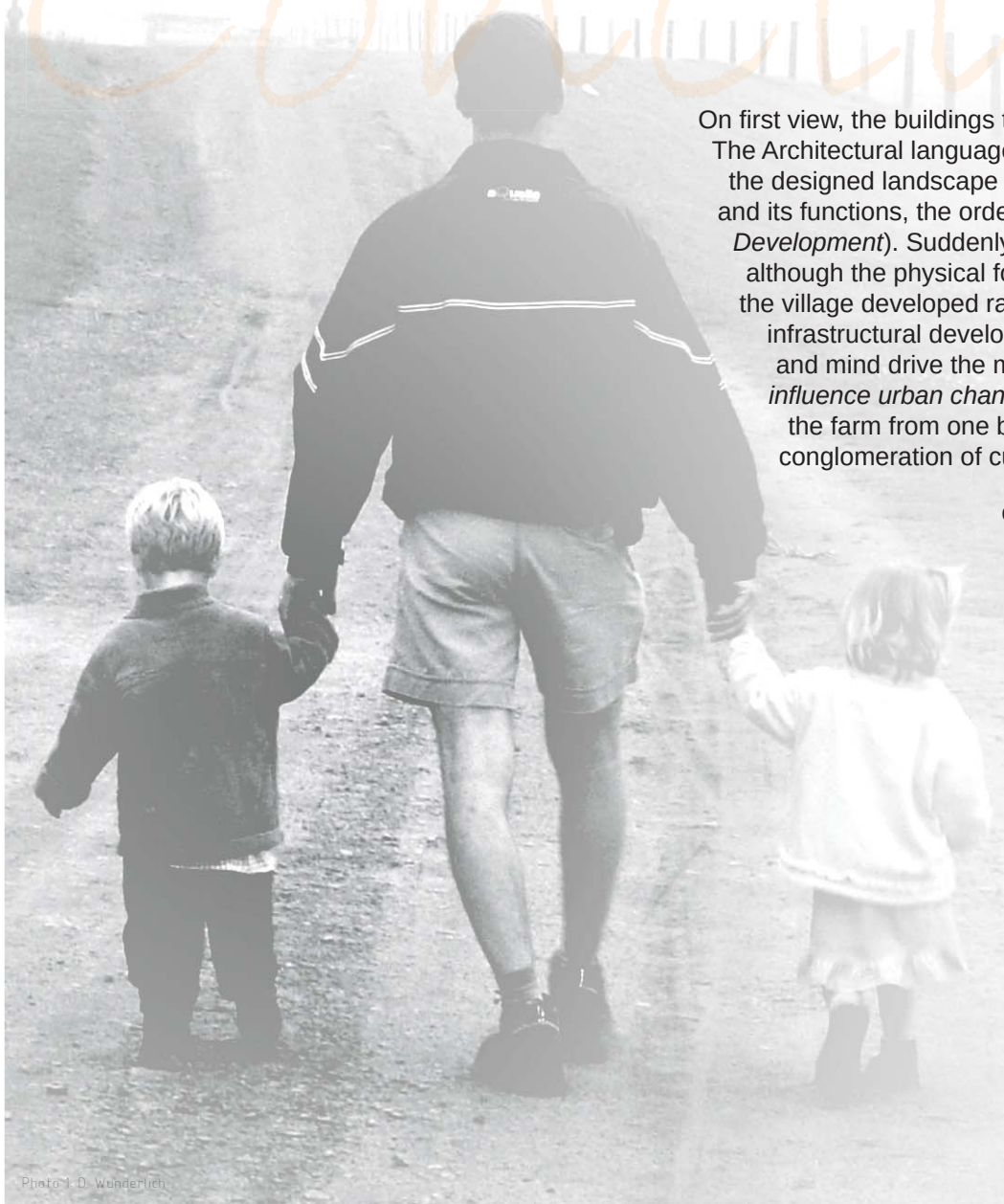


Photo 1 D. Wunderlich

On first view, the buildings that form the settlement on the farm Kwasizabantu, seems to be scattered over the site. The Architectural language does not speak of an expressed identity and the natural landscape is neglected while the designed landscape only starts to emerge. As I met the people and documented the history of each project and its functions, the order was revealed and the forces that shaped it started to emerge (see appendix *Historical Development*). Suddenly the buildings have a reason, a history, a specific function and a character to preserve, although the physical form does not necessarily correspond to its neighbour building. Due to the social needs the village developed rapidly and the economical misery of the Umvuti municipality manifest in the independent infrastructural development of the mission station. Internal forces of innovation born out of a renewed heart and mind drive the mission larger and larger. Bunchoten writes that *proto-urban conditions simultaneously influence urban change in many places*, and *lead to new form* (p32). These proto-urban conditions changed the farm from one building to a village with many people. As new people with their ideas are added to the conglomeration of cultures, the site's function, as well as the village's physical form and character changes.

Assessment of change, dynamics, and cause and effects are at the heart of thinking and explanation. To understand is to know what cause provokes what effect by what means, at what rate." - Georges Perec, Especces d'espace (Bunchoten, 2001, p77).

I see our role as Landscape Architects as the enhancer of peoples and environments' lives, not limited to the solving of the defined needs of both, but the adventurous exploring of the undefined needs to answer the unasked questions in which character expression, relationship structuring and artistic expression is all part of.

"we *are among the very few people today capable of revealing the rich complexity of sites and situations where other specialists see only chaos."* Michel Desvigne

Design can be good as far as it does good (Newton, 1957, p200).

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References

Photo 1: D.Wunderlich

Photo 2: D.Wunderlich

Photo 3: D.Wunderlich

Appendix

Photo 4: D.Wunderlich

Photo 5: D.Wunderlich

Photo 6: D.Wunderlich

Time	Building	Why/History	Emperical Information
1966	Small existing building.	The farm was bought with the one building, which was used for the services. It is now a hospital, or place where the sick is cared for.	
	Mud house for youth services.	The mud building was built where the switchboard building stands today. It was built for services, mostly for Zulu people, since it is only later that other cultures started to join.	The building soon becomes too small to accommodate all the people who attend the services, and a tent is used for the services.
1967			
1968			
1969			
1970	Technical workshop.	The workshop was started to cater for the needs that arose on the mission, and is still mainly used for the mission.	
1971	Uncle Erlo's house.	A bedroom and kitchen were built for the director of the mission; this house was also used to accommodate visitors, but soon became too small.	The house is used today as the home of the director of the mission station and his family, with other families living there. This is also the place where special guests, such as Mangusuto Buthelezi, are accommodated when they visit the mission.
	Switchboard building.	Accommodation for co-workers, one part for the men, the other part for women; youth services were conducted in the top room, but eventually they needed bigger spaces.	It is now being used for offices as well as sleeping quarters for the co-workers. The first floor, which was used for the conducting of services, is now being used as sleeping quarters for women.

Something Interesting	Vision/ Needs	Input and Output	Spacial Implications	Used for now?
Straw mattresses are made on which youth visitors can sleep.	The building was later demolished, and in its place the switchboard building was erected where the services were held on the first floor.	Not applicable.	Not applicable.	Demolished and replaced.
	Reactive growth.	Input: Electrical equiptment. Output: Electrical quiptment, oil, grease.	Close to other workshops; in need of open space to be able to service the heavy vehicles.	Technical workshop.
Uncle Friedel (one of the people who were part of the mission from the beginning and is today in charge of the European branches of the mission) slept in a caravan when the mission started.	The house forms part of the history of the building and, as such, will be kept as part of the heritage of the settlement and used for the accomodation of special geusts.	Input: Household products. Output: Household waste.	The house will stay as it is with the garden that surrounds it, which is used when many guests dine together (which happens quite frequently).	House for a few families.
	More accomodation for residents and visitors is needed.	Input: Household and office needs. Output: Household and office waste.	The building is ideal for accomodation.	Rooms, offices and switchboard.

Time	Building	Why/History	Emperical Information
	Wooden shop opposite existing building.	For the sale of products produced on the mission.	This shop was replaced with the shop that is now in use.
1972			
1973	Extension of original building.	Original building was extended to accommodate the number of people attending the services.	This building, as previously mentioned, is now used for a hospital.
1974	First trip overseas: Europe.	The people of the mission were invited to Germany to go and tell them of what is happening on the mission.	The connections with European countries, and later many other countries around the world, necessitates communication systems on the station. A Telkom tower was later erected, and the mission station implemented an internet server. Due to travel via aeroplane to and from the station, the landing strip was constructed.
1975			
1976	Uncle Erlo's house extended with extra wing.	For the accommodation of European visitors.	
	Kitchen.		
	Oversea's visitors start to come.	See 'First trip overseas: Europe', 1974.	
	Uncle Kjell's house (co-worker).	House was built for the co-worker and his family; also to accommodate visitors.	
1977			

Something Interesting	Vision/ Needs	Input and Output	Spacial Implications	Used for now?
	Was demolished and replaced with a shop just opposite the place where the old shop had stood.	Not applicable.	Not applicable.	Does not exist anymore.
		Input: Medicine, food etc. Output: Chemicals, human waste.	Expansion of the building necessary; access of vehicle close to building is important. Outside spaces for specific use for the ill can be considered.	Hospital.
Mama Lydia, a Zulu lady, recalls her experience: the European people found her hair and skin colour very strange and wanted to touch the black people. Europeans were surprised when she or her friends laughed or showed any emotion and would comment on it.	There are many visitors from other countries, and so more accomodation is needed. Then the legibility of the settlement must be improved, because it is quite difficult, on first-time arrival, to know where to go.	A regular movement of visitors in and out of the station.		
A blind man was involved in the building of the kitchen.				
		Input: Household needs. Output: Household waste.	House.	

Time	Building	Why/History	Emperical Information
1978	Bokamer developed - gathering place for co-workers.	The 'bokamer' was built for the co-workers to gather and conduct meetings.	The 'bokamer' is the room on top of the kitchen. The amount of co-workers are increasing, thus more room is needed to accommodate them. There are approximately 160 co-workers, but not all of them are stationed on the mission station.
	Landing strip - used for uncle Kurt Koch (doctor in psychology).	Dr Kurt Koch was a well known German psychiatrist during this time. He wrote many books that were published in mainly German, but English and Afrikaans and other languages as well. He visited many contries and flew regularly. His wife is still living on Kwasizabantu.	It is now being used by the Red Cross approximately once a month. Irrigation organisations used it during certain times of the year as needed by the farmers. For the mission station it is not used regularly. Maintenance costs are high, and it is being considered to disuse it as a landingstrip it for time being. It is also used by the children to play on.
1979			
1980	First part of existing shop built.	The shop is used to provide in the daily needs of the local people and the produce of mission is sold here.	A small portion of the products made in the factories on the farm are sold in the shop, together with products to provide in everyday needs.
	Construction on auditorium commenced.		
1981			
1982	Electrical workshop developed.	The electrical workshop was started to provide in the electrical maintenance needs of the rondavels.	Approximately four men are working here and provide in the missions needs for any electrical reparations or work as well as maintenance of the electrical infrastructure.

Something Interesting	Vision/ Needs	Input and Output	Spacial Implications	Used for now?
	In need of a larger room.	Input: Office needs. Output: Office waste.	Specific gathering space for co-workers that can accommodate the amount of people and provide in the needs of a prayer room.	
	Shouold be either upgraded to meet the standards for landing strips, or demolished and, if needed, built elsewhere.	Input: Mowing of lawn and maintenance of lights; enough precipitation and thus no need for irrigation. Output: Grass cuttings.	The landing strip is a prominent landscape feature that divides the settlement in two.	
	The shop provide in the needs of the people on the farm, but also for the people living in the Traditional Authority areas. More defined spaces for different uses, such as Telkom phones, post boxes, butchery, bakery etc., is needed that will be accessable, but secure.	Input: Basic services. Output: Waste of product packing-materials, food and produce that have expired.	Expansion, planning and defining of the space as the economical heart of the settlement; the village centre.	
	In need of more space.	Input and outputs: Electrical parts.	Expansion of existing building.	Electrical workshop.

Time	Building	Why/History	Emperical Information
	Rondavels built for visitors.	The rondavels were initially built for the many visitors that stayed on the mission for a while. They are now converted into homes, with families of up to six people living in one rondavel.	As the different families require more space, the rondavels are built up as double storeys.
1983	(Approximately at this time) houses for Germans built.		
1984	(Approximately at this time) reception and VIP rooms built.	The buildings were built to accommodate important people that came to visit the mission. Today it is being used as the reception of visitors and also as offices.	
	Uncle Friedel's house built.		Many people dine here, and house is used for families that stay there, or for visitors.
1985	(Approximately at this time) two dormitories built close to dinning hall.		These dormitories are used for single people living on the mission, as well as sleeping quarters for visitors.
	Accommodation for men: half for men and other half for "boeties", or co-workers.		

Something Interesting	Vision/ Needs	Input and Output	Spacial Implications	Used for now?
	The rondavels are part of the history and identity of the place, but better suit the function of accomodating visitors. Parking, communal spaces and children's play areas must be added.	Input: Household products. Output: household waste.	Parking, public spaces, children's play area added to area. Rondavels as part of the historical identity will be kept.	Houses.
		Input: Everyday needs for a family. Output: Water, sewerage, household waste.	Parking .	Houses.
Kurt Koch decided to build it.	Waiting room for a group.	Input: Office needs Output: Office waste	Needs to be relocated or emphasised to be easy to find on arrival. Reception overflow into landscape; parking area for visitors on arrival.	Reception area and offices.
Uncle Friedel is the manager of the oversea's branches of the mission.		Input: Household inputs. Output: Household waste.	Remain as is.	House.
	More accomodation for single women living on mission necessary.	Input: Household input. Output: Household waste.	More accomodation; mass accomodation.	Dormitories.
	More accomodation for single men living on mission necessary.	Input: Household input. Output: Household waste.	More accomodation; mass accomodation.	Dormitories.

Time	Building	Why/History	Emperical Information
1986	Carpentry workshop started.	To supply the needs of the mission.	Two people employed, and also about four volunteers man the workshop. Wood is supplied, some by the mission, but mostly from farmers in the surrounding areas that are mostly part of the congregation. They make, as far as possible, all the wooden products on the mission: wardrobes, kitchen units, tables, chairs, benches for the auditorium, roof trusses, etc.
	School constructed.		A creche, primary and secondary school.
1987			
1988	Bakery started.	The mission received all its bread from Sasko, but sometimes the bread came late, or was difficult to obtain and then became old etc. It became necessary to produce their own bread. At the same time a German man, who lives in Australia, wanted to get rid of his oven and moulder, and asked the mission if they wouldn't want the machines, since he would be willing to send it at his own cost. At the same time, a lady who had studied bakery in Switzerland felt led to start a bakery on Kwasizabantu, but due to the fact that there was no bakery or any equipment on the mission, was unsure whether she whould go through with it and leave her country. At that time the German man of Australia visited Europe for some reasons. One night the lady visited some friends just to find the German man there, who then told her of his mission to take bakery machines to Kwasizabantu (not knowing of her struggle concerning starting a bakery in Kwasizabantu). The lady decided to follow the German man to Kwasizabantu, where he spent a while in order to teach the people to work with the machines. They started the bakery under the leadership of this lady, Godron, who now lives on Kwasizabantu. The first building utilised was situated next to the existing dininghall, but moved to be close to the shop and the coffee shop. They bake 2000 bread loaves every day, as well as different pasteries for markets, the mission's shop and to those who place orders.	Dependent on generators for electricity due to the inconsistency of electricity received from Escom. The bakery is also part of the new coffee shop, and is used to provide what is necessary in the coffee shop.

Something Interesting	Vision/ Needs	Input and Output	Spacial Implications	Used for now?
	Reactive growth.	Off-cuts of wood go to boiler, which is used to heat the water for the mission. Shavings go to the pigs and chickens.	Working well at the moment.	Carpentry.
	Reactive growth.	Input: Office needs. Output: Office waste.	Parking and play area to be designed; location in relation to school buildings.	School.
	Reactive growth.	Kitchen input and waste.	Working well at the moment.	Kitchen for dining hall.

Time	Building	Why/History	Emperical Information
	Prefabricated houses built.	For accommodation.	
1989	Dormitories for girls and boys built between 1989 and 1990.		
1990	Auditorium finished.		
	Tabitha Adult School started.	The school was started for the education of adult people in reading, writing, learning new languages (Afrikaans, English, Zulu and German), computer skills and needlework. The building is located close to the entrance of the site to facilitate access for the people not living on the station.	Tabitha Adult School has 145 students and seven full-time teachers. Classes are given 12-13pm and 15-16pm. They have three classrooms, but are in need for more.
	Dairy moved.	Moved from building workshop to the one they now occupy	The cows stay on a farm 100km from the mission station, and the 4000-5000 liters of milk are transported to the mission everyday. They sell the processed products within a radius of 150km from the mission station. The factory workers are mostly people working on contract from outside areas.
1991			

Something Interesting	Vision/ Needs	Input and Output	Spacial Implications	Used for now?
				Houses.
	Play areas.	Household and kitchen inputs and wastes.	Working well at the moment.	
	In need of more facilities	Input: Office needs Output: Office waste	Expansion of building or extra buildings. Close to entrance for ease of movement for the people not living on the mission.	Adult school.
	The business is growing, and more space is needed for storage.	Input: Milk, water. Outputs: Mixed yoghurt, produced when machines are cleaned for new flavour, are sent to the kitchen (approximately 60kg of "waste" yoghurt a day); all waste water is collected and sent through a fat seperator before channeled to the septic tanks.	Expansion of building.	Dairy factory.

Time	Building	Why/History	Emperical Information
1992	Agricultural tunnels installed.	It was started when a man from Germany asked if he couldn't give his glass tunnels/hothouses to the mission. Although unskilled in the management and working of tunnels, they accepted it. He sent the tunnels, packed in three ship containers, over to South Africa. Of the three, one container was converted to the management office. At the beginning the growth of green peppers was developed/learned through trail and error. Eventually they got a man of Holland who was willing to help them. (Holland is the country with the most successes in the use of tunnels for crop production.) Today the tunnels are fully automatic, based on an Israeli program, and all peppers produced are sold to Woolworths.	It is important for the tunnels, firstly, to be rotated according to the sun for the optimal usage of the sun, and secondly, according to the wind for ventilation through the tunnels to reduce the heat (hothouse effect) and the supply of CO2. The peppers that are grown in the tunnels are very sensitive, and if any person enters the tunnels, he/she must first sterilise his/her feet. Anybody that smokes can't enter due to the influence of nicotine on the plants. There is a circulation of plants every five months. Some of the tunnels are used for the production of the plants. Coconut hair and wooden shavings are used as growthmedium. Coconut hair needs to be imported, and, while a small amount of wooden shavings of the carpentry can be utilised, the rest must be bought.
1993	Teacher's college built.		A four-years' teacher's degree is given in compliance with the Teachers College of Potchefstroom University.
1994			
1995			
1996	Recording studio (later Radio Kwezi) started.	Started with the recording of the Zulu choir for Radio Pulpit, but changed to a radio station to reach more people locally.	
1997			
1998	aQuelle started.	The existing water supply was brownish and tasted very bad, so it became necessary to bore for fresh water. According to geographic signs (cracks in the earth), they bore two holes to find the water. Later a chemical engineer who work with water purification came up with the idea to test it to see if they could bottle it. The water is of a very high quality, and in 1998 they started bottling in a small building with machines they received from Italy. Within a year or two they were in desperate need of upgrading. Today, they have 9, 30 ton lorries to distribute the bottled water. The area where the borehole is located, is changed to a conservation area and wild animals were introduced.	Work three shifts, twenty-four hours a day, seven days a week. Run according to ISO standards; UPS (batteries) connected to system; (generators ?). Borehole is 66m deep.

Something Interesting	Vision/ Needs	Input and Output	Spacial Implications	Used for now?
All profits are used to feed Aids orphans. Twenty-nine Zulu chiefs asked to help in the caretaking of the Aids orphans in their area, where they actively help with providing food for the orphans.	Pressure for more production.	All the water used for irrigation leads to kikuyu fields that were previously used for the pastures of the milking cows used. However, due grazing space, the cows are now on another farm.	More tunnels are needed to comply to the demand.	Tunnels for peppers and chillies.
		Input: Household and office needs. Outputs: Household and office as well as lab chemicals.		Teacher's college.
	They receive many visitors, but due to a lack of space it can become very crowded and difficult to walk around.	Input: Office needs. Output: Office waste.	Expansion of building. Building cannot be moved or relocated.	Radio station.
The borehole is under a sandstone layer, which is of the best purifying substrates.	aQuelle is growing extremely fast. It produce 25% of South Africa's bottled water. It is always on the lookout for expansion space. They are in the process of converting the area above the groundwater into a game and bird sanctuary.	The waste water is relatively clean, with only sugar, which comes from the left-over water in the tanks, when the tanks are cleaned, and chlorine, which is used for purify the water. The waste water is left to flow down the hill to the dam in the valley. Lots of waste plastic is produced that form part of the missions' waste that is dumped at a specially prepared waste point.	Expansion of building.	aQuelle water bottling factory.

Time	Building	Why/History	Emperical Information
	Weaving	The materials and instruments to weave were received from people from Germany.	There are three ladies that are weaving. Workshops are given to people who want to learn.
	Artemesian production started.		The plants are imported from China, because of its valuable medicinal properties. Areas of approximately 3,5ha are used for production. The production areas need to be rotated every third year. The plants are grown from cuttings on the mission, but they need to get new plants after twelve generations. The plants must be harvested just before they flower in March, when the artemesian content is the highest. The plants are harvested in the morning and left for drying in the sun from 10am-3pm. From there the plants are left over-night for drying. Old ship containers are used to make the ovens.
1999	Bakery moved to new building.		Closer to shop where the products are sold, and the coffee shop, for which it serves as kitchen.
2000			
2001			
2002			
2003			
2004			
2005			
2006	Care house for people suffering from HIV/Aids.		Any Aids sufferer is welcomed here. This is a place to stay and receive healthy food. Some medicine is provided.

Something Interesting	Vision/ Needs	Input and Output	Spacial Implications	Used for now?
	Artemesian and its medicinal value is still unknown by the majority of people and thus the growth of the small "factory" is not that fast. It is used to treat malaria with great success.	A very small amount of dried leaves and sticks are wasted (only the parts that fall on the floor during drying and processing).	Drying area needed.	Artemesian drying.
	Reactive growth.	Previously discussed.	Previously discussed.	
	Vast amount of accomodation space and caring facilities needed.	Household and medical inputs and outputs.	Accomodation, social and caring facilities needed.	Care house.

KwaZulu

Fig. 1 http://www.kznwildlife.co.za/

KwaZulu-Natal is characterised by increasing human populations, often with heavy reliance on natural resources for their livelihoods.
The use of renewable natural resources is fundamental to the economy, culture and well being of the people of KwaZulu-Natal.
Ezemvelo KZN Wildlife is mandated to conserve biodiversity for the benefit of all the people of the province and of the country.
For these reasons, “sustainable use” is advocated to achieve the objectives of improving and maintaining human welfare while maintaining or increasing our rich biodiversity.

KwaZulu-Natal has an astonishing array of wildlife. This province has diverse and spectacular landscapes with a wealth of plant and animal species to match.
Encompassing the sub-tropical abundance of the swamp forests, the mangroves and some of the highest forested coastal dunes in the world; evocative dry sandforest and bushveld; lakes and wetlands; grasslands, mistbelt forests and montane species living on the slopes of the Drakensberg Mountains.

Within 160 km the topography ranges from sea level to over 3000m in the Drakensberg - the moisture catching escarpment deeply incised by rivers, more rivers than any comparable area in southern Africa, that flow to the coast and the warm Mozambique current.
Sub-tropical conditions prevail in the northern coastal areas, frost and mist in the KwaZulu-Natal midlands and snow and ice in winter on the mountain peaks. Rain falls mostly in summer.
KwaZulu-Natal offers varied wildlife experiences ranging from wilderness trails in the Imfolozi Game Reserve (walking in White Rhino country), to sitting quietly in a hide at Mkhuze Game Reserve watching the natural world parade past. The Greater St Lucia Wetland Park, where your trail takes you into the territories of the hippopotamus and crocodile, has been internationally recognised for its species diversity.
You can be part of the scents, sights and sounds of the African bush from the comfort of your vehicle, on foot in the wilderness or from the verandah of your well-appointed chalet.

Wildlife List

Aardwolf
African Wildcat
Banded Mongoose
Blackbacked Jackal
Black Rhino
Blesbok
Black Wildebeest
Bat-eared Fox
Blue Duiker
Brown Hyena
Buffalo
Burchell’s Zebra
Bushpig
Bushbuck
Cape Fox
Caracal
Cheetah
Clawless Otter
Civet
Common Reedbuck
Dwarf Mongoose
Eland
Elephant
Giraffe
Grey Rhebuck
Grey Duiker
Hippopotamus
Impala
Klipspringer
Kudu
Large-spotted Genet
Leopard
Lion
Mountain Reedbuck
Nyala
Oribi
Red Duiker
Ratel
Red Hartebeest
Roan
Serval
Sidestriped Jackal
Small-spotted Genet
Springbok
Steenbok
Striped Polecat
Striped Weasel
Sable
Slender Mongoose
Spotted Hyena
Spotted-neck Otter
Suni
Turtle Green
Turtle Leatherback
Turtle Loggerhead
Tsessebe
Waterbuck
White Rhino
Warthog
Water Mongoose

Wild Dog
Yellow Mongoose

Wildlife Management

Technical Manuals

The sustainable use of natural resources in KwaZulu-Natal has grown exponentially in the past forty years and now generates both substantial income and a significent number of jobs.
This ranges from non-comsumptive use such as photography, hiking and wilderness trails to the consumptive use of plant and animal resources for, among other things, hunting, the capture and sale of live game, to the production of curios and traditional medicines.

In support of the use of natural resources, Ezemvelo KZN Wildlife has produced a series of technical manuals to help private and commercial landowners to manage their land and its resources to maximise the benefits to both biodiversity and sustainability.

Technical Manuals

1. Antelope Abundance
2. Habitat Preference Of Game Mammals
3. Blesbok Management
4. Common Reedbuck Management
5. Impala Management
6. Oribi Management
7. Blackbacked Jackal Caracal Bushbuck Management
8. Managing For Otters
9. Guinea Fowl Management
10. Alien Plant Threats
11. Trout Stream Management
12. Trout Dam Management
13. Constructing Dams For Waterfowl
14. Creating A Bird Garden
15. Wildlife Conservancies
16. Forest And Bush Restoration
17. Replanting A Degraded Watercourse
18. Grass Carp For Weed Control
19. Warm Water Fish Production

Fig. 2 http://www.kznwildlife.co.za/

Birding

Fig. 3 http://www.kznwildlife.co.za/

The birds of KwaZulu-Natal(KZN) are probably the best known in Africa. Many of the early birders worked here, the reason that more than a few African birds have natalensis as the second half of their scientific name. KZN has a long bird list, about 470 species being regularly recorded, and another 200 less regularly. This diversity reflects the number of habitats in KZN.

The coastal plain is influenced by the warm Mozambique current, with the result that a number of tropical birds push to their southernmost extremity there.
Some of these are species absent from the rest of South Africa.
Other tropical species spread south on a broader front, sometimes occupying the whole of KZN. None of these is a South African endemic, but a few are endemic to the coastal plain, just extending into Mozambique.
Many are breeding migrants, retreating to equatorial Africa in winter.
The KZN interior is structurally diverse - forests, woodlands, grasslands, wetlands - although these habitats are not unique to KZN.
Here the tropical birds mingle with species spreading from the western half of southern Africa. These latter are year-round residents, although some migrate short distances to lower altitude in winter.
Most of the widespread species come from the southern and western Cape.
KZN's alpine species are a mixture of Karoo birds at their easternmost limit, and species confined to high altitude. Many of these are endemics.
A number of north-western KZN birds are more typically associated with the Kalahari or highveld.
Much of the diversity of KZN is accounted therefore by its unique position at the crossroads of two, and by some definitions four avifaunas.
It also receives a substantial proportion of the Palaearctic migration that graces Africa each summer.
One consequence of KZN's crossroads position is that no species is endemic to the province.
The importance of KZN in conserving South Africa's birds is reflected in the number of Red Data species present. Of the 62 species currently listed, 49 occur regularly in KZN, and KZN makes a major, or the only contribution towards the conservation of 26 of them.

Bird Lists

Grey-winged Francolin
Natal Spurfowl
Swainson's Spurfowl
Crested Giumeafowl
White-faced Duck
Egyption Goose
Spur-winged Goose
African Pygmy-goose
Yellow-billed duck
Acacia Pied Barbet
Crested Barbet
Southern Yellow-billed Hornbill
Southern Ground-Hornbill
African Hoopoe
Nrina Trogon
Malachite Kingfisher
African Pygmy-Kingfisher
Giant Kingfisher
Giant Kingfisher
Pied Kingfisher
Burchell's Coucal
Purple-Crested Turaco
Barn Owl
Grass Owl
African Scops-Owl
Southern White-faced Scops-Owl
Cape Eagle-Owl
Pel's Fishing-Owl
African Wood-Owl
Marsh Owl
Black-bellied Bustard
Grey Crowned Crane
Blue Crane
Wattled Crane
African Finfoot
Black Crake
African Purple Swamphen
Red-knobbed Coot
Common Greenshank
Common Sanpiper
Little Stint
Greater Painted-snipe
African Jacana
Water Thick-knee
Spotted Thick-knee
Kittlitz's Plover
Collared Pratincole
Grey-headed Gull
African Fish-Eagle
Bearded Vulture
White-backed Vulture
Cape Vulture
Lappet-faced Vulture
White-headed Vulture
Lizard buzzard
Jackal Buzzard
Verreaux's Eagle
African Hawk-Eagle
African Crowned Eagle
Lanner Falcon
African Darter
Reed Cormorant
White-breasted Cormorant
Black Heron
Little Egret
Great Egret
Grey Heron

Goliath Heron
Green-backed Heron
Black-crowned Night-Heron
Dwarf Bittern
Hamerkop
Greater Flamingo
Lesser Flamingo
Glossy Ibis
Hadeda Ibis
African Spoonbill
Great White Pelican
Pink-backed Pelican
Yellow-billed Stork
Woolly-necked Stork
Saddle-billed Stork
African Paradise-Flycatcher
Black-crowned Tchargra
Bokmakierie
Cape Crow
Pied Crow
Dark-capped Bulbul
Yellow-bellied Greenbul
Cape Rock-Thrush
Pale Flycatcher
White-browed Scrub-Robin
Familiar Chat
Cape Glossy Starling
Southern Red Bishop
Thick-billed Weaver
Orange-breasted Waxbill
African Quailfinch
Cut-throat Finch
Grey Waxbill
Blue Waxbill
Green-winged Pytilia
African Firefinch
Village Indigobird
Yellow-fronted Canary

Endemic Bird Lists

Southern Bald Ibis
Cape Vulture
Forest Buzzard
Jackal Buzzard
Black Harrier
Grey-wing Francolin
Blue Crane
Blue Korhaan
Knysna Turaco
Ground Woodpecker
Knysna Woodpecker
Melodious Lark
Rudd's Lark
Botha's Lark
Thick-billed Lark
Grey Tit
Bush Blackcap
Cape Rock-Thrush
Sentinel Rock-Thrush
Buff-streaked Chat
Sickle-winged Chat
Chorister Robin-Chat
Drakensberg Rockjumper
Brown Scrub-Robin
Knysna Warbler
Cape Grassbird
Karoo Prinia
Fiscal Flycatcher
Fairy Flycatcher
African Rock Pipit
Mountain Pipit
Yellow-breasted Pipit
Southern Tchagra
Pied Starling
Southern Double-collared Sunbird
Greater Double-collared Sunbird
Cape White-eye
Cape Weaver
Swee Waxbill
Forest Canary
Drakensberg Siskin

Red Data Bird Lists

Near-threatened:
Great White Pelican
Black Stork
Woolly-necked Stork
African Openbill
Marabou Stork
Greater Flamingo
Lesser Flamingo
African Pygmy-Goose
Secretarybird
Bat Hawk
Ayres' Hawk-Eagle
African Crowned Eagle
Pallid Harrier
Black Harrier
Peregrine Falcon
Lanner Falcon
Blue Korhaan
Black-bellied Bustard
Lesser Jacana
Greater Painted-snipe
Black-winged Lapwing
Collared Pratincole
Black Coucal
Half-collared Kingfisher
Knysna Woodpecker
African Broadbill
Bush Blackcap
Orange Ground-Thrush
Broad-tailed Warbler
Rudd's Apalis
Woodwards' Batis
Black-throated Wattle-eye
Cape Longclaw
Red-billed Oxpecker
Neergaard's Sunbird
Pink-throated Twinspot
Lemon-breasted Canary
Vulnerable:
Pink-backed Pelican
White-backed Night-Heron

Southern Bald Ibis
Cape Vulture
White-backed Vulture
Lappet-faced Vulture
White-headed Vulture
Tawny Eagle
Martial Eagle
Southern Banded Snake-Eagle
Bateleur
African Marsh-Harrier
Lesser Kestrel
Blue Crane
Crowned Crane
Corn Crake
Striped Flufftail
African Finfoot
Denham's Bustard
White-bellied Korhaan
Caspian Tern
Eastern Bronze-naped Pigeon
African Grass-Owl
Pel's Fishing-Owl
Swamp Nightjar
Mangrove Kingfisher
Southern Ground-Hornbill
Green Barbet
Shorttailed Pipit
Yellow-breasted Pipit
Yellow-billed Oxpecker
Critical:
Eurasian Bittern
Wattled Crane
White-winged Flufftail
Rudd's Lark
Blue Swallow
Endangered:
Saddle-billed Stork
Bearded Vulture
Hottentot Buttonquail
Cape Parrot
Botha's Lark
Spotted Ground-Thrush

Fig 4 http://www.kznwildlife.co.za/

Flora

Fig. 5 http://www.kznwildlife.co.za/

The landscapes of this region are spectular, from the Usutu river on the Mozambique border in the north, to the Umtamvuna river on the border of the Eastern Cape in the south; from the Indian Ocean on the east to the Drakensberg, the highest mountain range in southern Africa on the west. Within 160 km the topography ranges from sea level to over 3000m, with moisture catching escarpments deeply incised by rivers , more rivers than any comparable area in southern Africa

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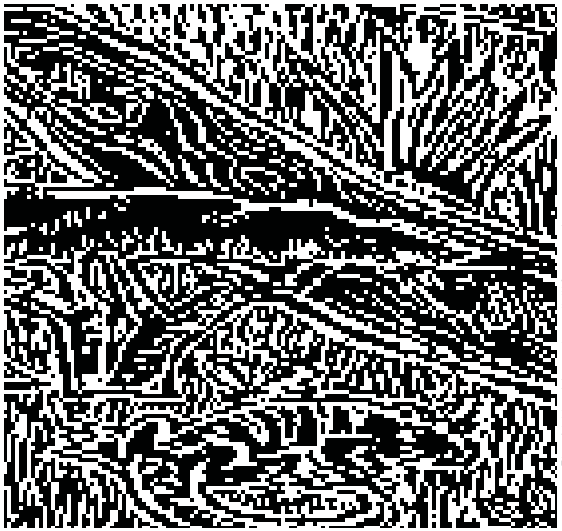

Fig. 6 http://www.kznwildlife.co.za/

The warm Mozambique current brings sub-tropical conditions to the northern coastal areas, whereas frost and mist can be found in the Natal midlands and snow and ice on the mountain peaks. Rain falls mostly in summer.

The plant life matches this varied landscape with its richness and diversity of species, from the sub-tropical abundance of the swamp forests, the mangroves and some of the highest forested coastal dunes in the world, to the evocative dry sandforest and bushveld, lakes and wetlands, grasslands, mistbelt forests and to the montane species clinging to the slopes of the Drakensberg. The flora of KZN is rich from several perspectives. It is home to over 6 000 vascular plant species and 1 258 genera (70% of the genera in southern Africa).The region is home to almost two thirds of South Africa's tree species--over 750 species. It has 11 times as many tree species as the whole of Europe.

Approximately 16% of the flora is endemic and 11% is rare and threatened. Southern Africa* has the highest known concentration of threatened plants in the world (Hilton-Taylor 1996) and is the most species-rich temperate flora in the world with over 24 000 species. (*The area to the south of the Kunene, Okavango and Limpopo Rivers excluding Mozambique.)

(With thanks to Elsa Pooley's Trees of Natal and Rob Scott-Shaw's Rare and Threatened Plants)

In the many protected areas in KwaZulu-Natal are to be found pristine examples of these plant communities, from the Themeda and Festuca grasslands of the Ukhahlamba Drakensberg Park to the huge canopy trees of the Ongoya and Nkandla forests, from the Acacia savannahs of Zululand with their fever trees and umbrella thorns to the Lala palm covered coastal plains of Maputaland with ancient dunes greened with sandforest and wetlands holding vast reedbeds and primeval swampforests. In these areas are wonderful and rare plants, some with strange growth forms, others with brilliant flowers in colours that overwelm the senses.

A floral kingdom that has to be experienced!

Grasslands

Grasslands are found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal. The topography is mainly flat and rolling, but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level. Grasslands (also known locally as Grassveld) are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized habitats.

Forbs and specifically geophytes are often abundant and more species rich than the grasses. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

There are two categories of grass plants. Sweet grasses have a lower fibre content, maintain their nutrients in the leaves in winter and are therefore palatable to stock. Sour grasses have a higher fibre content and tend to withdraw their nutrients from the leaves during winter so that they are unpalatable to stock. At higher rainfall and on more acidic soils, sour grasses prevail, with 625 mm per year taken as ,the level at which unpalatable grasses predominate.

Grass plants tolerate grazing, fire, and even mowing, well, most produce new stems readily using a wide variety of stratagies.

The Grassland Biome is considered to have an extremely high biodiversity, second only to the Fynbos Biome. Rare plants are often found in the grasslands especially in the escarpment area. These rare species are often endangered, comprising mainly endemic geophytes or dicotyledonous herbaceous plants. Very few grasses are rare or endangered. The scenic splendour of the escarpment region attracts many tourists. Protected areas with good examples of grassland are the Ukhahlamba Drakensberg Park, Spioenkop, Chelmsford and the Umfolozi section of the Hluhluwe Umfolozi Park.

With grateful thanks to Elsa Pooley's Trees of Natal and Wildflowers of KwaZulu-Natal, Rob Scott-Shaw's Rare and Threatened Plants and Tainton, Bransby and deV. Booysen's Common Veld and Pasture Grasses of Natal.

Grassland Plant List

Aristada junciformis
Acacia sieberiana
Cymbopogon excavatus
Erythrina zeyeri
Eucomis autumnalis
Gerbera aurantiaca
Hyphaene coriacea
Hyparrhenia hirta
Rhynchelytrum repens
Themeda triandra
Watsonia densiflora

http://www.kznwildlife.co.za/

date visited 17 May 2006

Riparian Fringe Plant List:

Buddleja salviifolia
Crinum bulbispermum
Duvernoia adhatodoides
Gladiolus sp.
Hypoestes aristata
Plectranthus fruticosus
Rhamnus prinoides
Rhamnus prinoides

Trees:
Acacia xanthophloea
Calodendrum capense
Psychotria capensis
Cyathea dregei
Calodendrum glabrum
Commiphora harveyi
Dovyalis caffra
Dombeya rotandifolia
Erythrina lysistemon
Protorhus longifolia
Ptaeroxylon obliquum
Vepris lanceolata

Wetland Plant List:

Cyperus papyrus
Gomphostigma virgatum
Gunnera perpensa
Hesperantha coccinea
Juncus effusus
Typha capensis
Zantedeschia aethiopica

Fig 7 http://www.kznwildlife.co.za/