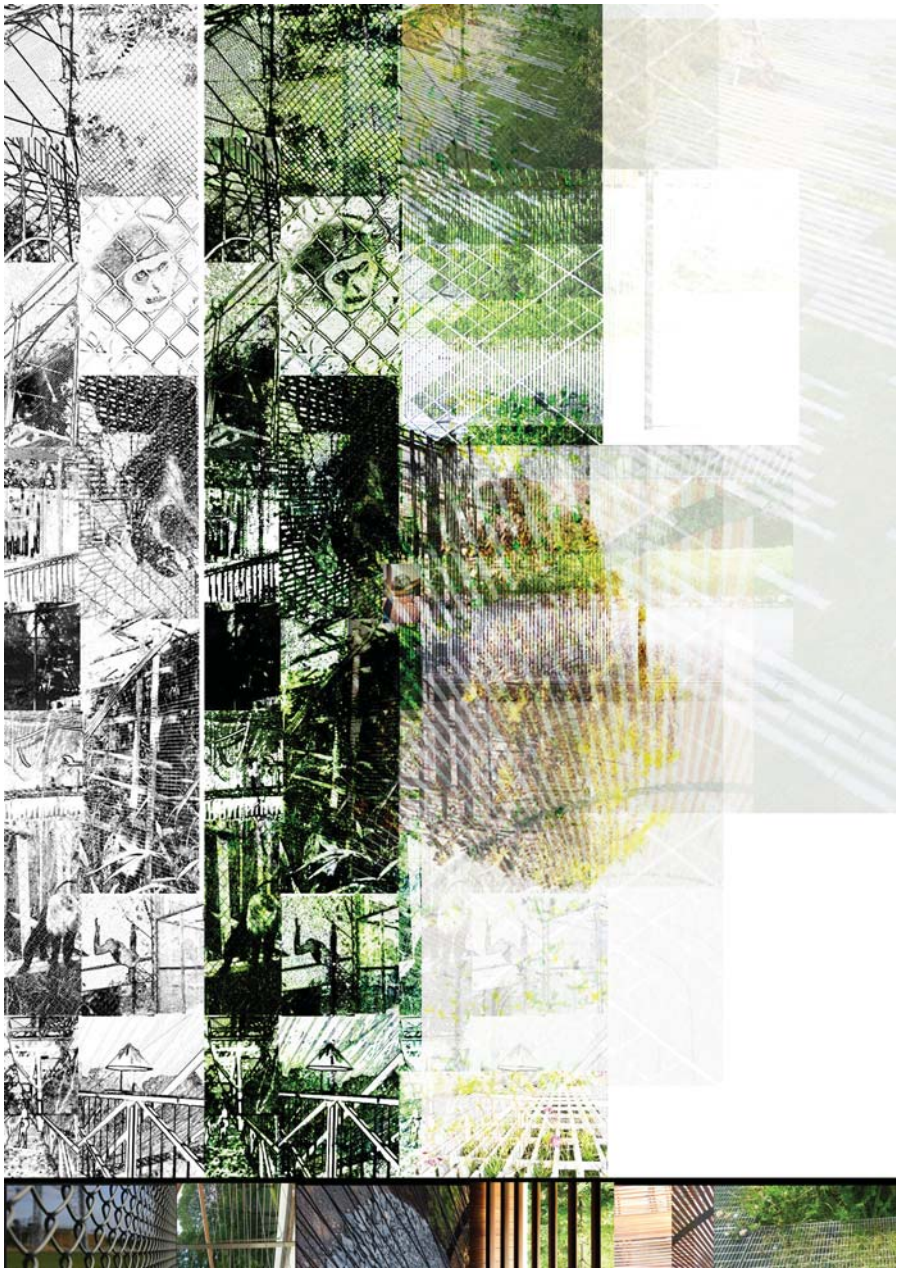


VI_1.
Conceptual technical approach colloage of materiality disintegration (Author 2014)

CHAPTER VI

TECHNICAL SPECTACLE

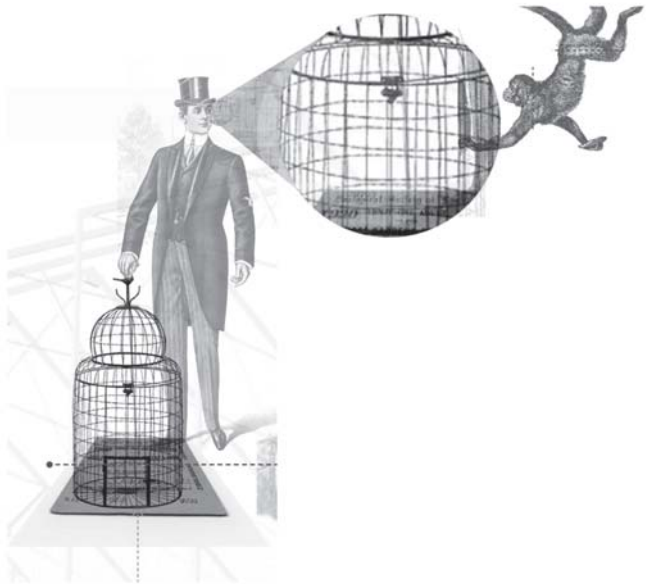
technical resolution

THE TECHNICAL SPECTACLE PRESENTED IN CHAPTER VI WILL SERVE AS THE INVESTIGATION OF THE TECHNICAL AND PROGRAMMATIC REQUIREMENTS OF THE ENCLOSURE DESIGN INTERVENTION.

◀◀◀

6.1 Introduction

Technical strategies were developed to give expression to the palimpsest concept on-site. Special attention ought to be given to specific detailing elements when considering the overall concept of this dissertation. Materials were carefully selected throughout the enclosure to interpret the palimpsest and the character of the zoo.



VI_2. Conceptual representation of the technical spectacle (Author 2014).

6.2 *Vervet monkey*

The vervet monkey was chosen as the primary client for the proposed enclosure. The pragmatic requirements and zoo husbandry is therefore an important consideration for the design enclosure intervention. The study has simplified the life history universe as described in Chapter III to fit the daily activities of the monkey in terms of their eating, sleeping, resting and nesting habits (refer to figure VI_2 on page 232). The selected species will therefore inform decisions, such as the planting pallet, moat wetland design, general material selection and the ecological approach of the enclosure design.

1. Vervet monkey

Chlorocebus pygerythrus

Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Primates
Family: Cercopithecidae
Genus: Chlorocebus
Species: C. pygerythrus

weight
(m) 4.5kg
(f) 3.3kg.

height
height: 46-66cm

habitat
Savannah and woodland edge, near water.

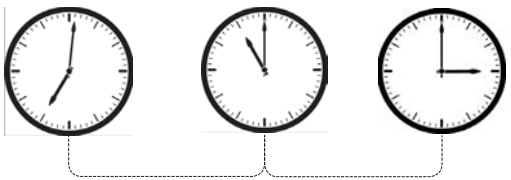
status
ST
least concerned

FEEDING

1. *Acacia erioloba* – *seeds and pods*
2. *Aloe spp* – *nectar (flowers)*
3. *Celtis africana* – *fruit*
4. *Colophospermum mopane* – *seeds*
5. *Deinbollia oblongifolia* – *fruit*
6. *Euphorbia ingens* – *fruit*
7. *Euphorbia tirucalli* – *fruit*
8. *Ficus abutifolia* – *figs*
9. *Ficus sur* – *figs*
10. *Ficus sycomorus* – *figs*
11. *Grewia caffra* – *fruit*
12. *Harpephyllum caffrum* – *fruit*
13. *Hyphaene coriacea* – *fruit*
14. *Protorhus longifolia* – *fruit*
15. *Searsiachirindensis* – *fruit*
16. *Sclerocarya birrea* – *fruit*
17. *Strelitzia nicolai* – *soft parts of the flowers*

RESTING

NESTING



TRAVELLING, FEEDING

FEEDING, RESTING, GROOMING

monkeyland

The world's first free-roaming multi-species primate sanctuary,
Plettenberg Bay, Western Cape

12 hectare forest
550 primates total
6m high fence + 1m of live wires

VI_3. Suspension bridge at Monkeyland,PlettenbergBay (www.monkeyland.co.za 2011).

VI_4. Monkey at Monkeyland,PlettenbergBay(www.monkeyland.co.za 2011).

primate kingdom

Singapore Zoo

Primate Kingdom is made of six large and two small man-made islands planted with tall trees, wild grasses, palms and bamboos. It boasts several collection of attractive primate species such as the lion-tailed macaques, patas monkeys, playful bunch of brown capuchins, docile-looking Celebes crested macaques, douc langurs, black spider monkeys and golden-lion tamarins.

Its landscape was carefully designed to ensure there are ample spaces for each animal, not to mention the need for the primates to feed themselves from the trees.

VI_5. Gorilla enclosure at the Primate Kingdome, Singapore (Graetz 2000).

VI_6. Gorilla enclosure at the Primate Kingdome, Singapore (Graetz 2000).

6.3 *Water strategy*

Water will form a critical part of the proposed enclosure. The use of water will influence the ecology and pragmatic requirements of the enclosure design. Water will form the barrier of the enclosure and become an essential component of habitat creation. The water body will consist of smaller components and will be discussed in the following paragraphs.

6.1.1 *Stream*

A proposed stream will serve as an important ecological component of the design. In order to apply the vision encapsulated in Marais's quote, the purification of the water therefore becomes an important aspect. The topography will also be manipulated by means of gravity in order for the stream to flow. Figure VI_11 on page 239 illustrates the process of purification and of the moat.

6.1.2 *Moat*

The proposed moat is not only to serve as a functional barrier but bleeds as an ecological filter into both the proposed and adjacent enclosures. The moat itself will induce habitat creation and will be inhabited by birds, antelope, insect and other aquatic life. Fig. x illustrates the water purification process of the moat and the pragmatic requirements of the moat as barrier.

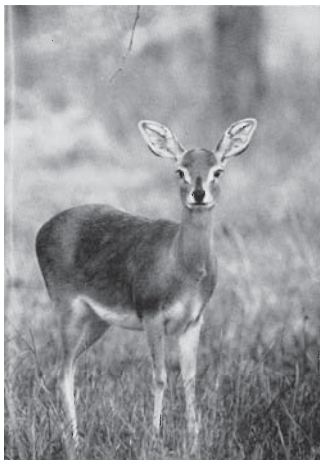
6.4 Ecology

The proposed ecosystem will be supported by habitat functions. The enclosure will provide a refuge and habitat to plants and animals, thereby contributing to the conservation of biological and genetic diversity and evolutionary processes. The enclosure will replicate the vervet monkey's habitat, specifically in context of Pretoria vegetation typologies and the site selection adjacent to the Apies River. The existing Celtis trees on-site form the basis of a historical Celtis forest replication and connect to the habitat functions of the vervet monkeys as well as other species that will not be a threat to the monkeys. The habitat will contribute to the conservation of biological, genetic diversity and evolutionary processes. A selective choice of species was made to share the enclosure with the vervet monkeys. The species include the bat-eared fox, steenbok, klipspringer, brown rabbit, leopard tortoise, the South African hedgehog, grey reedbuck, the secretary bird, the blue crane and other bird and aquatic species. Figures VI_7 on page 237 shows similar species from the NZG Guide from 1960.

VI_7. Female Oribi (Chris Pisart in NZG Guide 1960).

VI_8. Crowned crane (Chris Pisart in NZG Guide 1960).

VI_9. Bushbuck (Chris Pisart in NZG Guide 1960).

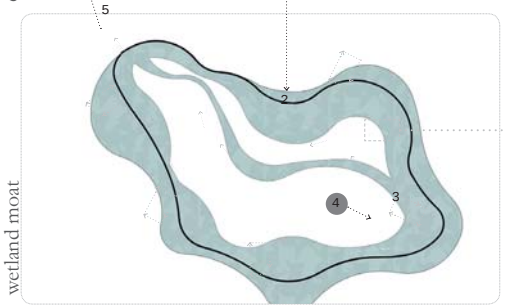


VI_10. Steenbuck ewe (Chris Pisart in NZG Guide 1960).

2 Wetland moat

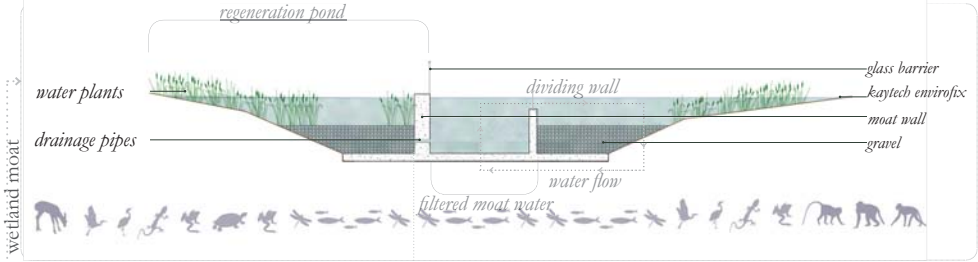
existing apies river

wetland moat



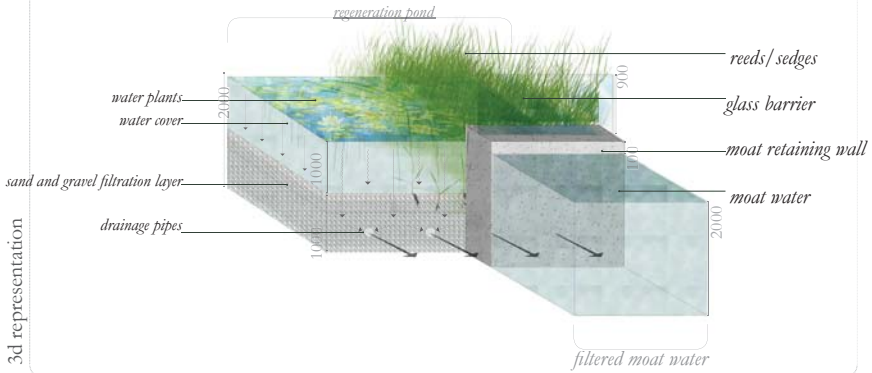
1. *water supply from Apies river borehole*
2. *moat fills to indicated water level*
3. *water circulated/ aerated with nozzles*
4. *emergency supply reservoir to provide for evaporation loss*
5. *overflow into river during flood event*

wetland moat

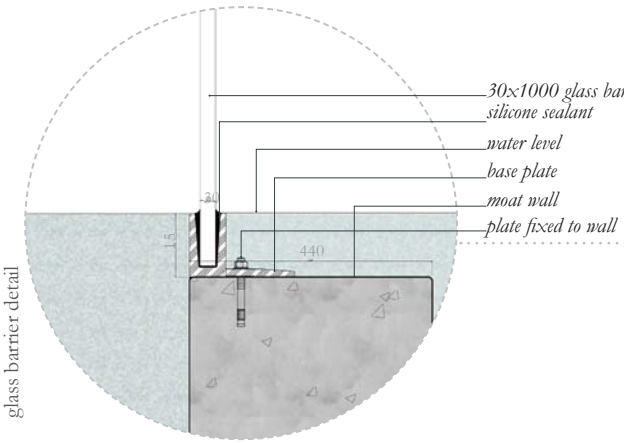


level difference creates pressure for water to filter through

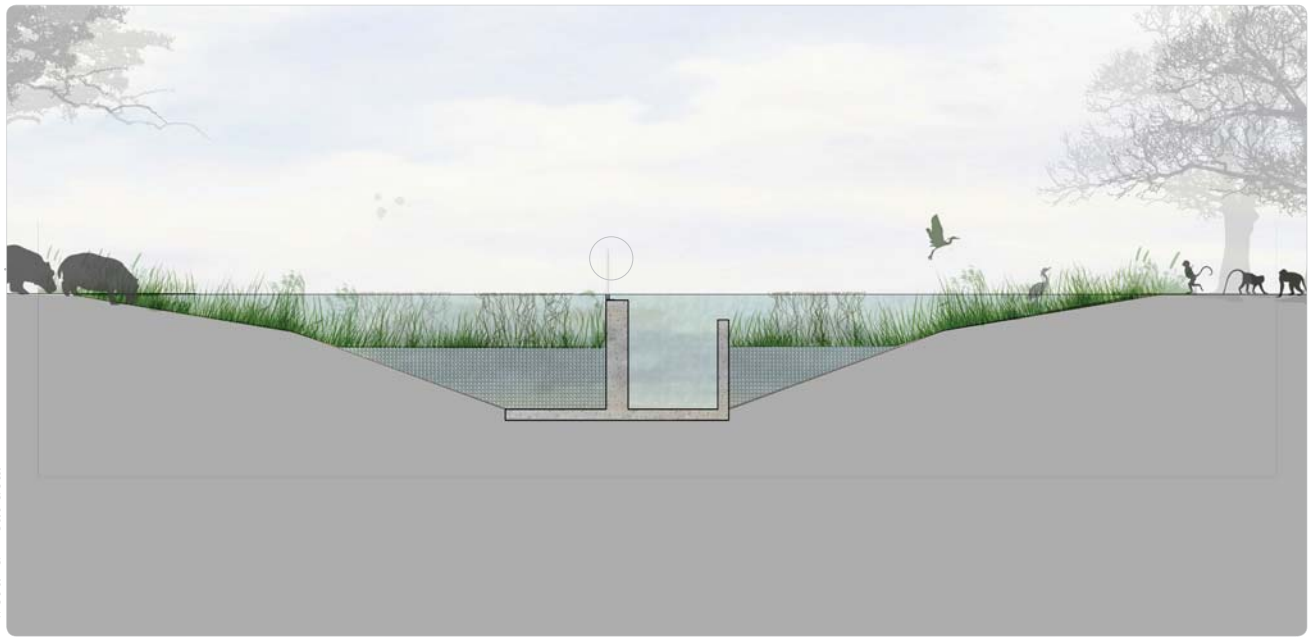
3d representation



glass barrier detail



wetland moat detail

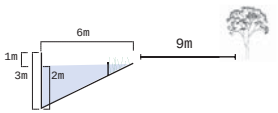


VI_11. Water strategy: wetland moat (Author 2014).

water strategy

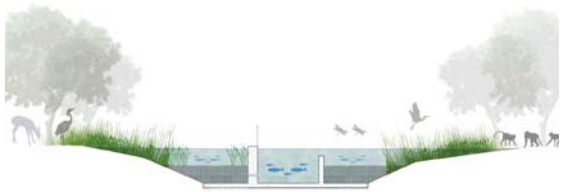
existing Apies river

barrier

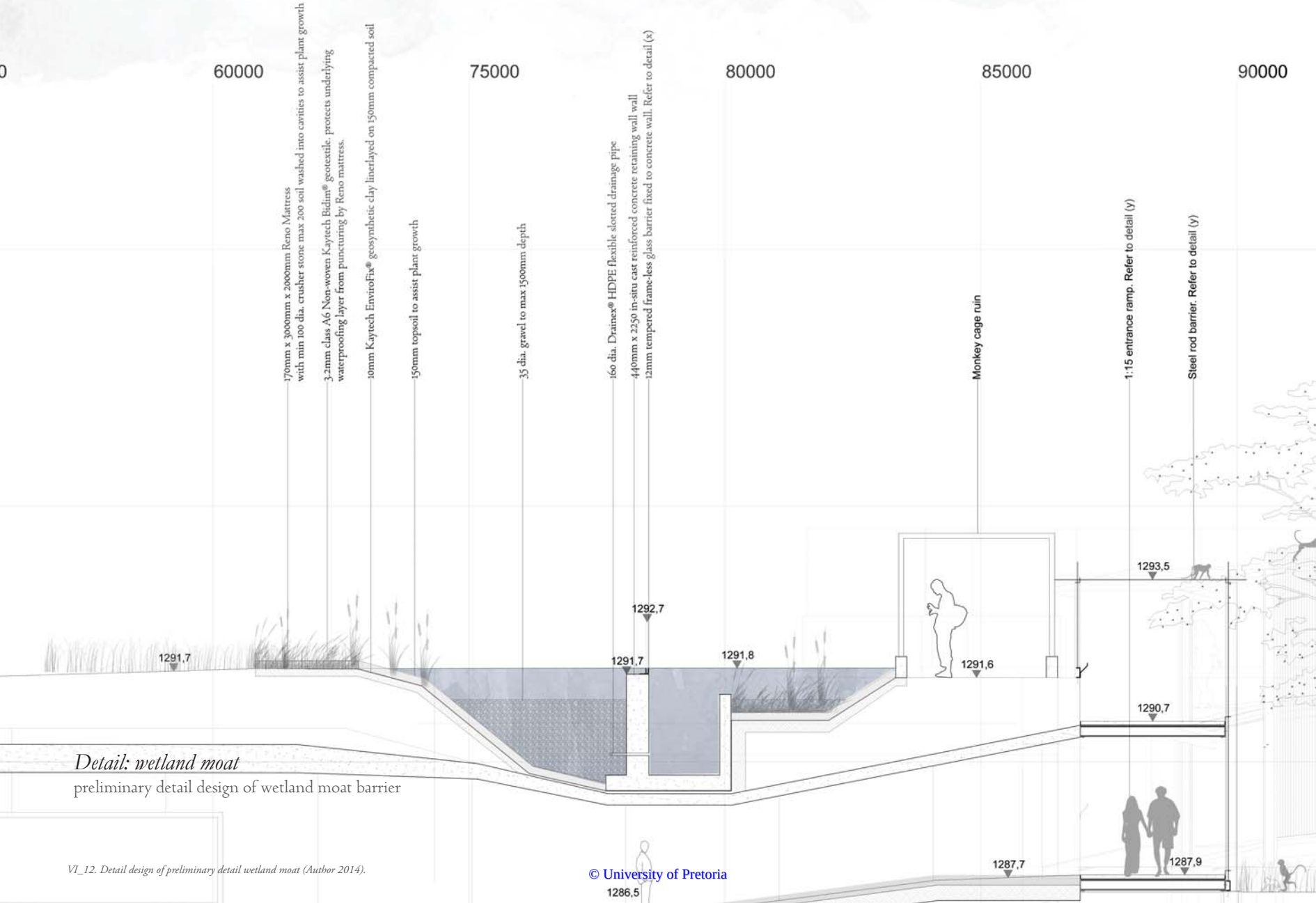


enclosure regulations

"river" moat



ecosytem



Detail: wetland moat

preliminary detail design of wetland moat barrier

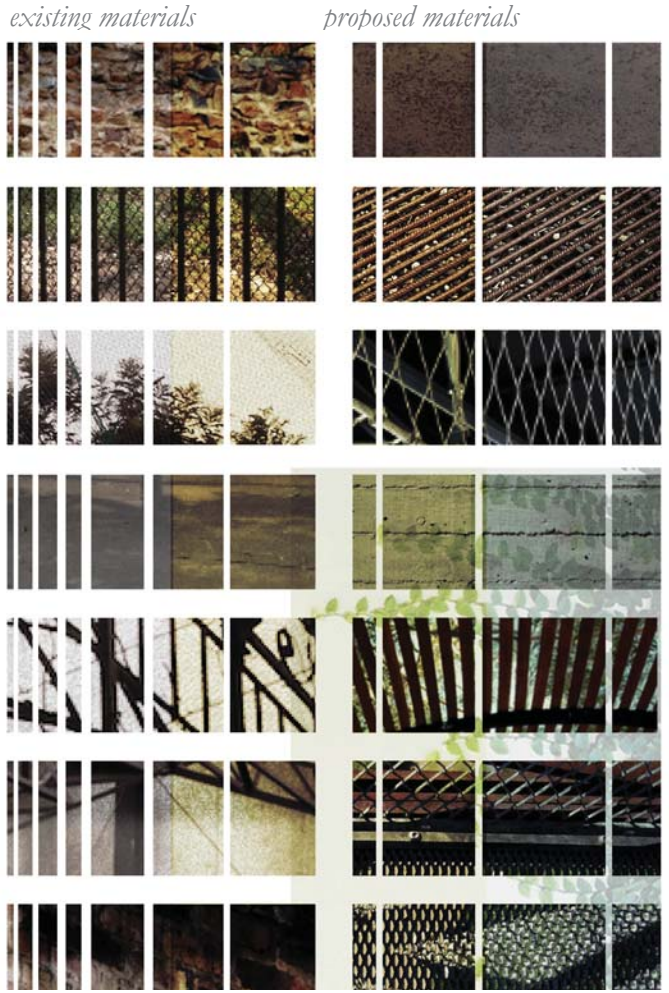
VI_12. Detail design of preliminary detail wetland moat (Author 2014).

6.5 Materials

The design experience aims to provide sensory and haptic qualities that will reconnect the zoo visitor with the animal and its habitat. The beauty, as described by Meyer, will be unveiled throughout the design to stimulate the user's senses. Materiality is therefore an important design consideration when building landscape experiences in subtle and unique ways.

The visitors rely on all their senses to identify opportunity for interaction with the animal. Hence the need exists for active comparative identification so that one can exploit conservation and cultural messages throughout the landscape design.

The material palette is carefully selected to celebrate the existing character of the historical cages by means of material choices on-site. The technical approach will induce an analogy with the proposed elements in relation to the old materials. The material choices will contribute to the narrative of the enclosure route and extend to properties, such as weathering and seasonality. The narrative will commence at a confined cage-like character, dissolving towards lighter materials and finally release into natural spaces. Mild steel plates, steel rods, reinforcement bars, concrete and timber will be typical materials used in different ways to strengthen the transition and haptic quality of the enclosure experience. The contemporary zoo materials will also be implemented where specific views must be acknowledged. A skywalk circulation tunnel and tower will attempt to serve as an extruded experience for both man and animal.



VI_13. Material selection: existing versus new.

6.1.3 *Mild steel plates*

The *dynamic beauty principle* requires a material that changes over time, just as the planting palette will differ with season changes. The proposed mild steel plates will be allowed to weather over time and adapt to the appearance of dynamic changes through time. The staining caused by corrosion will be channelled in such a way that it selectively allows for stains to occur on the concrete at certain points and complement the dynamic beauty intention.

6.1.4 *Steel rods and reinforcement bars*

Steel rods and reinforcement bars will be used as aesthetical and functional elements within the enclosure. The rods and reinforcement bars will strengthen the cage-like narrative within the enclosure and provide opportunity for a haptic and transitional experience.

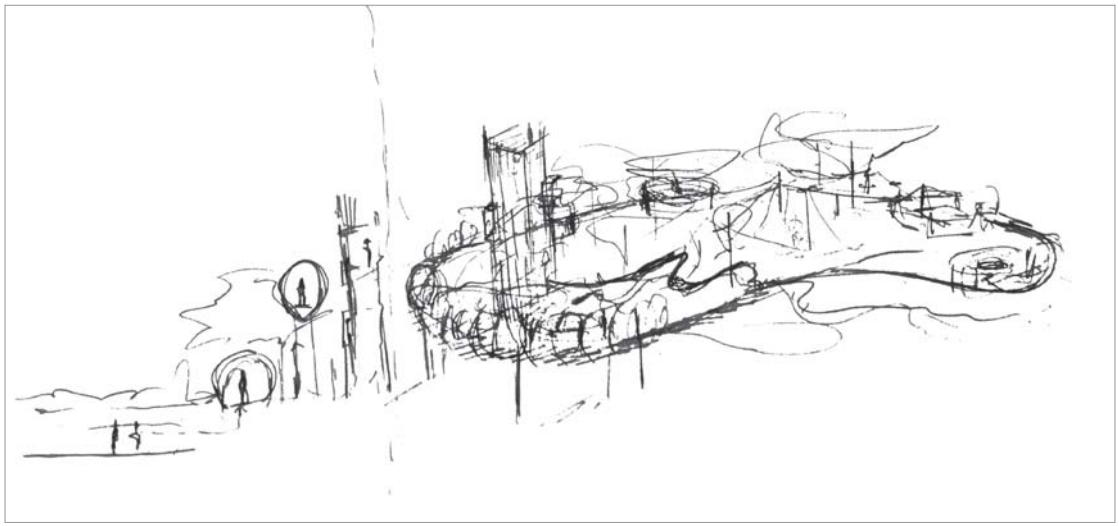
6.1.5 *Mesh*

The proposed enclosure canopy will consist of a transparent grid structure made of stainless steel rope from Jakob® INOX LINE series. The Jakob® INOX LINE webnet has a skin-like appearance of a diaphragm. The mesh will form a simplistic surface but can also be tensioned into three-dimensional forms featuring funnel-type, cylindrical or spherical shapes. It is therefore an ideal material to use within the enclosure. The mesh has a translucent appearance and is weather-resistant and non-corrodible.

The mesh is 1mm thick and strung in a 30mm diamond pattern, the webnet mesh breaks down the visual barriers between inside and outside. Due to its transparency and flexibility, the mesh can cover large areas of the design. The mesh will be implemented over all walkways and the arrival space, and act as a barrier for the general communal areas.

6.1.6 *Surface finishes*

The surface finishes of the walkways on ground level will be constructed with steel reinforcement bar. The intention will be to expose the 'natural' surface underneath the walkways and contribute to the interface between the visitor and the landscape.



VI_14. Conceptual movement and strata intent of elements (Author 2014).

6.6 Movement

The experience through the enclosure is dependent on the intended stratification of the design. The general movement of the design therefore circulates the visitor from as many levels as possible. The visitor will experience the enclosure from below the ground right through to the tree canopy level.

The design aims to provide inclusive access across the entire site. The SANS 10400-S:2014 guidelines will therefore influence the walkway and ramp decisions. The design will therefore adapt a 1:15 gradient on all ramped areas with a minimum of 1200mm landing space.

6.1.7 *Planting strategy*

According to the Sustainable Sites Initiative (SSI) ecosystem processes involving the interaction of living elements, such as vegetation and soil organisms, and non-living elements, such as bedrock, water and air, have many direct and indirect benefits to humans (www.sustainablesites.org 2014).

The SSI suggests that a design should implement ecosystem processes in order for a sustainable site to strive, protect or regenerate sustainable land development and management practices.

In order to sustain such practice, a site-specific planting palette was investigated to reinstate an appropriate endemic community. The planting palette includes the establishment of a woodland habitat relating to the local climate and site conditions. The chosen plant species will provide feeding opportunities and attract the maximum number of species.

Sufficient light, a suitable growing medium, nutrients, irrigation, survival ability, grazing, browsing and other animal impacts are some of the basics requirements for vegetation choices within the enclosure. Plants are selected to accentuate their natural appearance and be planted in mixed communities.

Nevertheless, this proposed strategy will require management practices to overcome the wear and tear generated by the animals within the habitat. An adequate period of time will be allowed (minimum 4 to 6 months) for plant species to ensure sufficient plant growth and establishment.

6.1.8 *Community*

The plant strategy for the proposed and existing vegetation is to duplicate the inventory of the communities; Marikana thornveld and the species of the Moot plains as they previously existed in this region.

These species shape the environment by virtue of sheer size and numbers. The design will therefore aim to recreate the plant community that was once established at the identified site by implementing most plant species from the chosen community structures.

6.1.9 *Habitat*

The community is divided into the three habitats that correlate with the habitat of the vervet monkey species and the existing Apies River habitat. The habitats include wetland, riparian and woodland ecologies. The plant strategy choices are therefore further categorised according to these three introduced habitats. These specified species occur mostly in the form of vegetated strips throughout the site and create spaces and places for ecological emergence. Biological processes, social interactions and recreational activities of both man and animal will still remain as important factors of the design.

The introduction of the stream, wetland and woodland typologies into the enclosure aims to improve the biodiversity. Wildflowers, grass, birds and insect species will inhabit the enclosure and form part of the ecological processes.

6.1.10 *Current conditions:*

Woodland Community

This Woodland Community habitat established by Grobler *et al.* (2002) generally occurs on gradual to moderate steep slopes and consists of aspects of hills, ridges and granite boulders. The Woodland Community is common to occur along rivers in lower lying areas in the Pretoria vicinity. The vegetation typology presented within the Woodland Community will be introduced to the enclosure to support the woodland ecology of the vervet monkey habitat.

6.1.11 *Vervet monkey feeding*

The vervet monkey is an omnivorous animal. Their diet consists of both plant matter and other smaller animal species in order to get the nutrition they need to survive. Leaves and young shoots make up the bulk of the vervet monkey's diet, along with tree bark, flowers and fruits that can be found in the trees surrounding them. The monkeys forage for food on the ground, such as roots, bulbs, seeds, grasses and small arthropods. The final addition to the plant strategy will provide a habitat for the dietary needs of the vervet monkey. The vegetation introduced to the enclosure will aim to sustain the vervet monkeys during most of the year, especially during the summer months.

3. Planting strategy

wetland

mix 1:

Setaria megaphylla (s)
Juncus kraussii (s)
Cyperus prolifer (s)
Sium repandum (wl)
Eragrostis plana (s)

mix 2:

Nymphoides thunbergiana (wl)
Nymphaea nouchali (wl)
Mentha aquatica (wl)

riparian

trees

tall trees:

Celtis africana
Ficus sur (a) (r)
Harpephyllum caffrum (a)
Searsia chirindensis (a) (r)
Sclerocarya birrea

shrubs:

Asparagus cooperi (c)
Grewia occidentalis (a)
Buddleja saligna (c)
Searsia pyroides var. pyroides

other:

Strelitzia nicolai
Hyphaene coriacea

mix 1:

Asparagus laricinus
Scadoxus puniceus
Setaria megaphylla
Panicum maximum

mix 2:

Hibiscus calyphyllus
Hypoestes aristata
setaria megaphylla
Jasminum multipartitum

river

riverine/woodland

trees

tall trees:

Searsia lancea (c)
Acacia caffra (c)
Combretum molle (c)
Combretum erythrophyllum (w) (e)
Searsia leptodictya (w)
Zanthoxylum capense (w)
Ilex mitis (e)
Colophospermum mopane

shrubs:

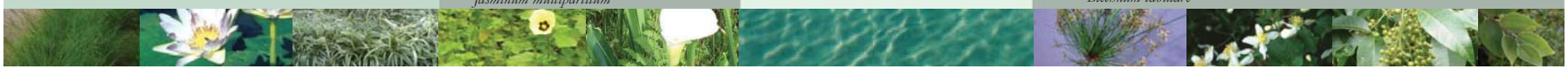
Euclea crispa subsp. crispa (c)
Pavetta gardeniifolia
Olea europaea subsp. africana (c)
Rhamnus prinoides (a) (w)
Buddleja salviifolia (e)

other:

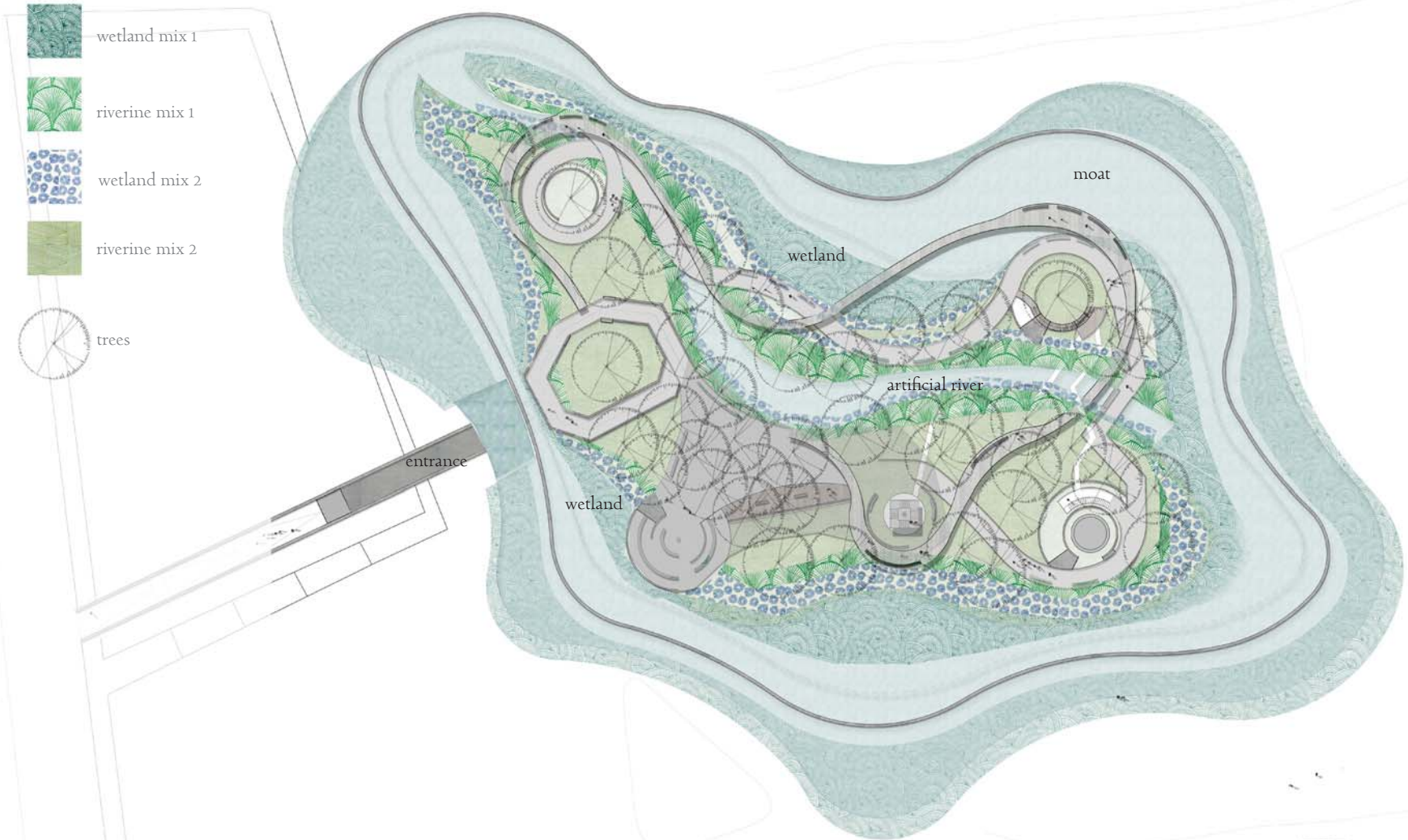
Melinis nerviglumis (g)
enneapogon scoparius (g)
themeda triandra (g)
Euphorbia ingens (a)
Euphorbia tirucalli (r) (a)

mix 1

Vernonia oligocephala
Clematis brachiata
Phyllanthus reticulatum
Zantedeschia aethiopica
Blechnum tabulare



VI_15. *Planting strategy habitat (Author 2014).*



VI_16. Conceptual preliminary planting plan (Author 2014).

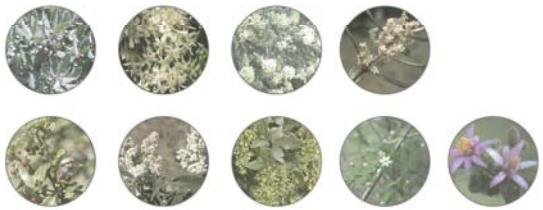
Resultant specie list:

Trees

- *Celtis africana (c)*
- *Searsia lancea (c)*
- *Acacia caffra (c)*
- *Combretum molle (c)*
- *Combretum erythrophyllum (w) (e)*
- *Searsia leptodictya (w)*
- *Zanthoxylum capense (w)*
- *Ilex mitis (e)*
- *Colophospermum mopane (a)*
- *Ficus sur (a) (r)*
- *Harpephyllum caffrum (a)*
- *Searsia chirindensis (a) (r)*
- *Sclerocarya birrea (a)*

Shrubs

- *Euclea crispa subsp. crispa (c)*
- *Pavetta gardeniifolia var. gardeniifolia (c)*
- *Buddleja saligna (c)*
- *Olea europaea subsp. africana (c)*
- *Rhamnus prinoides (a) (w)*
- *Buddleja salviifolia (e)*
- *Searsia pyroides var. pyroides (c)*
- *Asparagus cooperi (c)*
- *Grewia occidentalis (a)*



Herb

- *Hypoestes aristata*
- *Hibiscus calyphyllus (w)*
- *Plyllanthus reticulatu (a) (r)*
- *Vernonia oligocephala (g)*
- *Clematis brachiata (g)*

Graminoids

- *Melinis nerviglumis (g)*
- *enneapogon scoparius (g)*
- *themeda triandra (g)*

VI_17.
Planting pallete.
Image source
(Plantzafrica 2014).

Wetland

Setaria megaphylla (s)
Juncus kraussi (s)
Cyperus prolifer (s)
Nymphoides thunbergiana (wl)
Nymphaea nouchali (wl)
Eragrostis plana (s)
Mentha aquatica (wl)
Sium repandum (wl)
Vallisneria aethiopica (wl)
Phragmites australis (wl)
Gunnera perpensa (s)
Marsilea schelpiana (wl)
Limosella major (r)
Isolepsis prolifer (s)
Eucomis autumnalis (wl)
Falkia oblongata (r)
Gomphostigma virgatum (s)

Succulents

Euphorbia ingens (a)
Euphorbia tirucalli (r) (a)

Other

Hyphaene coriacea (a)
Strelitzia nicolai (a)
Zantedeschia aethiopica (h)
Blechnum tabulare (h)

Key: (c)- community; (w)- woodland; (e)- existing; (r)- riverine; (a)- monkey feeding plant; (wl)- wetland ; (g)- grass; (s)-sedge; (h)- historical

VI_18.
Planting pallete.
Image source
(Plantzafrica 2014).

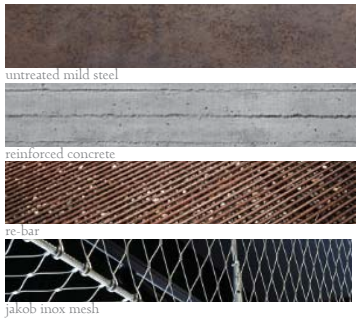
4. Enclosure entrance

VI_19. Bell-lloc winery, RCR Arquitectes (Archdaily 2014)

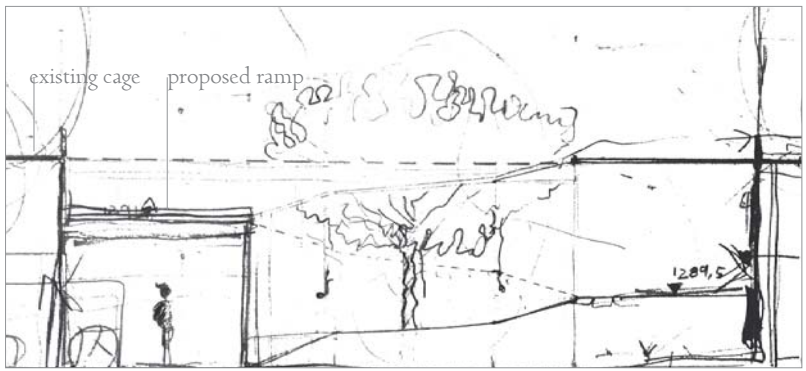
VI_20. Bell-lloc winery, RCR Arquitectes (Archdaily 2014)

VI_21. Bell-lloc winery, RCR Arquitectes (Archdaily 2014)

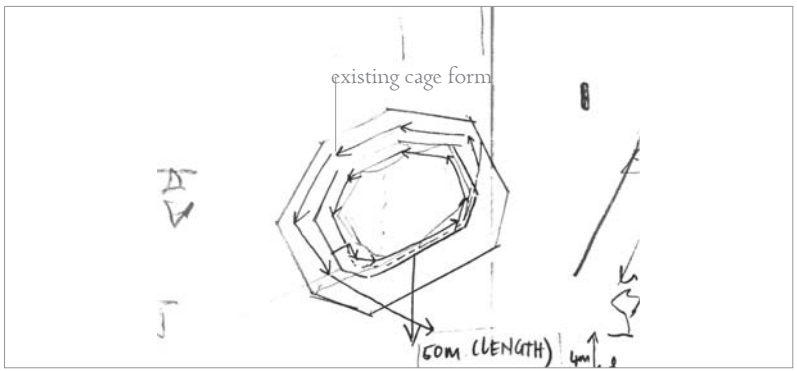
VI_22. Jakob Inox mesh (Jacobinox 2012)



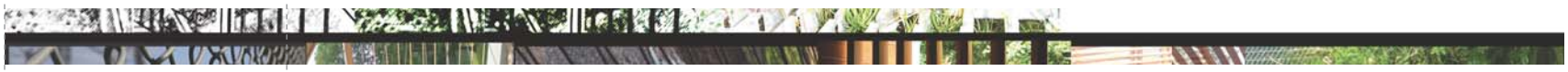
VI_25. Material pallet of Entrance and ramp (Author 2014).



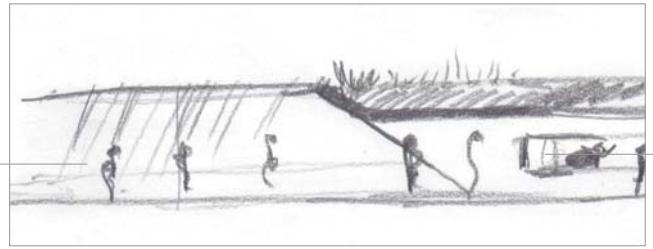
VI_23. Desgin development: entrance ramp and monkey space excavation (Author 2014).

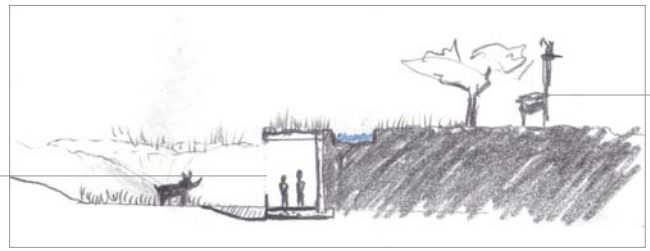


VI_24. Desgin development: entrance ramp circulation in old cage (Author 2014).

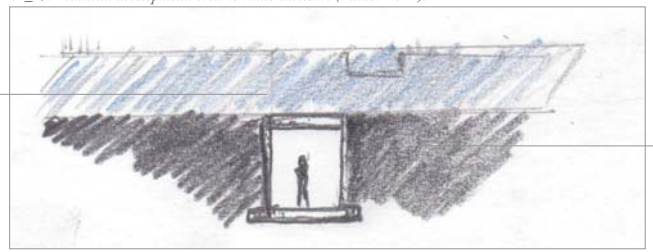


VI_26. Technical development: entrance (Author 2014).



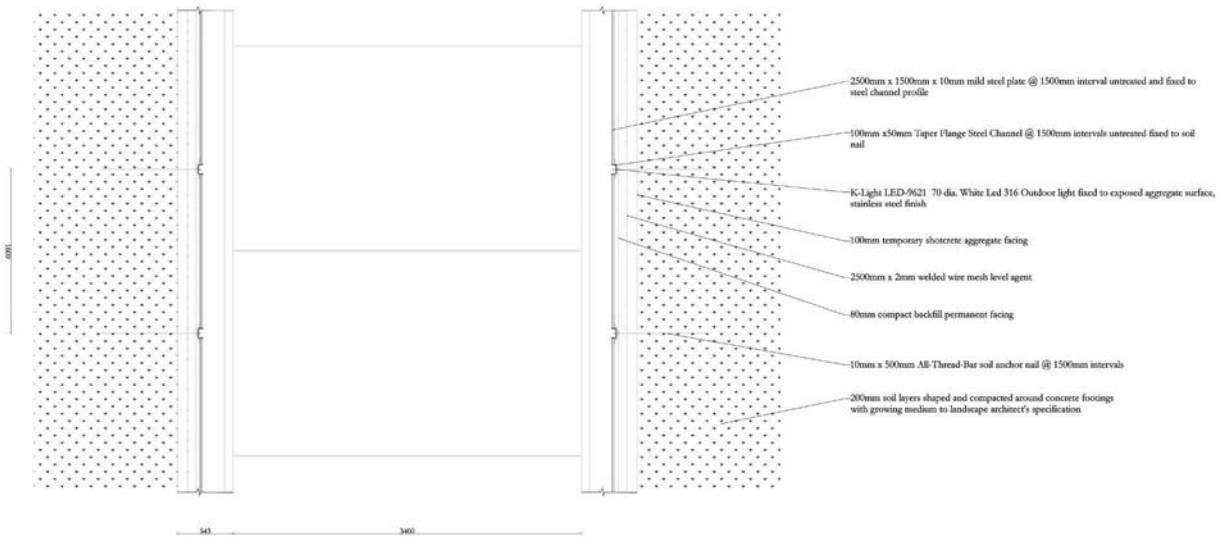


VI_27. Technical development: view to rhino enclosure (Author 2014).



VI_28. Technical development: underground tunnel (Author 2014).

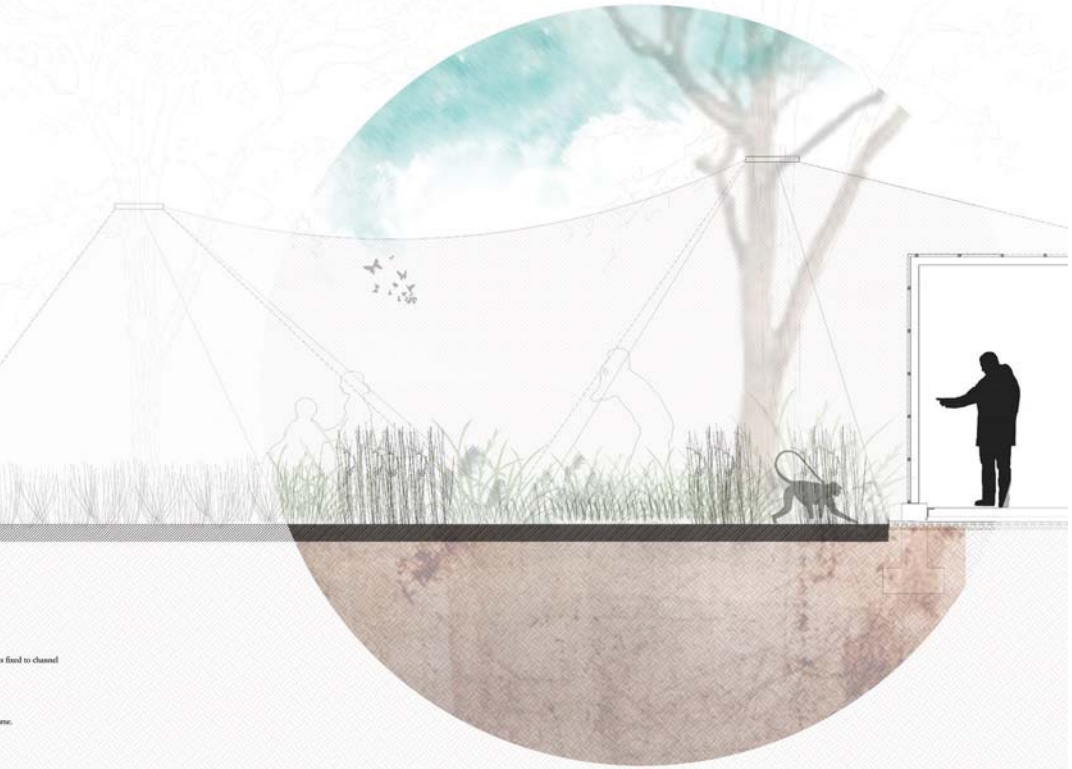
Detail: entrance tunnel
detail design of entrance tunnel into enclosure (not to scale)

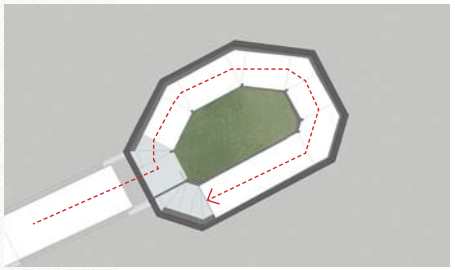


Detail: entrance ramp

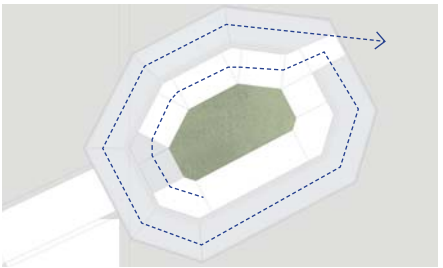
detail design of entrance ramp into existing cage (not to scale)

VI_29. Detail design of preliminary detail of entrance ramp (Author 2014).





VI_30. Entrance ramp circulation (Author 2014).



VI_31. Entrance ramp circulation: existing cage (Author 2014).

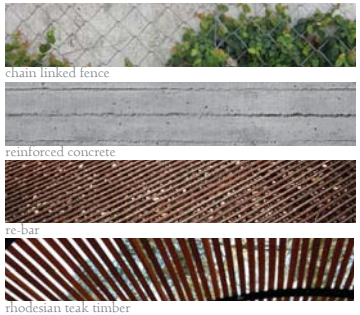
5. Ground level walkway

VI_32. Puffadder walkway, Babylonstoren, Patrice Taravella (Dezeen 2014).

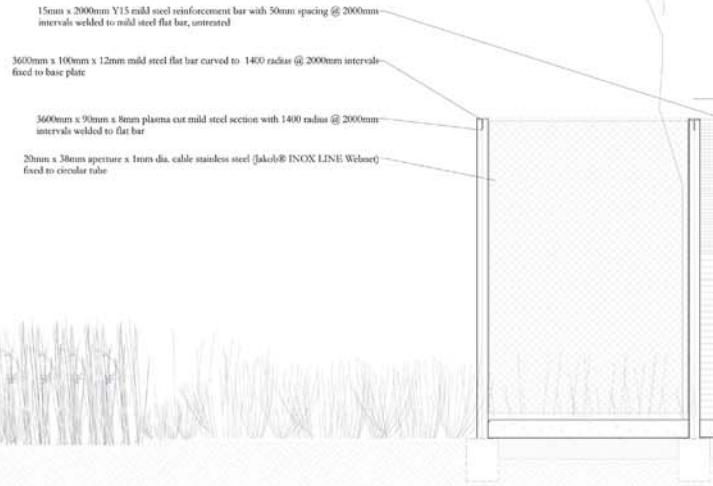
VI_34. Puffadder walkway, Babylonstoren, Patrice Taravella (Dezeen 2014).

VI_33. Eggum Lofoten, Snohetta Architects (Archdaily 2007)

VI_36. Les fleurs maudites, Charlotte Trillaud (Domusweb 2014)



VI_35. Material pallet of walkway (Author 2014)

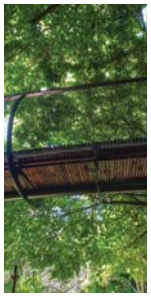


Detail: ground level walkway

detail design of ground level walkway (not to scale)

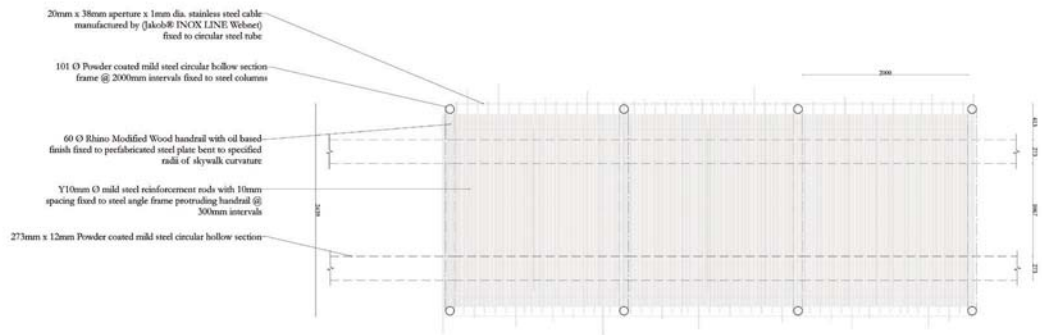
6. Skywalk

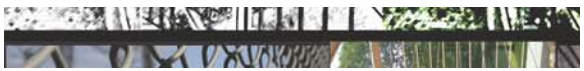
VI_37. Eggum Lofoten, Snohetta Architects (Archdaily 2007)

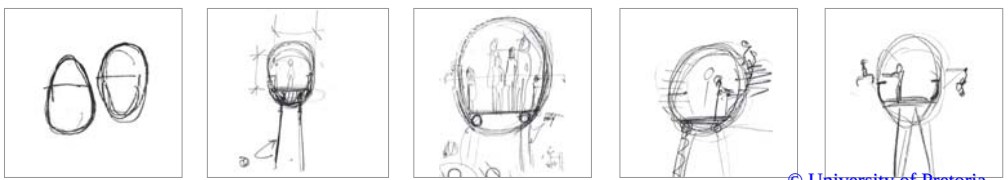


VI_38. Kirstenbosch "boomslang" canopy walkway Mark Thomas Architects (Archdaily 2007)

VI_39. The Saxon Boutique Hotel walkway (Classicafrica 2010)



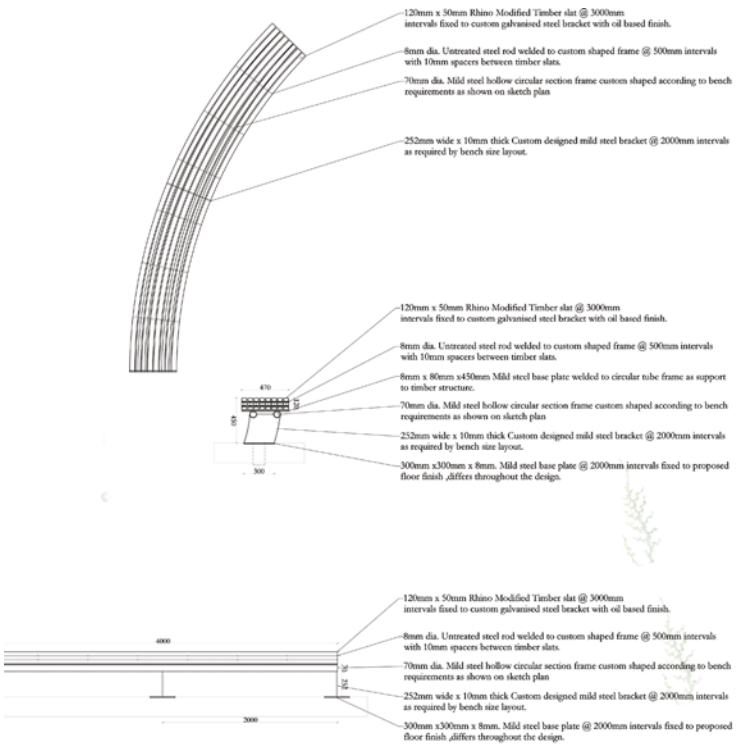


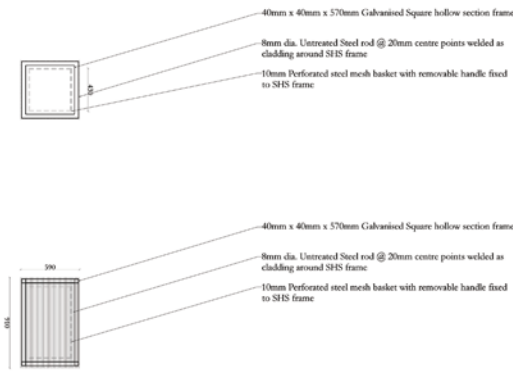


Detail: skywalk
detail design of skywalk (not to scale)

6. Furniture

Detail: bench on skywalk
detail design of bench (not to scale)





Detail: bench and dustbin

detail design of bench and dustbin (not to scale)

6.1.12 *Zoo landscape sustainability*

According to Thayer (1994: 317), 'the goal of sustainable landscapes is the transformation of culture – the taming of technology, the emergence of a new environmental ethics, a new measure of life quality and a substantially broadened sense of community, including not only humans but all life'.

With hundreds of people visiting the NZG, the NZG can influence visitors by example. The enclosure will therefore aim to design a landscape that encourages natural plant succession, the demonstration of wildlife conservation, and regional resource collaboration. The enclosure will produce oxygen, collect storm water and recycle waste, while creating a habitat for humans and animals. The enclosure will interpret sustainable design principles by responding to the local climate, culture, planting and animal requirements. This will result in a rich diversity of new design principles for the design enclosure.

The sustainable use of water is a global issue that zoos need to address. A well-designed exhibit can set an example for the public and designers of the zoological milieu. The plant selection and horticultural practices can reduce the requirements for ongoing irrigation. The design will therefore aim to include endemic vegetation and proper soil preparation. Composting programmes, such as collecting animal manure produced on a daily basis, must also be implemented.

In conclusion, the sustainable principles implemented within the enclosure will aim to reduce the water demand, act as a filter, reduce storm-water runoff, provide wildlife habitat, reduce energy consumption, improve air quality, improve human health and increase outdoor recreational opportunities (www.sustainablesites.org 2014).

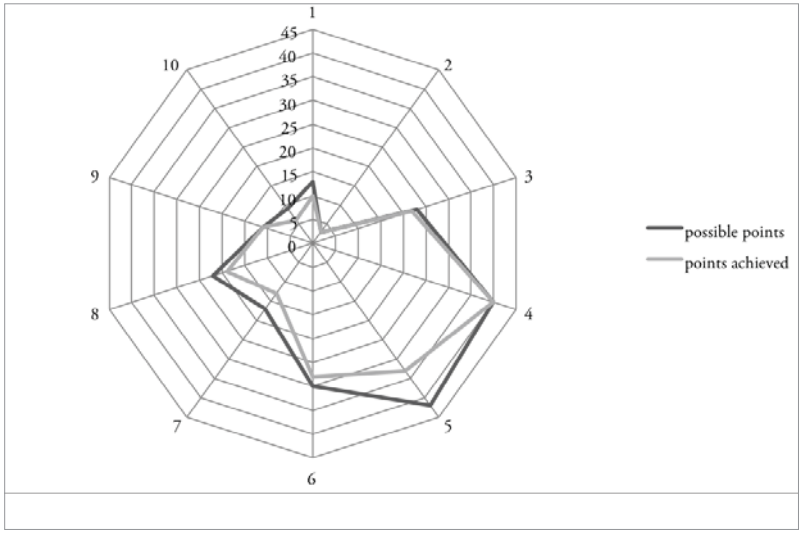
6.1.13

Sustainability rating

The Sustainable Sites Initiative (SSI) tool was used to generate a sustainability rating for the proposed vervet monkey enclosure. The prerequisites and credits are organised into nine sections that are based on the process of site development. The vervet monkey enclosure achieved the following ratings:

Site context: 10/13
Pre-design assessment and planning: 3/3
Site design – water: 22/23
Site design – soil and vegetation: 40/40
Site design – Material selection: 33/42
Site design – human health and well-being: 28/30
Construction: 13/17
Operations and maintenance: 19/22
Education and performance monitoring: 11/11
Innovation or exemplary performance: 6/9

The design achieved an overall rating of 185/200, which classifies it as a platinum-rated project.



VI_41. Graphic representation of SSI sustainability rating: possible points vs points scored (Author 2014).

VI_42.
Conceptual "Apies" habitat vision (Author 2014)

CHAPTER VII

APPENDIX

The concluded enclosure

The concluded enclosure has multiplied, overlapped and implemented the difference design experience strata on various scales through different rhythms. The incremental moments of monkey and human interaction has revealed, enabled and regerated a temporal and dynamic ecology. The enclosure revive d the romantic Apies River described by Eugene Marais, while simultaneously creating habitat en evoking visitor emotion. The final design response redefined the threshold between man and animal through reconfiguration and spatial manipulation. The study proved that a zoological enclosure can provide experience and beauty to the user without compromising the animal exhibited, the natural dignity of the habitat, or finally, the character of the zoological garden.

Figures

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