



RECONFIGURING THE BURNT SCAR

A LANDSCAPE ARCHITECTURAL RESPONSE TO THE KNYSNA FIRES of JUNE 2017

by Louise Kathleen Brukman

University of Cape Town

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A LANDSCAPE ARCHITECTURAL RESPONSE TO THE KNYSNA FIRES of JUNE 2017

Louise Kathleen Brukman
BRKLOU004

Submitted in partial fulfilment of the Master of Landscape Architecture Degree
Dissertation
120 Credits

December 2017
University of Cape Town

Supervisor: Dr. Julian Raxworthy



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EXECUTIVE SUMMARY

June 2017 will be remembered by South Africans for decades to come. A moment when Mother Nature showed her true power and the only options was to get out her path or watch in awe. Within 72 hours 20 000 hectares of land and in excess of 800 homes were burnt in the Knysna region along the Garden Route. While fires are not uncommon in this area, this fire had all the conditions to make it 'The Perfect fire'. It was simply a matter of time for these conditions to align.

This project begins with an understanding of conditions that caused the fire using the agent of time. Time, according to French philosopher, Henri Lefebvre, can be classified into three categories; Linear Time, Event Time and Cyclical Time.

Through this process one is able to isolate the solvable from the unsolvable environmental conditions and thus an on going proposal for intervention can be proposed. The process of reconfiguring the burnt scar begins through the implementation of immediate solutions and long term planning.

This project traverses a variety of scales due to the types of fuel load that contributed to the fire. The large areas of unmanaged fynbos, the pine plantations that border Knysna region and the havoc caused as it ripped through the urban settlements down to the domestic garden scale. At a regional scale the reconfiguring of the burnt scar requires a management system that is responsible for immediate controlling of erosion post fire. As well as the monitoring and the implementation of controlled ecological burns of fynbos stands and the removal of alien invasive species.

Furthermore, it is proposed that the reconfiguring of the burnt scar requires a restructuring of the commercial plantations and the establishment of critical fire breaks affecting the urban interface. The introduction of fire resistant non-native commercial trees mass scale present a landscape character and scenic value to the region that calls upon the ideals of the Picturesque.

A significant contributing factor the fire was the fuel load within the suburban environment. This project proposes a vegetation palette that property owners could use in a variety of ways to form domestic scale fire break, that when in-conjunction with neighbours, a district break is established.



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THE RESEARCH STUDY

STUDY ABSTRACT

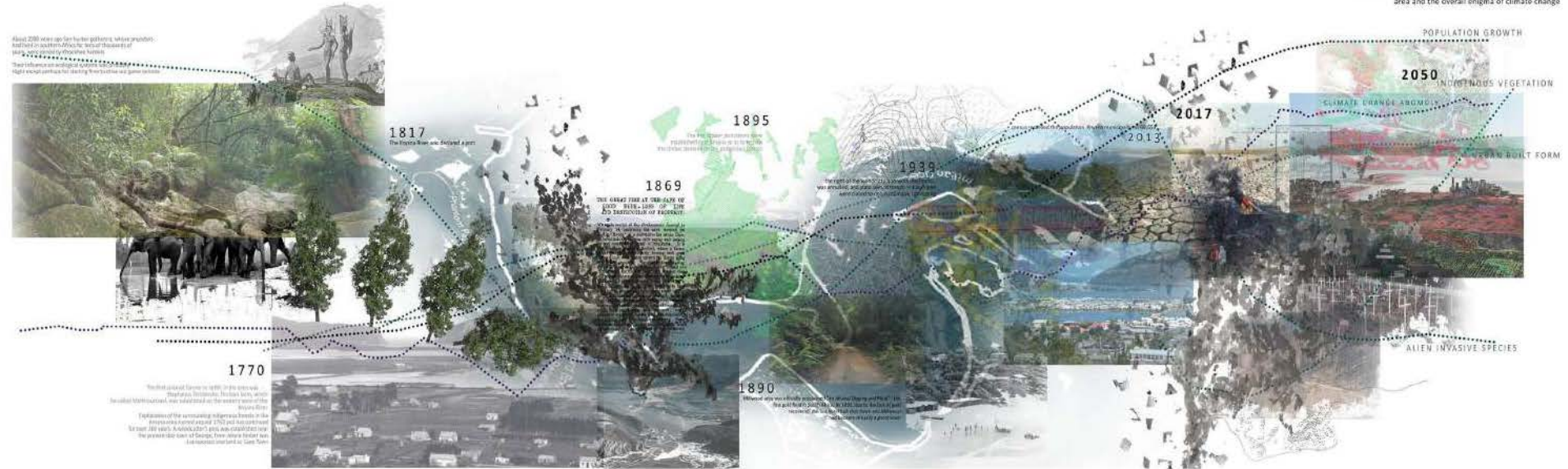
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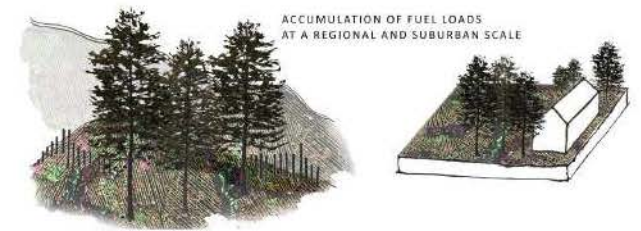
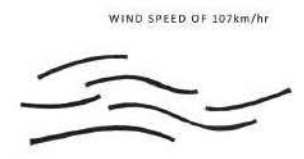
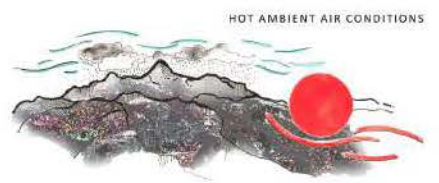
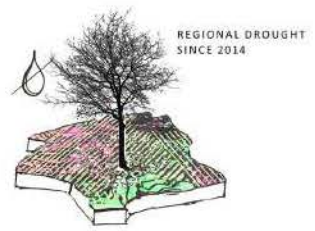
++++Time and landscape architecture

LINEAR TIME

Linear time refers to the start of time being the start of civilisation and within this context the beginning of the role various people have played over centuries that has had an impact on the environment that contributed to the enormity of the Knysna Fire. This ranges from the establishment of plantations, deforestation, the increased population in the area and the overall enormity of climate change



CONTRIBUTING FACTORS - KNYSNA FIRE





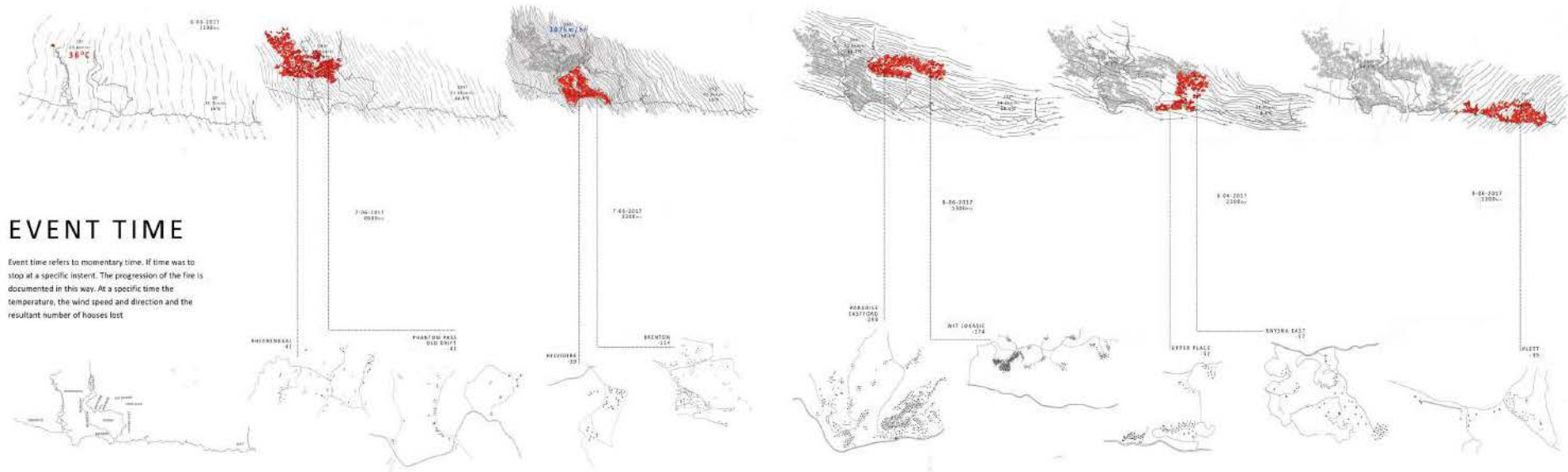
The event of the photograph of the denuded sand dunes near Buffalo Bay - July 2017



The event of the photograph of strip pine plantations, ash blanket dotted with fallen trunks - July 2017



The event of the photograph of charred pine plantations and eroded slopes - July 2017



EVENT TIME

Event time refers to momentary time. If time was to stop at a specific instant. The progression of the fire is documented in this way. At a specific time the temperature, the wind speed and direction and the resultant number of houses lost

CONCEPTUAL RECONFIGUREMENT
OF THE REGION



THE BURNT SCAR



CYCLICAL TIME

Cyclical time refers to time as a continuum. The combination of linear time and event time as a cyclical whole. Within the environment there are processes that are self-regulating, repeating and self-perpetuating as a way to establish equilibrium. This is no different to the event of fire. As we may know, fynbos has evolved over centuries to rely on fire to regenerate. And then there is the phenomena of fire resistant or fire retardant vegetation like that of the Outeniqua Afromontane forests and the Sedgfield Milkwood forests that managed to stop the fire in its tracks.

With the understanding of a cyclical natural system and an understanding of the nature of fire, as a process of discovery, a number of layers were 'unpacked', the remnant vegetation after the fire and the topographical features of the area such as the deep valleys, were randomly rearranged to create the above image of a 'conceptual reconfigured region'. New topographical features, new colours and overlapping textures emerged, indicating new vegetation types and mixed vegetation.



DOCUMENTED VEGETATION POST FIRE: JULY- OCTOBER 2017



The cyclical process of mounting and overlaying imagined reconfigured burnt scar of photograph of the denuded sand dunes

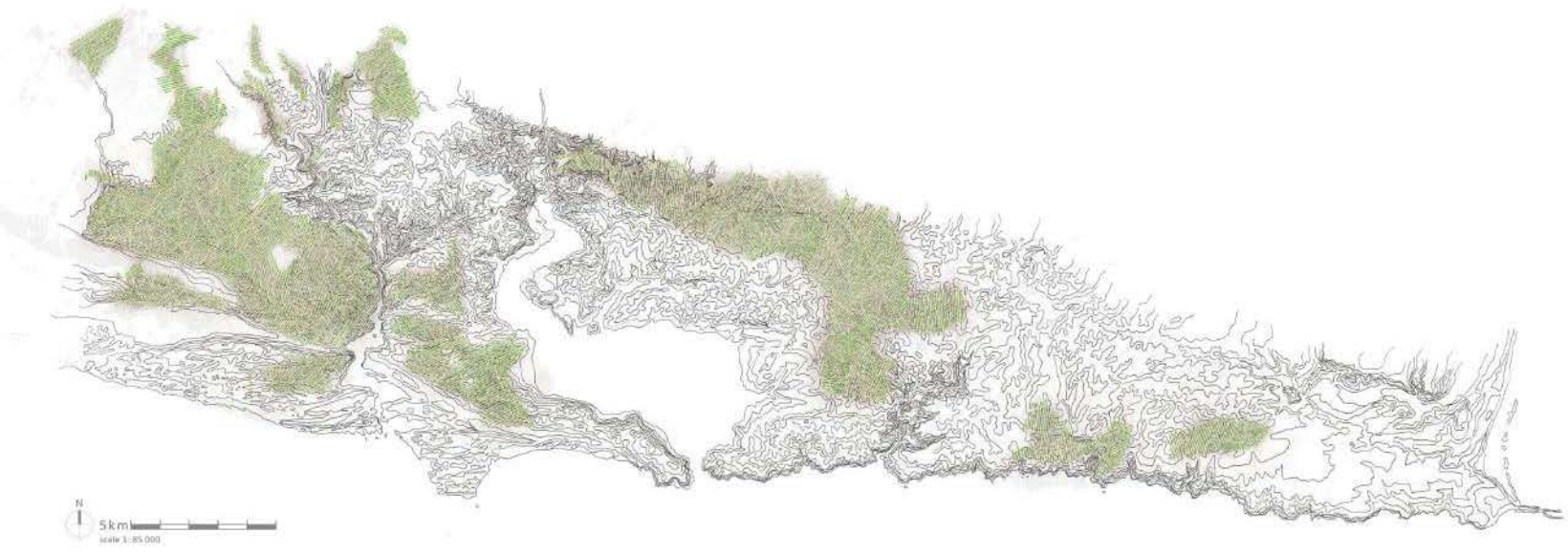


The cyclical process of mounting and overlaying imagined reconfigured burnt scar of photograph of strip pine plantations, ash blanket dotted with fallen trunks



The cyclical process of mounting and overlaying imagined reconfigured burnt scar of photograph of charred pine plantations

PINE PLANTATIONS + TOPOGRAPHY





RECONFIGURING THE BURNT SCAR

DESIGN DISSERTATION

DESIGN DISSERTATION ABSTRACT

This project traverses a variety of scales due to the types of fuel load that contributed to the fire. The large areas of unmanaged fynbos, the pine plantations that border Knysna region and the havoc caused as it ripped through the urban settlements down to the domestic garden scale. At a regional scale the the reconfiguring of the burnt scar requires a management system that is responsible for immediate controlling of erosion post fire. As well as the monitoring and the implementation of controlled ecological burns of fynbos stands and the removal of alien invasive species. Furthermore, it is proposed that the reconfiguring of the burnt scar requires a restructuring of the commercial plantations and the establishment of critical fire breaks affecting the urban interface. The introduction of fire resistant non-native commercial trees mass scale present a landscape character and scenic value to the region that calls upon the ideals of the Picturesque.

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+++++Time and landscape architecture

RECONFIGURING THE BURNT SCAR MANAGEMENT

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COMPARTMENTS

Adopting a system that SANParks uses of compartmentalizing the landscape for management purposes, the entire landscape has been divided into a mosaic of management pockets of between 10-20 hectares. The reason for this is multifold. One is able to monitor specific vegetation types, water systems, fire safety, alien invasive species, erosion and the allocation of labour services to deal with these processes

The compartments have been divided according to the following criteria:

LAND USE

MAJOR ROADS

RIVERS

TRIBUTARIES

VEGETATION TYPE

SLOPE ASPECT

SLOPE GRADIENT

ECOLOGICAL BURNS

The vast majority of Fynbos plants have their lives intimately tied to fire. Fynbos plants cue their reproduction to post-fire conditions when competition is low, and plant-eating animals are sparse. Studies have shown that while almost all Fynbos species are adapted to cope with fire, each species has a different preference in terms of fire frequency and intensity. Scientists widely believe that Fynbos plant biodiversity is maintained and best maintained if the vegetation is a mosaic of different aged stands that burnt at different times of year and under varied conditions. Most importantly when Fynbos islands are not burnt at their appropriate times the island becomes overgrown and becomes thicker, thus significantly increasing the fuel load. The above map indicates the event and time that each compartment should be burnt based on documented burns dating back to 1980. This area is largely aseasonal. This implies a lack of any seasonal constraint on burning, which has encouraging management implications. This management system will maintain a healthy Fynbos island and control the fuel load

EROSION CONTROL

Following a fire event one of the major hazards is soil erosion and landslides. Plant roots stabilise the soil, and stems and leaves slow the water to give it time to percolate into the soil profile. Fire can destroy this soil protection. Before respawning or reseeding takes place there are immediate steps to implement such as jute mat covers and straw sausage barriers. Other methods include log barriers, sandbags, silt fences, and straw bale check dams



Photograph of Protea seeds. Most Proteas, as the rest of the Fynbos biome, are dependent on fire to disperse and/or germinate their seeds. The seeds were in the flower-heads, that the heat of the fire opened and dispersed



Photographs of an open protea cone and the released seeds collected in the depressions in the soil post Knysna fire



Photograph of Fire Lilies (Cyrtanthus spp.) emerge within weeks of fire and persist for a few days and are not seen again until the next burn



Resprouting: Rubus fruticosus - Bramble. European blackberry - Bramble - Category 2b Invasive



Resprouting: Acrodicta confertiflora - Madrone vine. Category 1b Invasive



Resprouting from rootstock: major. Periwinkle. Category 1b Invasive Species



Germinating: Acoxa meenarii - Black Wattle. Category 2 Invasive

DOCUMENTED ALIEN INVASIVE VEGETATION



Photograph of jute matting on north facing Brenton extension. This material is yarn woven to form a 65% open mesh structure which is ideal for erosion control. It serves to conserve moisture and hold seeds and soil firmly in place



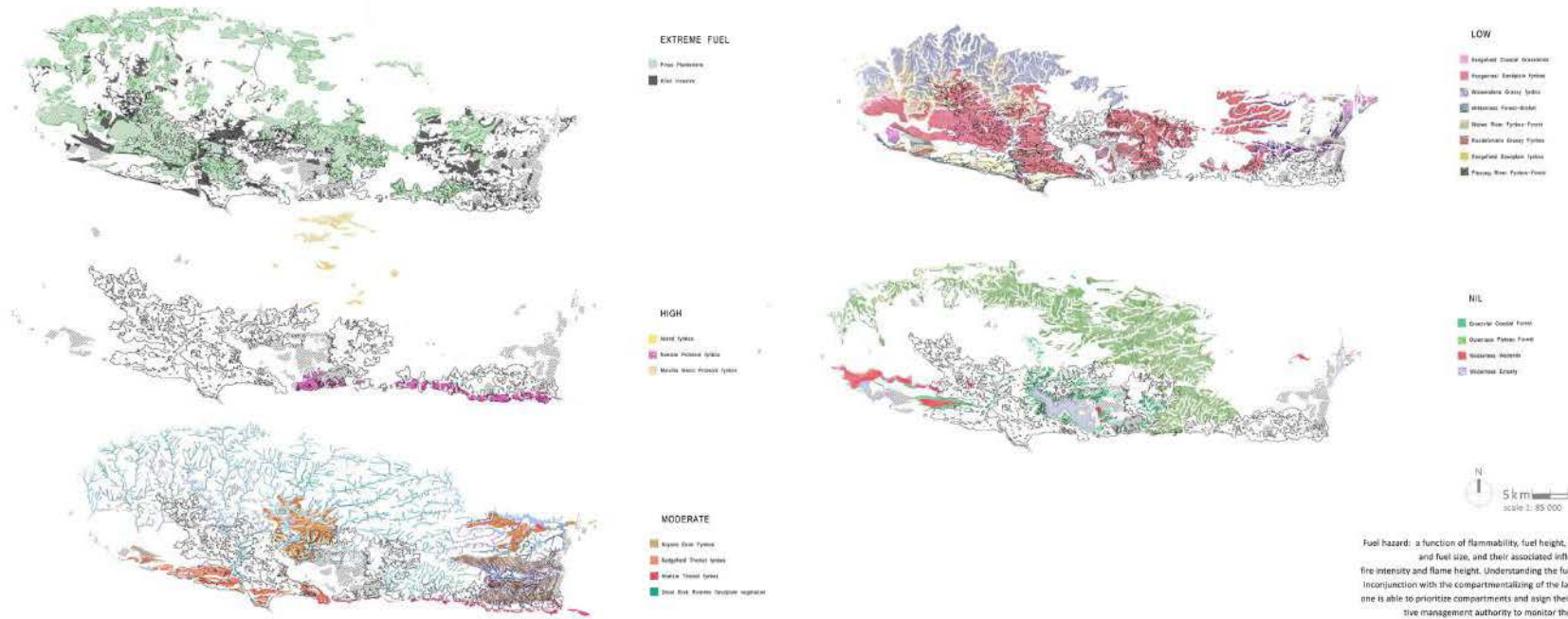
Photograph of jute matting on north facing Brenton extension. The open structure provides space for plant propagation and growth



Photographs of straw sausages on north facing Brenton extension. The sausage field with wooden pegs act as slope stabilizers catching any run off creating natural terraces over time



FUEL HAZARD CLASS

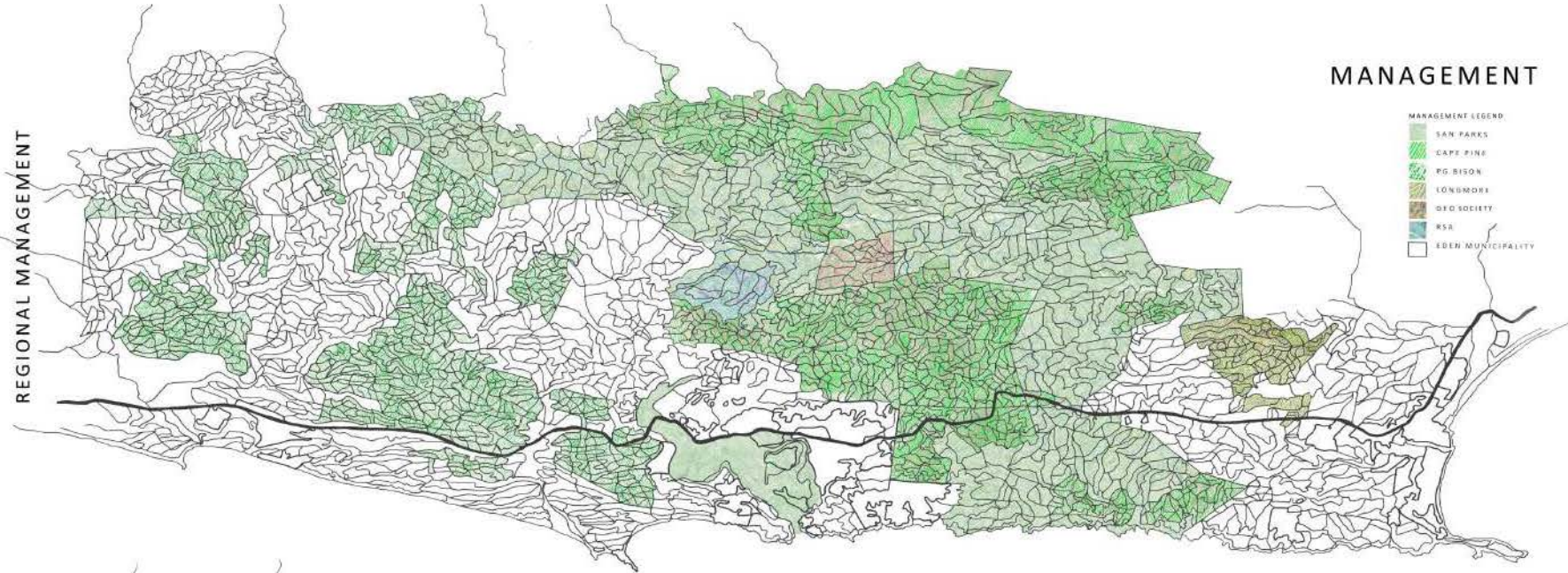


Fuel hazard: a function of flammability, fuel height, fuel load and fuel size, and their associated influence on fire intensity and flame height. Understanding the fuel hazard inconjunction with the compartmentalizing of the landscape, one is able to prioritize compartments and assign their respective management authority to monitor the fire risk

REGIONAL MANAGEMENT

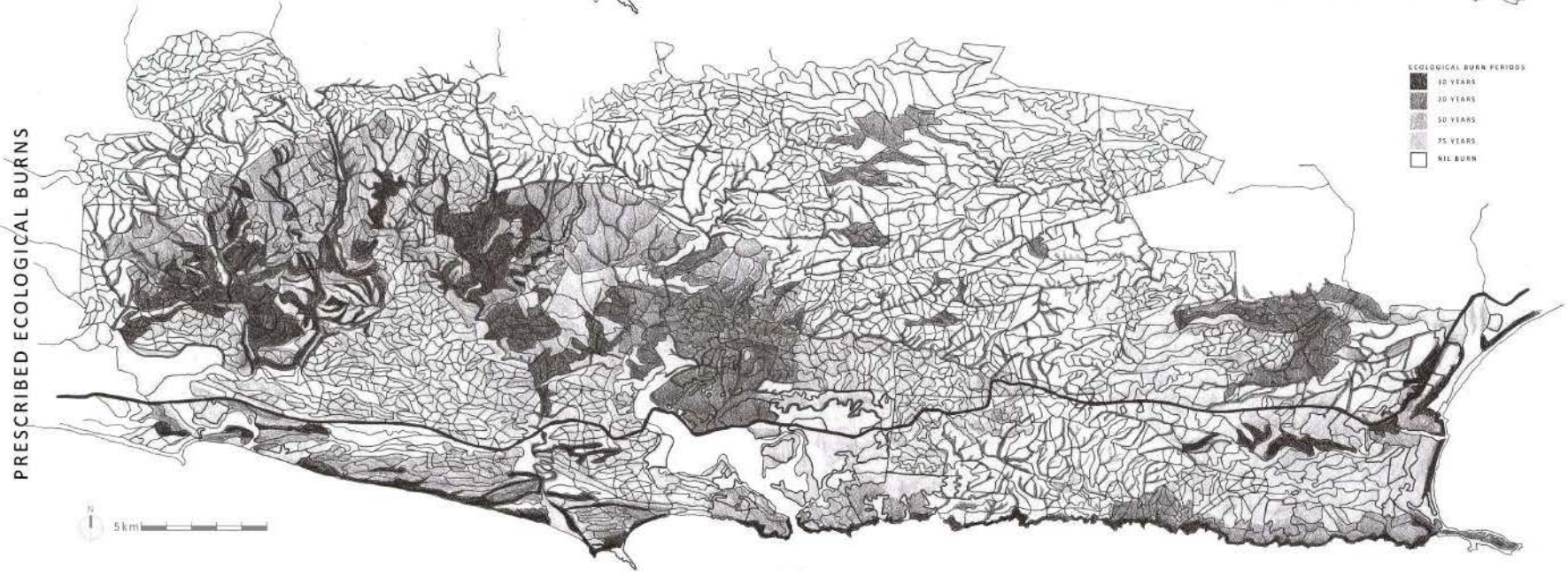
MANAGEMENT

- MANAGEMENT LEGEND:
- SAN PARKS
 - CAPE PINE
 - PG BISON
 - LOUNGMORE
 - GEO SOCIETY
 - KSA
 - EDEN MUNICIPALITY



PRESCRIBED ECOLOGICAL BURNS

- ECOLOGICAL BURN PERIODS
- 10 YEARS
 - 20 YEARS
 - 50 YEARS
 - 75 YEARS
 - NIL BURN



RECONFIGURING THE BURNT SCAR

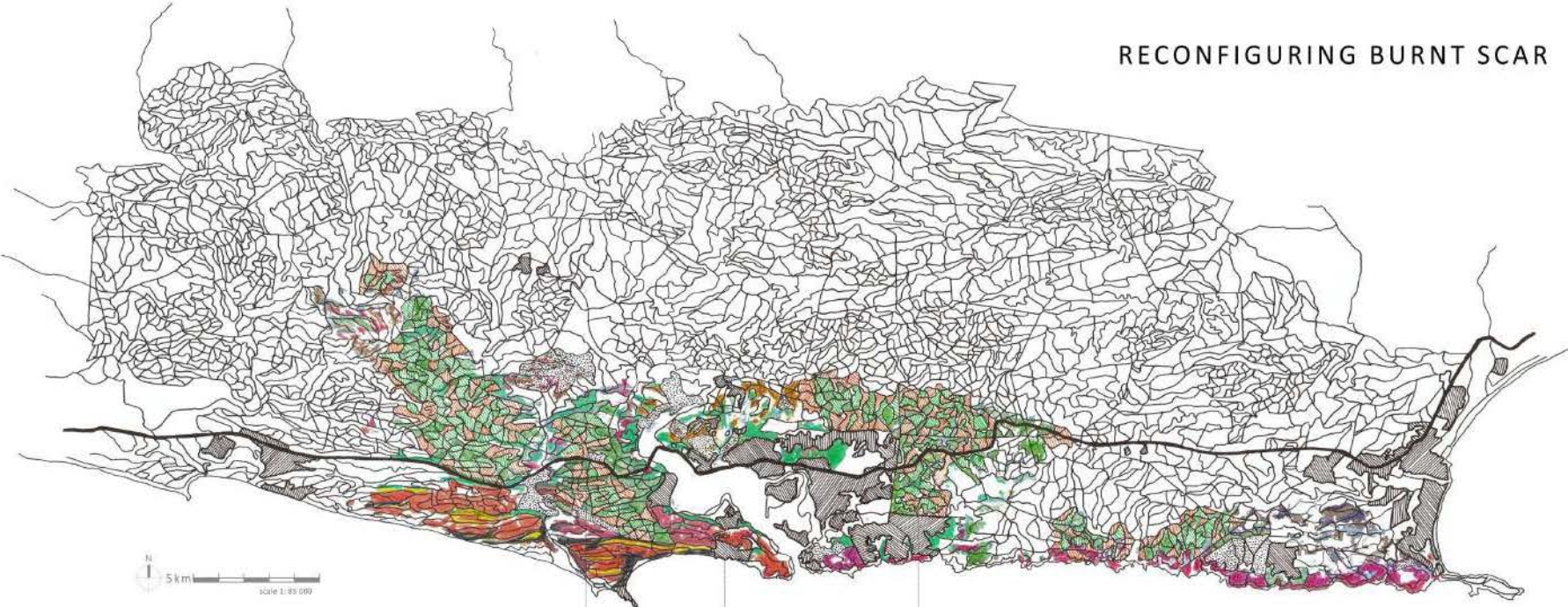
PLANTATION BREAKS

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RECONFIGURING BURNT SCAR



PLANTATION TREE CONFIGURATION

The plantations in the Knysna region are solely Pinus which is of extreme fuel hazard and as a result majority of these stands where burnt leaving bare soil and the opportunity to reimagine the commercial plantations of the area. It is proposed that new commercial tree species that are fire resistant are introduced. The plantations will instead act as firebreaks for the surrounding urban fabric as well as a self-regulating plantation firebreak. *Populus simonii* which are extremely fast growing, commercially in demand and are fire resistant will be introduced. *Betula nigra*, River Birch, is also a fast grower and will add in bank stabilization. Additionally, some of the native Outeniqua Forest species will be introduced. Finally, the *Cupressus semperviridis* which is the most fire resistant of all trees will act as guardians of the plantations and the urban fabric. These native and non-native commercial tree stands will surround the islands of Pinus stands.

Great misapprehension prevails on the subject [of fire], caused mainly by looking at it from the point of view of an inhabitant of Northern Europe. The color [fire] here is not an accidental disaster but a natural event, that usually is only abnormal when ignominiously interrupted or for some reason or other, too long deferred. David Ernest Hutchins, 1893

The phenomenon is that the fynbos stands will return their natural state stronger and thriving as can be seen by the documented resprouting and germinating photography post fire. The landscape for the most part will reconfigure itself. The intervention will apply to the extremely distributed areas.

EAST BREAK



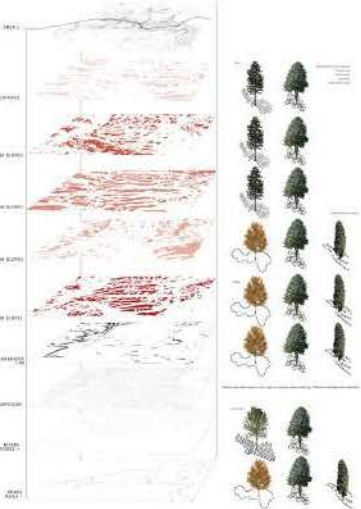
WEST BREAK



BRENTON EXTENSION

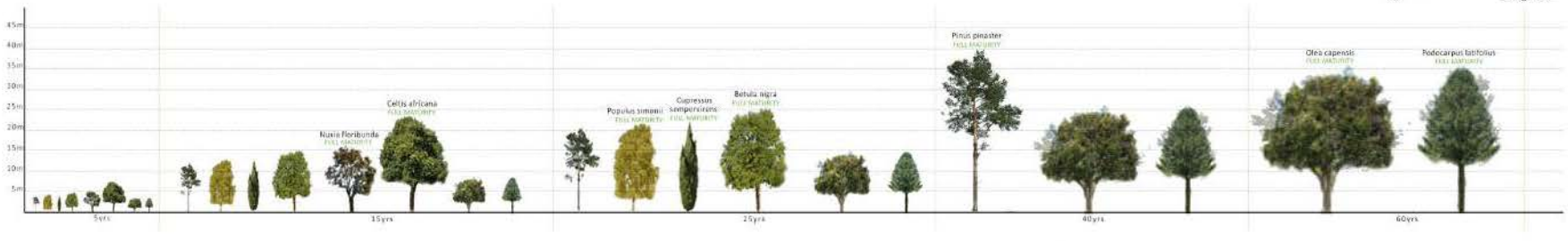


AXONOMETRIC PLANTATION RECONFIGURATION

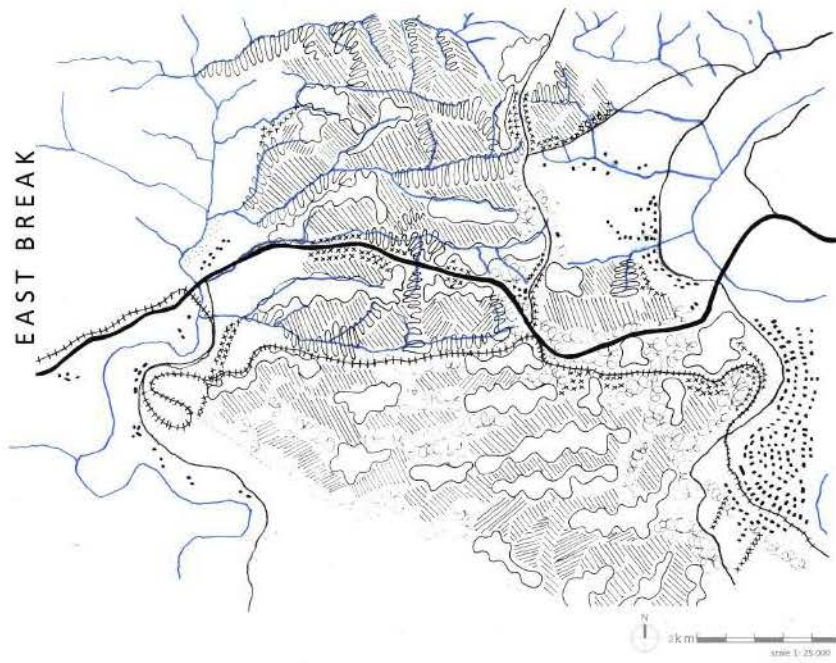




TREE GROWTH RATE



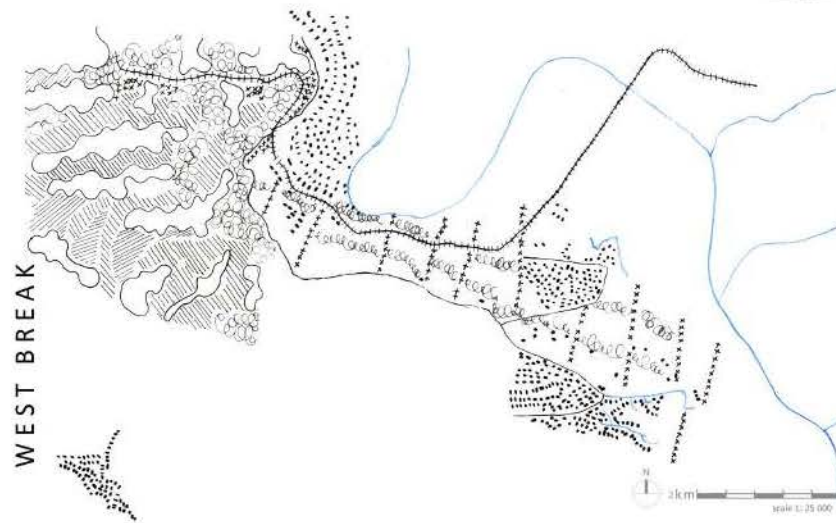
TREE BLOCK ARRANGEMENT OF PLANTATIONS



Perspective montage view of reconfigured plantations from the N2 along the Garden Route entering Knysna from the 'East Break'



Perspective montage aerial view of reconfigured plantations and firebreaks from the N2 along the Garden Route entering Knysna from the 'East Break'

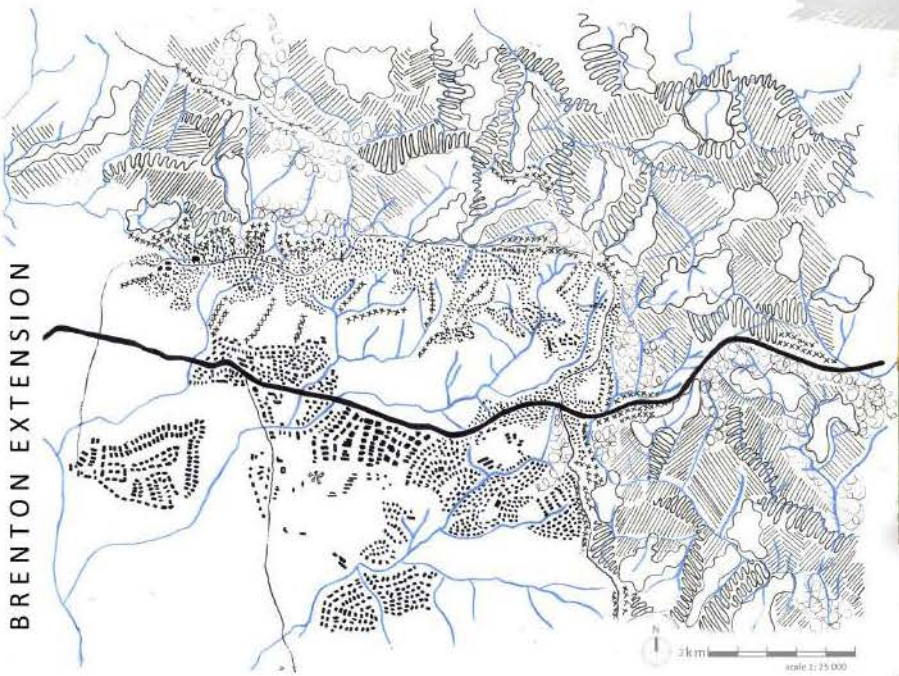


Perspective montage view of reconfigured plantations and firebreaks from the N2 along the Garden Route entering Knysna from the 'Brenton Extension'



LANDSCAPE CHARACTER + THE PICTURESQUE

The Knysna region forms part of the scenic route of The Garden and the previously existing pine plantations stood as gateways when entering and exiting Knysna. The proposed reconfiguration and introduction of the new deciduous tree species would create a new textured and multicoloured landscape. Much like the vast agricultural rolling hills of yellow canola fields during spring along the Garden Route, so the Poplars and Birch stands will add to the "beautiful" Picturesque productive landscape



RECONFIGURING THE BURNT SCAR

GARDEN BREAK

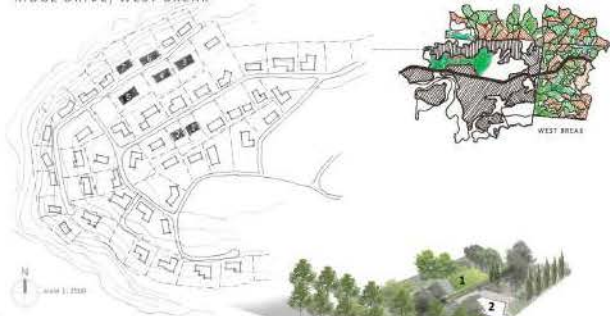
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DOMESTIC GARDEN BREAK

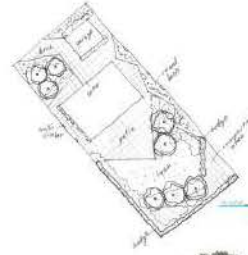
RIDGE DRIVE, WEST BREAK



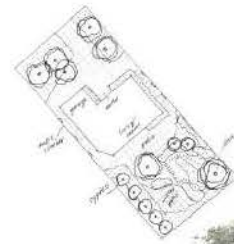
COMPOSITE STREET SCAPE



GARDEN BREAKS AT 0<20°

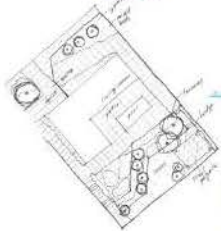


Plot 1: Narrow plot in hues of yellow and autumn seasonal change

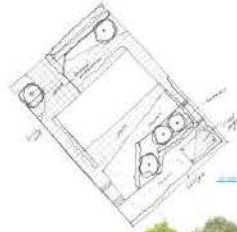


Plot 2: Narrow plot with Mediterranean character

GARDEN BREAKS AT 20<40°



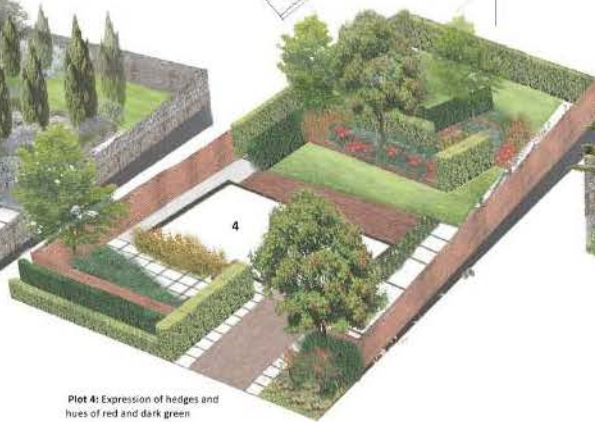
Plot 3: Mediterranean character with terraces and pool



zone 1: buffer zone
 common to all plots. It is a transitional zone between the garden and the street. It is a buffer zone. It is a buffer zone. It is a buffer zone.

zone 2: medium resistance
 It is a zone of medium resistance. It is a zone of medium resistance. It is a zone of medium resistance. It is a zone of medium resistance.

zone 3: low resistance
 It is a zone of low resistance. It is a zone of low resistance. It is a zone of low resistance. It is a zone of low resistance.

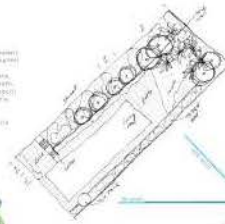


Plot 4: Expression of hedges and hues of red and dark green

zone 1: buffer zone
 common to all plots. It is a transitional zone between the garden and the street. It is a buffer zone. It is a buffer zone. It is a buffer zone.

zone 2: medium resistance
 It is a zone of medium resistance. It is a zone of medium resistance. It is a zone of medium resistance. It is a zone of medium resistance.

zone 3: low resistance
 It is a zone of low resistance. It is a zone of low resistance. It is a zone of low resistance. It is a zone of low resistance.



Plot 5: Side facing street plot with tropical character

CONCLUSION

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APPENDIX
PLAGIARISM DECLARATION

Name: LOUISE KATHLEEN BRUKMAN

Student Number: BRKLOU004

Course: APG 5052S

Declaration

1. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.
2. I have used the Harvard convention for citation and referencing. Each contribution to, and quotation in, this dissertation from the work(s) of other people has been attributed, and has been cited and referenced.
3. This dissertation is my own work.
4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

signature removed
Signature: _____

Date: __15 December 2017__

APPENDIX

ETHICS CLEARANCE

Application for Approval of Ethics in Research (EIR) Projects
Faculty of Engineering and the Built Environment, University of Cape Town

APPLICATION FORM

Please Note:
Any person planning to undertake research in the Faculty of Engineering and the Built Environment (EBE) at the University of Cape Town is required to complete this form before collecting or analysing data. The objective of submitting this application *prior* to embarking on research is to ensure that the highest ethical standards in research, conducted under the auspices of the EBE Faculty, are met. Please ensure that you have read, and understood the **EBE Ethics in Research Handbook** (available from the UCT EBE, Research Ethics website) prior to completing this application form: <http://www.ebe.uct.ac.za/ebe/research/ethics1>

| APPLICANT'S DETAILS | |
|--|---|
| Name of principal researcher, student or external applicant | Louise Kathleen Brukman |
| Department | Architecture, Planning and Geomatics |
| Preferred email address of applicant: | Louise.brukman@hotmail.com |
| If Student | Your Degree: e.g., MSc, PhD, etc. |
| | Credit Value of Research: e.g., 60/120/180/360 etc. |
| If this is a research contract, indicate the source of funding/sponsorship | Name of Supervisor (if supervised): |
| | |
| Project Title | A Landscape Architectural Response to Fire Events in Knysna, South Africa |

- I hereby undertake to carry out my research in such a way that:
- there is no apparent legal objection to the nature or the method of research; and
 - the research will not compromise staff or students or the other responsibilities of the University;
 - the stated objective will be achieved, and the findings will have a high degree of validity;
 - limitations and alternative interpretations will be considered;
 - the findings could be subject to peer review and publicly available; and
 - I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

| SIGNED BY | Full name | Signature | Date |
|---|-------------------------|-------------------|------------|
| Principal Researcher/ Student/External applicant | Louise Kathleen Brukman | signature removed | 01/09/2017 |

| APPLICATION APPROVED BY | Full name | Signature | Date |
|-------------------------------|----------------------|-------------------|------------|
| Supervisor (where applicable) | Dr. Julian Raxworthy | signature removed | 08/09/17 |
| HOD (or delegated nominee) | PROF T. BERGMAN | signature removed | 15/09/2017 |

Final authority for all applicants who have answered NO to all questions in Section 1: and for Undergraduate research (including Honours).

Chair : Faculty EIR Committee
For applicants other than undergraduate students who have answered YES to any of the above questions.

