THE ATELIER ...AGROECOLOGICAL NEXUS

REPURPOSING DESOLATED INDUSTRIAL SPACES THROUGH LANDSCAPE ARCHITECTURAL INITIATIVES INTO A FUNCTIONAL, AESTHETIC AND INTERACTIVE AGROECOLOGICAL NEXUS

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

PLANETARY POLYCRISIS

Author, 2024 (Adapted from Miguel Altiere, 2023)

Humanity is facing a series of global problems, food insecurity, climate change, biodiversity loss, economic inequality, environmental degradation, energy shortages, water loss etc.

These problems cannot be addressed in isolation, as these problems are systemic in nature, they are interconnected and interdependent.

When one of the problems are aggravated, the effects spread throughout the system, exacerbating the other problems.

SYSTEMIC VIEW OF THE GLOBAL CRISIS

The underlying causes of the pandemics are the same global environmental changes that drive biodiversity loss + climate change.

The pandemic - induced health crisis has quickly triggered an economic crisis.

All of this is unfolding in the context of a climate crisis, which exacerbates the pandemic and the economic crisis.

CLIMATE CHANGE, PANDEMICS + ECONOMIC CRISIS

ECOLOGICAL AND ECONOMIC RUPTURE

PANDEMIC AND CLIMATE CHANGE CONSTITUTE CATASTROPHES

DUE TO EXTRACTIVE AND CONSUMING PATTERNS

INDUSTRIAL AGRICULTURE

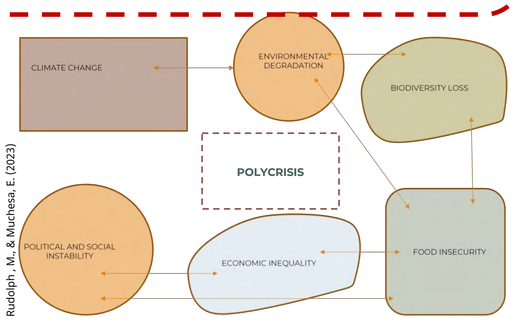
DISRUPTION OF WILD ECOSYSTEMS

HUGE ECOLOGICAL TOLL ON THE PLANET

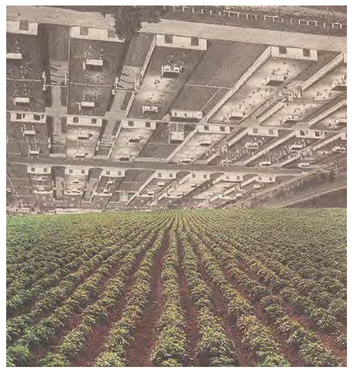
ECOLOGICAL CASCADE

SA POLYCRISIS

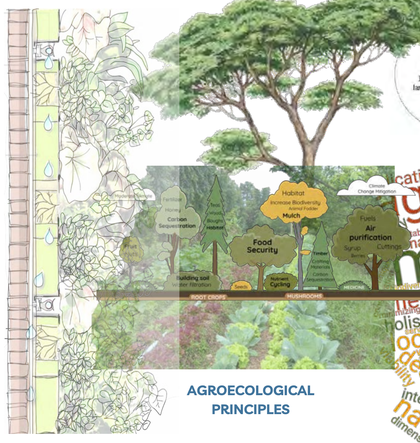
Rudolph , M., & Muchesa, E. (2023)



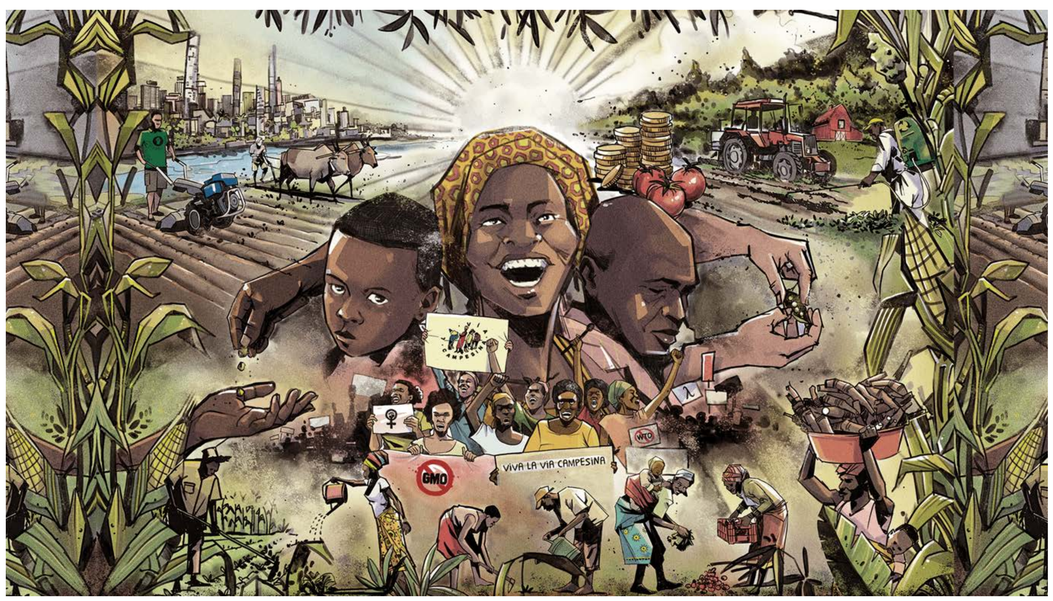
PLANETARY POLYCRISIS

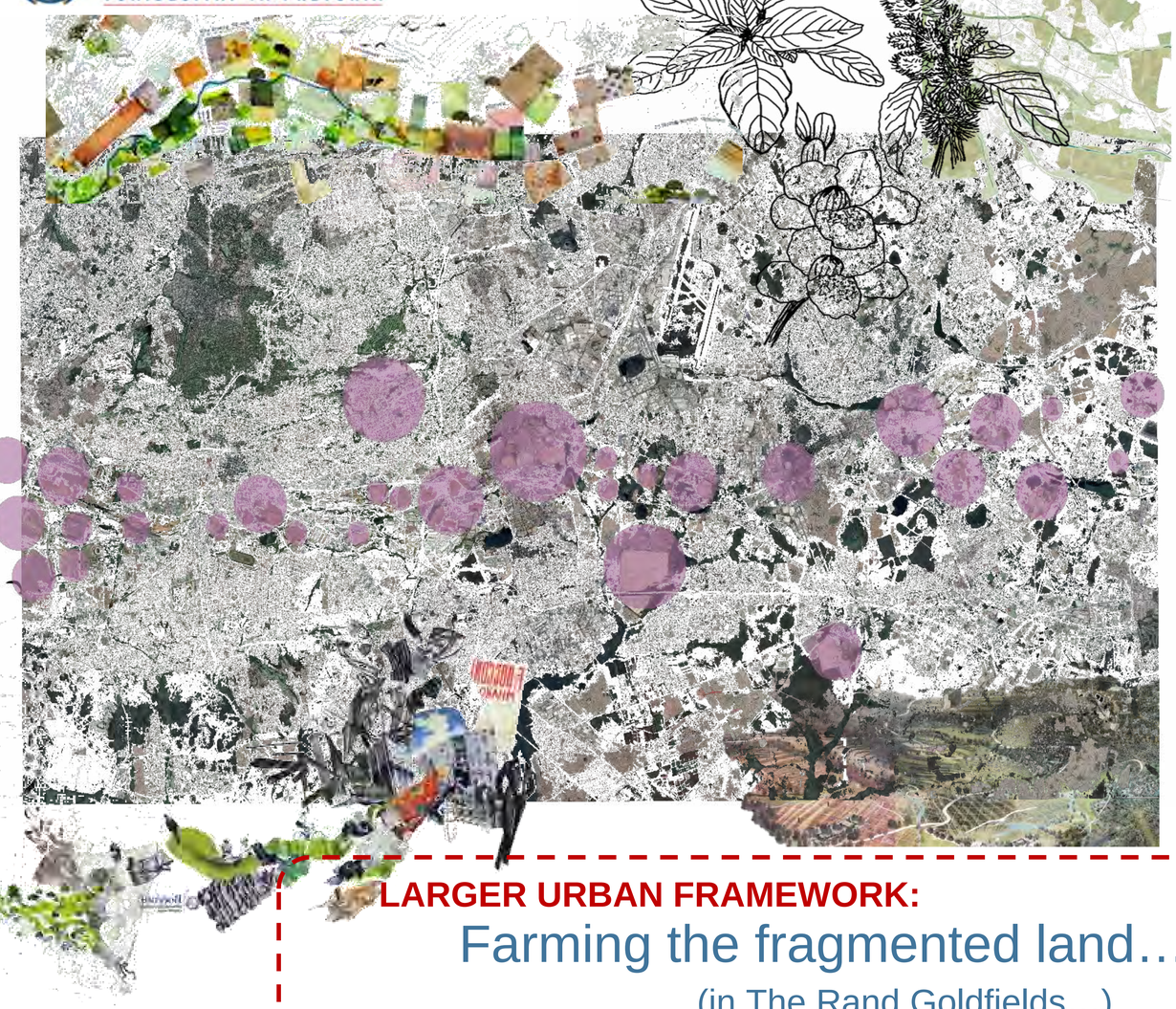


INDUSTRIAL + MONOCULTURE FARMING



AGROECOLOGICAL PRINCIPLES





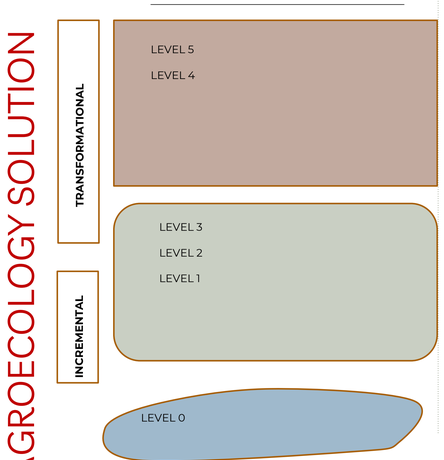
LARGER URBAN FRAMEWORK:

Farming the fragmented land…

(in The Rand Goldfields…)

AGROECOLOGY SOLUTION

LEVELS OF FOOD TRANSITION



13 PRINCIPLES

10 ELEMENTS

ISSUES & SOLUTIONS

© University of Pretoria

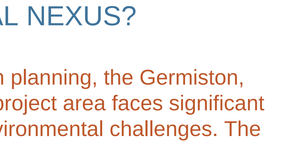
THE ATELIER….AGROECOLOGICAL NEXUS

HOW CAN DESOLATED INDUSTRIAL SPACES BE REPURPOSED THROUGH LANDSCAPE ARCHITECTURAL INITIATIVES INTO A FUNCTIONAL, AESTHETIC AND INTERACTIVE AGROECOLOGICAL NEXUS?

Due to pre-apartheid town planning, the Germiston, Ekhuruleni, South Africa project area faces significant social, economic, and environmental challenges. The design approach focuses on revitalising and re-vegetating these damaged areas, turning them into productive agrarian spaces that support a circular economy through the adaptive reuse of run-down buildings and spaces. This plan integrates traditional African crops and food production, processing, distribution, and consumption, drawing from the rich traditional knowledge of the diverse Southern African cultures. The project promotes a sustainable urban agricultural model that enriches local biodiversity, reduces carbon emissions, and provides economic opportunities

2030 Agenda for Social Development

Interactive Agroecological Landscape



Closed Loop Circular Systems

Guiding Framework:
Provides a global framework that aligns the project with recognized Sustainable Development Goals (SDGs), ensuring that efforts contribute to widely accepted sustainability standards.

Environmental Sustainability:
Supports goals like Clean Water and Sanitation (Goal 6), Affordable and Clean Energy (Goal 7), Climate Action (Goal 13), and Life on Land (Goal 15), reinforcing the project's environmental objectives.

Social Inclusion:
Emphasizes social aspects, such as Zero Hunger (Goal 2) and Reduced Inequalities (Goal 10), making sure the agroecological hub benefits the entire community and fosters social cohesion.

Economic Development:
Encourages economic resilience and sustainable job creation (Goal 8), highlighting the potential for local economies to thrive through green practices and responsible consumption and production (Goal 12).

Community Education:
Provides a hands-on learning environment where community members can learn about sustainable practices, agroecology, and resource conservation.

Biodiversity and Ecosystem Health:
Promotes biodiversity through varied plantings, which attract pollinators and foster a healthy ecosystem.

Community Engagement:
Creates communal spaces for workshops and gatherings, increasing local participation and encouraging a shared responsibility for sustainability.

Health and Wellbeing:
Offers accessible green spaces that improve mental and physical health by providing areas for recreation, relaxation, and interaction with nature.

Resource Efficiency:
Minimizes waste by reusing resources, such as composting organic waste to nourish soil, creating a self-sustaining ecosystem within the hub.

Soil Health and Regeneration:
Utilizes composting and nutrient cycling to maintain and improve soil fertility, essential for crop productivity.

Water Conservation: Reduces water usage through greywater recycling, rainwater harvesting, and efficient irrigation, enhancing drought resilience.

Economic Resilience:
Reduces dependency on external inputs, lowering operational costs and making the system more economically sustainable over the long term

: Integrating Landscape Architecture and Agroecology

The Agroecological Nexus integrates landscape architectural and agroecological strategies to enhance food security, community resilience, and environmental sustainability. This project emphasises cultivating Traditional African Crops (TACs) while restoring ecological balance, aligning with the Sustainable Development Goals (SDGs) for sustainable cities, zero hunger, and responsible consumption (IFLA, 2020).I

FOR SUSTAINABLE LAND DESIGN AND DEVELOPMENT

3 PILLARS OF SUSTAINABILITY

SDG

CRISIS

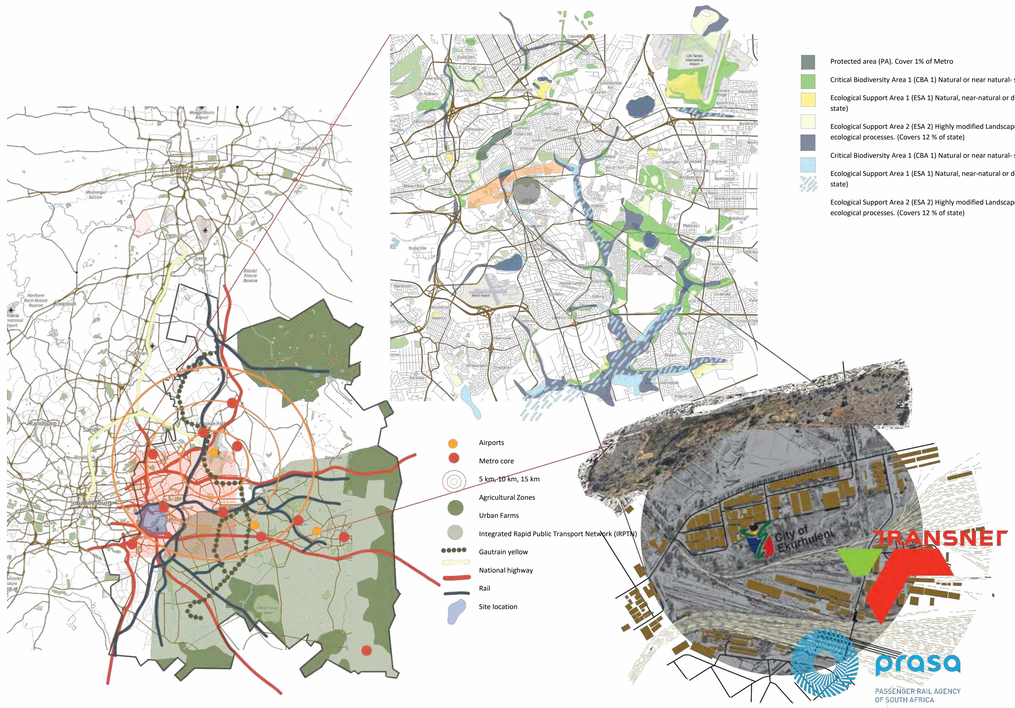
AGRICULTURE SYSTEM

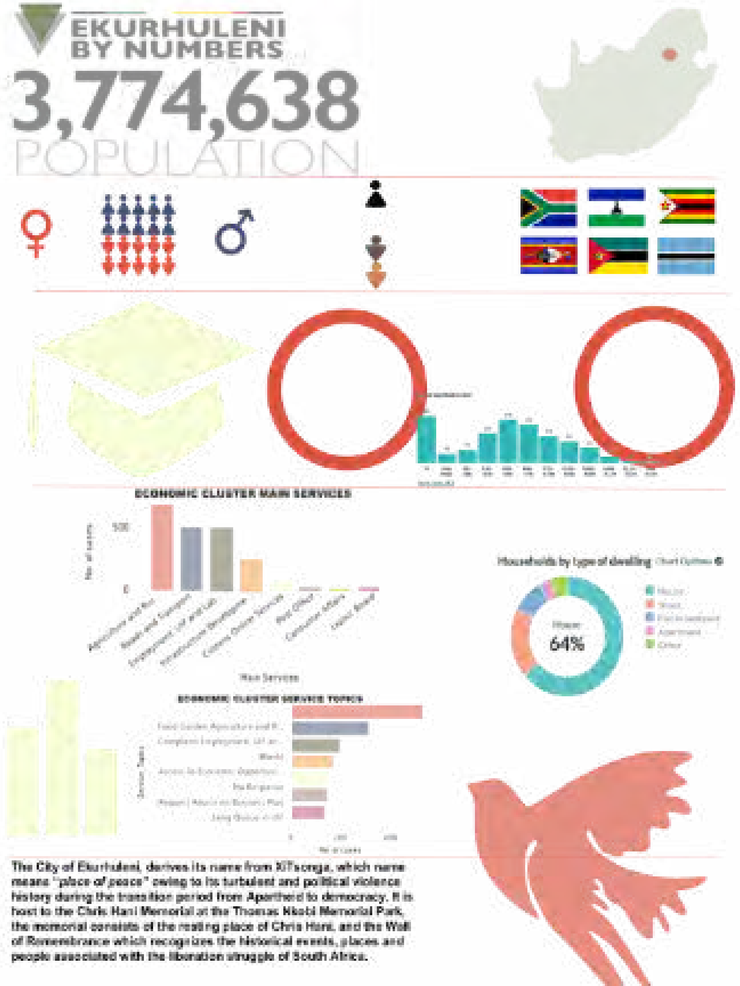
ECOLOGICAL

SOCIAL

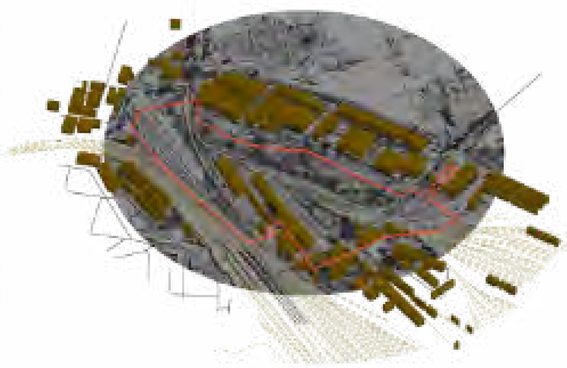
ECONOMICAL

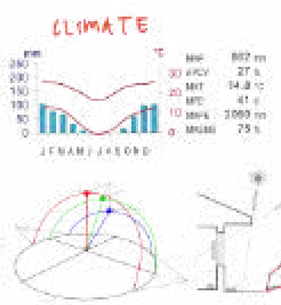
INTRODUCTION TO PROJECT

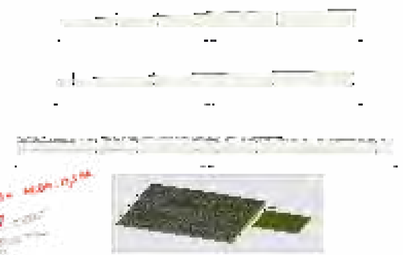




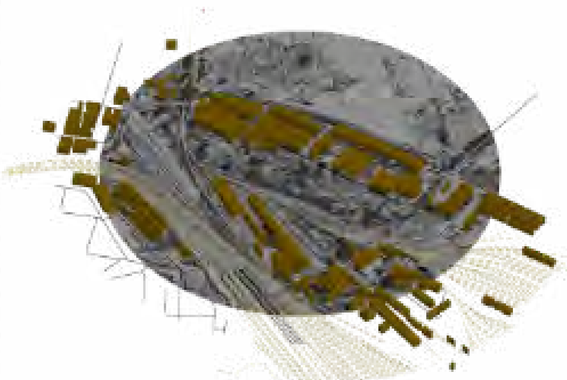
PHYSICAL ATTRIBUTES



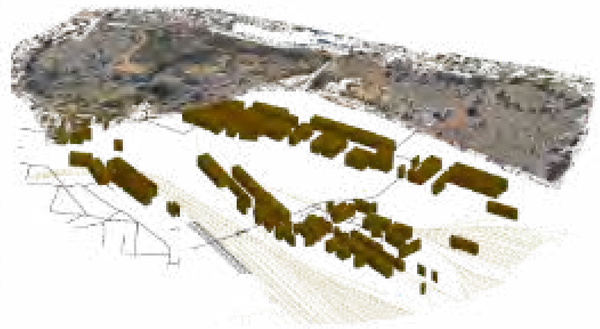


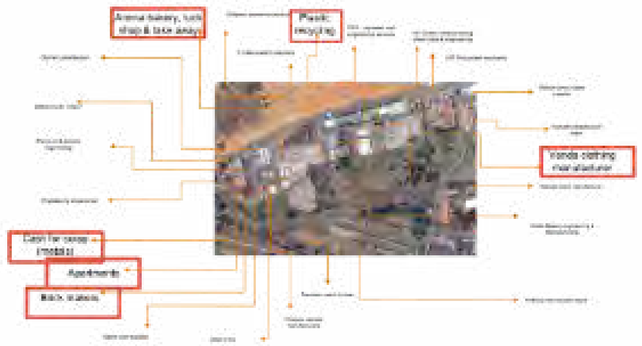


BIOLOGICAL ATTRIBUTES

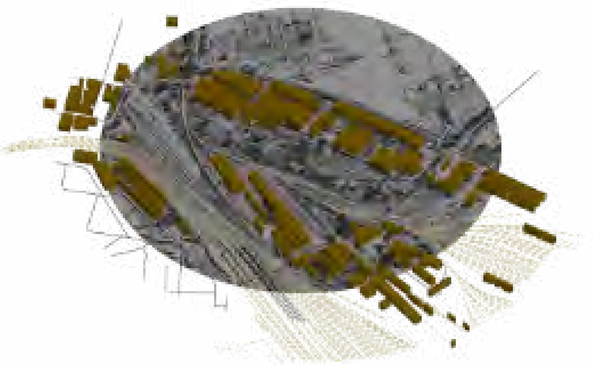


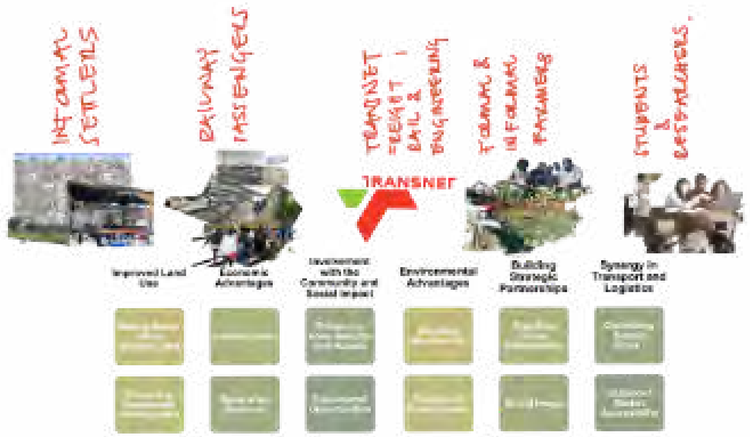
CULTURAL ATTRIBUTES





USER ATTRIBUTES





SITE INVENTORY & ANALYSIS

Raw Data

Train station

Low-income communities

Construction materials

Streetscape from station

Vendors on streetscape

Urban agriculture adjacent to site

Site

(Only 2 x steel structures remaining)

Existing structures

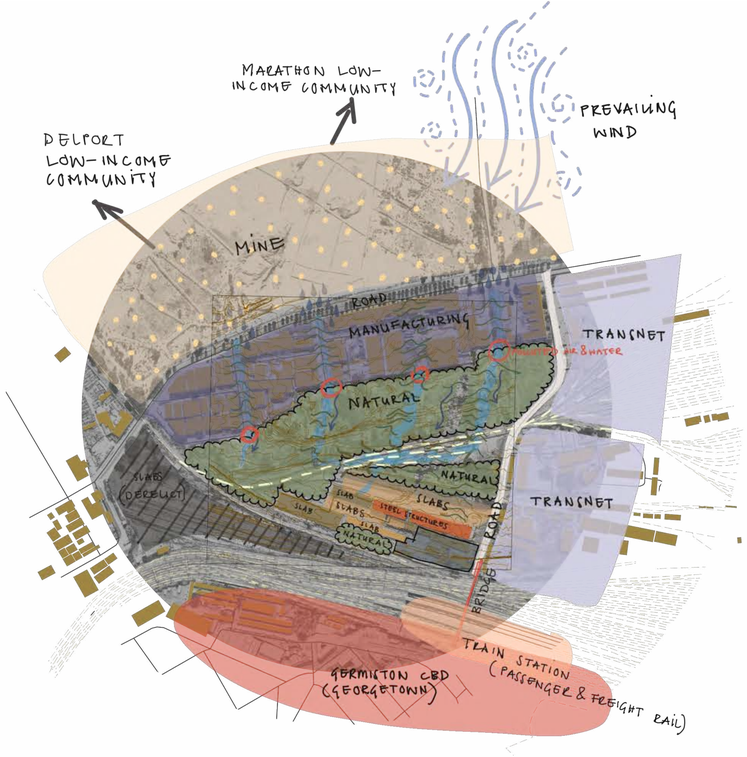
Water features

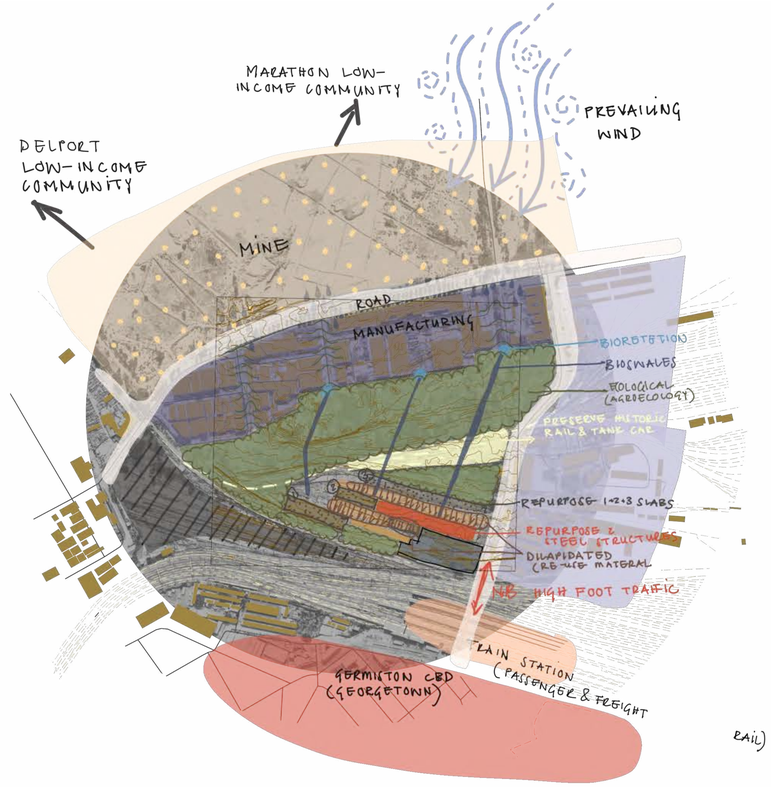
Dilapidated structure

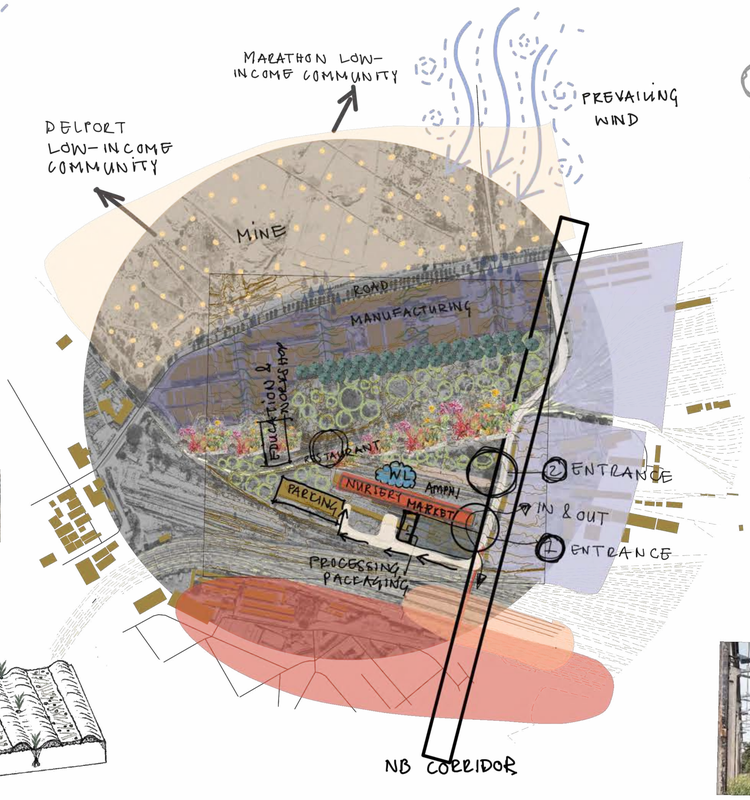
Recycle hub

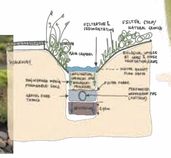
On-site material for repurpose

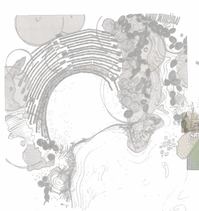
SITE – ZOOM IN











SITE INVENTORY & ANALYSIS

Interpreted & Synthesized

PRECEDENT STUDY 1

AGRO FOOD PARK, AARHUS, DENMARK

PRECEDENT STUDY 3

URBAN BARN

Project Summary:

Name: Urban Farm / Urban Barn

Scope: Urban Agriculture & Factory Conversion and Renovation

Owner: Isavaret Tamonut

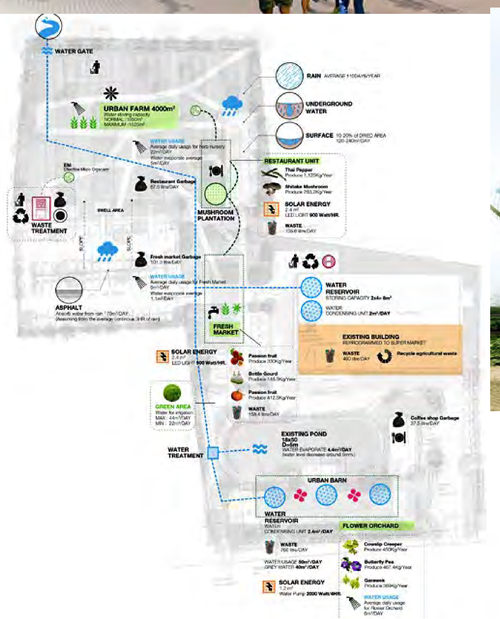
Design Team: Vichayuth Meenaphant, Manassak Senachak, Phuttipan Aswakool, Jariyawadee Lekawatana, Pailin Paijitsattaya, Marisa Charusilawong

Main Consultants: Singh Intrachooto, Chaiyot Pinitjirsamut, C-Insight Co., Ltd.

Engineering: Piroj Chaimongkol, Weint Engineering and Management Co., Ltd.

Project Area: 1.4 hectares

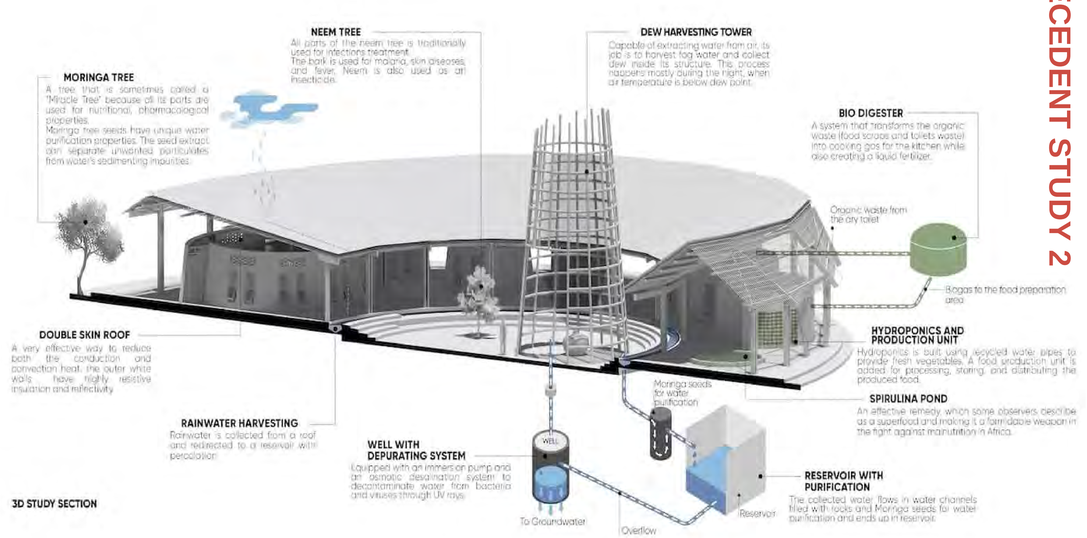
Project Stage: Design Development



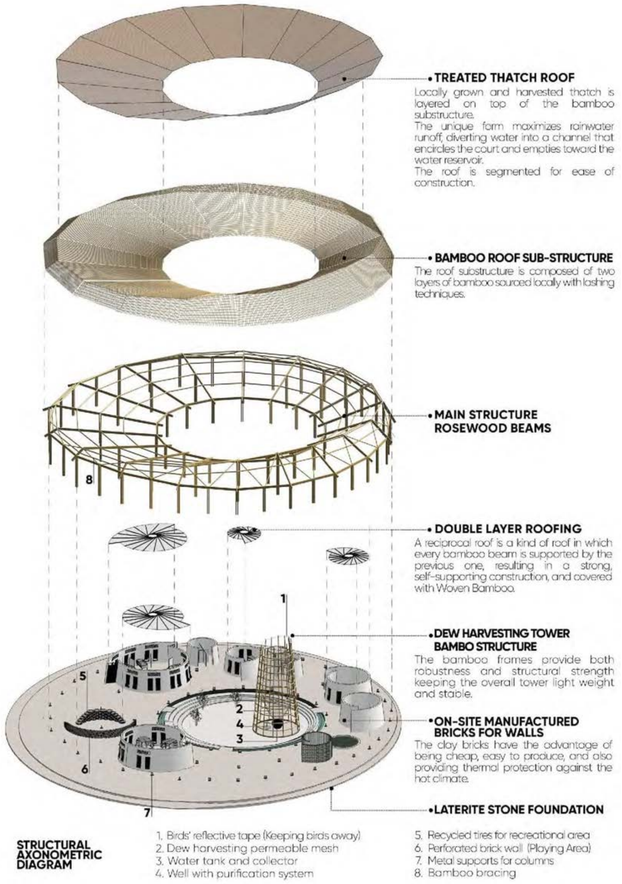
PRECEDENT STUDY 2

LE PHARE: AN ARCHITECTURAL PROTOTYPE FOR COMBATING HUNGER IN HIGHLY POLLUTED REGIONS IN AFRICA

Sédhiou Region, Senegal



Awards: 1st place at the innovation of the Year Award 2023 at Big 5 annual impact Awards.
International recognition: Represented Egypt at the UIA 2023 World Congress Copenhagen
SDG goals implemented: SDG 2: Zero Hunger, SDG 3: Good Health and Well-being, SDG 6: Clean Water and Sanitation, SDG 7: Affordable and Clean Energy, SDG 11: Sustainable Cities and Communities, SDG 12: Responsible Consumption and Production, SDG 15: Life on Land.



PRECEDENT STUDIES

PREREQUISITE / CREDIT	TITLE	POINTS
Water P3.1	Manage precipitation on site	Required
Water P3.2	Reduce water use for landscape irrigation	Required
Water C3.3	Manage precipitation beyond baseline	4-6 points
Water C3.4	Reduce outdoor water use	4-6 points
Water C3.5	Design functional stormwater features as amenities	4-5 points
Water C3.6	Restore aquatic ecosystems	4-6 points

P3.1 – Manage precipitation on site

•Retain the 60th percentile precipitation event by adhering to the guidelines provided by the U.S. EPA or local equivalents to calculate and preserve this amount on-site through **infiltration, evapotranspiration, or reuse**.
•Strategies to reduce runoff:
•Utilise **permeable materials** for hard surfaces, such as permeable concrete, asphalt, or pavers.
•Direct **hard surfaces to drain into landscape areas** capable of accepting precipitation runoff.
•Incorporate **bioswales**, rain gardens, or water quality ponds for filtration and retention.
•**Integrate vegetation and soil-based systems** to manage stormwater on-site.
•Cisterns and stormwater systems: If cisterns are utilised, they must be integrated with natural runoff-reduction methods.
•Site maintenance plan: **Incorporate stormwater features** and delineate long-term maintenance activities to ensure effectiveness. Plan for regular cleaning, repairs, and vegetation management to uphold functionality.

P3.2 – Reduce water use for landscape irrigation

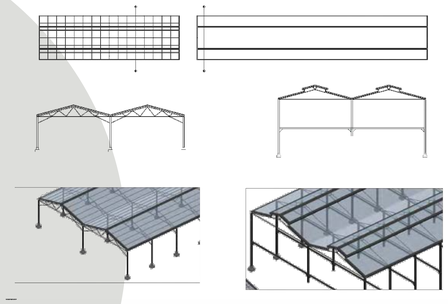
•Reduce the use of drinkable water for landscape irrigation by at least 50% compared to a baseline, utilising the U.S. EPA
•WaterSense Water Budget Tool or an equivalent local tool.
•Implement **water-efficient irrigation systems** such as drip irrigation and climate-based controllers.
•Create **planting zones** that minimise or eliminate the need for permanent irrigation.
•Choose **drought-resistant, locally suitable plant**s that can thrive on natural rainfall. Install **water meters** to monitor irrigation usage and compare it to the baseline.
•Additionally, following local health regulations, consider **using captured rainwater, greywater, or treated wastewater for irrigation after the establishment period.**
•Lastly, develop a maintenance plan outlining long-term irrigation practices, non-potable water sources, and watering schedules.

C3.3 – Manage precipitation beyond baseline

On-site retention techniques: Utilize infiltration, evapotranspiration, and harvesting methods for runoff management.
•Incorporate stormwater treatment technologies if complete retention is not possible.
•Pollution management: Ensure runoff treatment technologies reduce pollutants, maintaining total suspended solids concentrations below 25 mg/L. Address specific contaminants of concern if the site is in an impaired watershed.
•Site discharge: Ensure that treated water discharge aligns with natural erosion rates and does not elevate the erosion rate in receiving water channels.

Planting fast-growing trees and shrubs (Poster 3) to act as windbreaks can reduce wind-induced evaporation. Additionally, using pioneer species to create shaded microclimates can help retain moisture and rapidly reduce water requirements (Gliessman, 2007).

Mulch heavily: Mulching with organic materials (e.g., straw, **wood chips**) reduces evaporation and improves soil moisture retention. Mulch can reduce water evaporation by up to **75% in dry climates** (Altieri, 1995).



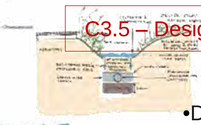
The 7-layer system (Poster 3) mirrors natural ecosystems, providing essential ecosystem services such as nutrient cycling, pest management, and improved soil health (Altieri, 1995).

Install drip irrigation systems: To reduce water waste, drip irrigation delivers water directly to the root zones of plants. Drip irrigation is far more efficient than traditional overhead systems, reducing water use by up **to 70%** (Gliessman, 2007)

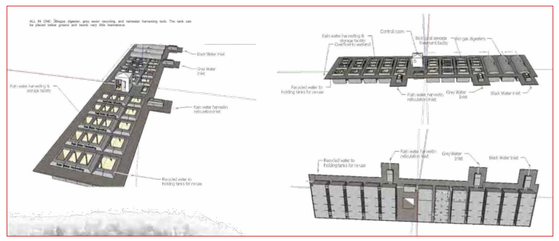
C3.4 – Reduce outdoor water use

•Options for reducing water usage:
•Option 1: Decrease outdoor water use by 75% from the initial period after establishment (4 points).
•Option 2: Refrain from using potable water or groundwater for irrigation (5 points).
•Option 3: Eliminate the need for long-term irrigation (6 points). Utilise alternative water sources: Use non-potable water sources such as rainwater harvesting, greywater, or reclaimed water. If temporary potable water use is necessary, ensure that irrigation systems are disconnected or removed after plant establishment.
•Management of water features: Ensure that 50%-100% of the water in site features is sourced from non-potable sources. Install water meters to monitor and compare water usage with the initial levels.
•Maintenance plan: Incorporate strategies to prevent the harm of aquatic life from chemicals like chlorine or bromine, and ensure that no mosquito habitats are created.

C3.5 – Design functional stormwater features as amenities



•Design of Stormwater Features:
•As attractive and functional amenities, incorporate stormwater management elements (e.g., bioswales, rain gardens, vegetated roofs) into the site. Ensure that a minimum of 50% (for 4 points) or 100% (for 5 points) of stormwater features are designed as amenities.
•Water Source Based on Precipitation: Ensure that all stormwater features solely utilise precipitation as their water source, excluding rainwater collected for reuse.
•Accessibility: Design stormwater features to be visually and physically accessible to users. Place them in high-traffic areas of the site where they offer aesthetic and educational value.
•Maintenance Plan: Develop long-term maintenance procedures to ensure that stormwater features function effectively without the use of harmful chemicals or the creation of mosquito breeding grounds.



Utilization of greywater recycling: Employing recycled household water for irrigating the agroecological permaculture system can decrease the need for freshwater inputs by 30% or more within the initial year (Gliessman, 2007).

C3.6 – Restore aquatic ecosystem – N/A

SITE DESIGN – WATER

PREREQUISITE / CREDIT	TITLE	POINTS
Soil+Veg P4.1	Create and communicate a soil management plan	Required
Soil+Veg P4.2	Control and manage invasive plants	Required
Soil+Veg P4.3	Use appropriate plants	Required
Soil+Veg C4.4	Conserve healthy soils and appropriate vegetation	4-6 points
Soil+Veg C4.5	Conserve special status vegetation	4 points
Soil+Veg C4.6	Conserve and use native plants	3-6 points
Soil+Veg C4.7	Conserve and restore native plant communities	4-6 points
Soil+Veg C4.8	Optimize biomass	1-6 points
Soil+Veg C4.9	Reduce urban heat island effects	4 points
Soil+Veg C4.10	Use vegetation to minimize building energy use	1-4 points
Soil+Veg C4.11	Reduce the risk of catastrophic wildfire	4 points

The use of the classic **7 layers** of vegetation (**canopy, understory, shrub, herbaceous, root, ground cover, and vines/climbers)** in a permaculture system aligns with the principles of agroecology, which emphasizes integrating ecological principles into agricultural systems to **enhance biodiversity, optimize resource use, and foster sustainable food production (Altieri, 2015)**. This seven-layer system mirrors natural ecosystems, providing essential ecosystem services such as nutrient cycling, pest management, and improved soil health (Altieri, 1995).

P4.1 – Soil Management Plan

ARC • LNR — Report Number: G-2024/25-0041

Sender No.			S+J	Train
Lab No.			2024/25 M3380	2024/25 M3381
Analyte	Method	Units		
Cu	HCL extract	mg/kg	0.003	0
Fe	HCL extract	mg/kg	0.873	0.186
Mn	HCL extract	mg/kg	60.9	3.33
Zn	HCL extract	mg/kg	3.67	1.64
7 Li	EPA 3050A	mg/kg	20.597	19.151
9 Be	EPA 3050A	mg/kg	2.47	BDL
47 Ti	EPA 3050A	mg/kg	195.045	300.878
51 V	EPA 3050A	mg/kg	130.523	35.914
60 Ni	EPA 3050A	mg/kg	BDL	BDL
75 As	EPA 3050A	mg/kg	7.851	64.528
85 Rb	EPA 3050A	mg/kg	27.746	13.663
88 Sr	EPA 3050A	mg/kg	203.757	351.614
95 Mo	EPA 3050A	mg/kg	224.955	6.535
111 Cd	EPA 3050A	mg/kg	2.537	2.237
121 Sb	EPA 3050A	mg/kg	20.962	3.369
125 Te	EPA 3050A	mg/kg	2.376	BDL
133 Cs	EPA 3050A	mg/kg	3.807	1.469
139 La	EPA 3050A	mg/kg	42.12	16.687
182 W	EPA 3050A	mg/kg	3.096	BDL
195 Pt	EPA 3050A	mg/kg	6.669	BDL
201 Hg	EPA 3050A	mg/kg	17.577	BDL
209 Bi	EPA 3050A	mg/kg	8.137	1.779
238 U	EPA 3050A	mg/kg	4.564	7.895
Ca	Amm. Acetate	mg/kg	3,620.00	7,710.00
Ca_me	Calculated	cmol+/kg	18.06	38.47
K	Amm. Acetate	mg/kg	522	314
K_me	Calculated	cmol+/kg	1.33	0.8
Mg	Amm. Acetate	mg/kg	318	535
Mg_me	Calculated	cmol+/kg	2.62	4.4
Na	Amm. Acetate	mg/kg	18.7	19.4
Na_me	Calculated	cmol+/kg	0.08	0.08
P	Bray 1	mg/kg	40.39	31.51
pH	Water extract	*	7.05	7.48

•Amending site soils with organic matter in place - Importing a topsoil or soil blend designed to serve as topsoil
•When selecting a soil restoration strategy, consider the design, site use, and future sitemaintenance expectation.
- Add organic compost to unscreened soil
- Many un-screened and un-amended soils will drain adequately
- Amending with other earth materials to modify a soil's gradation/texture and organic matter content.
• See p. for soil management plan and action.

" Die basis katione Na, Ca, Mg en K en pH lyk nie te sleg nie (ek glo nie hulle EPA 3050A se swaarmetale nie , ek weet ook nie waar kom die relatief hoë fosfaat (P) vandaan nie.

Soos telefonies bespreek moet katione en anione (veral SO4) ook ontleed word as daar goudmyn hope naby is. Dan moet die electrical conductivity ook gedoen word (soute). "J.P. Nell (PhD, MBA)

Develop a Soil Management Plan (SMP) before construction,
- Minimize soil disturbance during construction, restoring disturbed soils in designated zones.
- Avoid using imported topsoil from protected lands (e.g., farmland).
- Restore disturbed soils to at least 12 inches deep. - Create a clear restoration strategy, integrating the SMP with erosion control plans. - Use methods like stockpiling existing soils or importing soil blends as needed for restoration. - Match soil restoration techniques with future site use and maintenance needs.

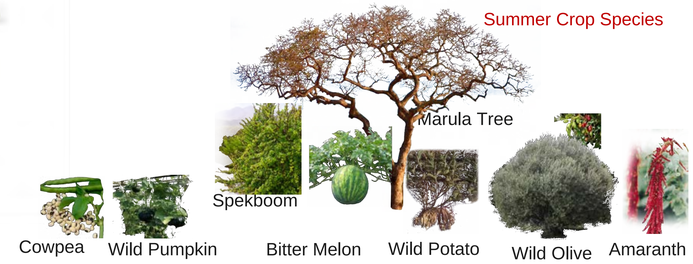
P4.9 – Reduce urban heat island effect

- Use plants for shade over paved areas within 10 years, with plants in place at certification.
- Install vegetated planters, no artificial turf, plants in place at certification.
- Provide shade with structures using solar or wind energy.
- Use architectural structures with specified reflectance values and include cleaning in the maintenance plan.
- Use vegetated structures for shading.
- Use paving materials with specified reflectance values, clean surfaces every two years.
- Install open-grid pavement systems that are at least 50% unbound.

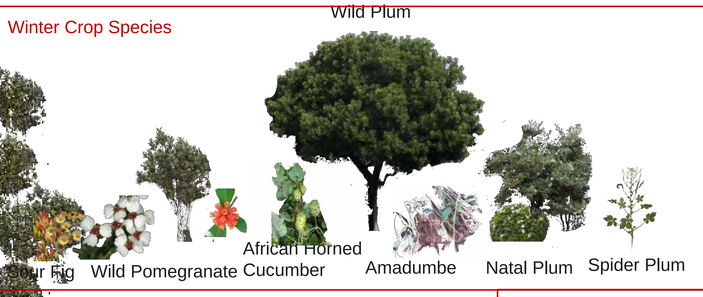
protect groups of trees rather than individual trees.

P4.3 – Use appropriate plants

Summer Crop Species



Winter Crop Species



P4.6 – Conserve and use native plants

P4.7 – Conserve and restore native plant communities

Special Features:

- Drought resistant
- Good potplant
- Hedge/screen
- Edible plant
- Medical plant
- Useful plant
- Pioneer plant

To improve the area, native plants must be planted to achieve a minimum native plant score of 60%. More than 60% of the native/indigenous vegetation on site will be kept. Establish Vegetation-Sensitive Planning Zones (VSPZs) to protect existing native plants. However, the site is degraded, and less than 10% of Gm 8 Soweto Highveld Grassland remains on site.

Key Flora that will benefit Agroecological Spaces:
- Grasses: Andropogon appendiculatus, Themeda triandra, Cymbopogon pospischilii.
- Herbs: Hermannia depressa, Acalypha angustata, Berkheya setifera,.
- Bulbous Herbs: Haemanthus humilis subsp. hirsutus, H. montanus.
- Low Shrubs: Anthospermum hispidulum, Felicia muricata, Ziziphus zeyheriana.

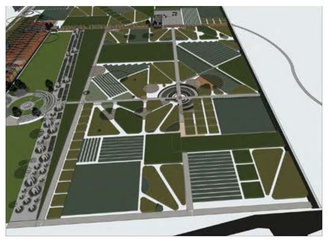
At most 10% of any species will be used.

J.P. Nell (PhD, MBA) was employed at the Institute for Soil Climate and Water, Agricultural Research Council in South Africa. J.P. conducts research in Soil Science, Water Science, Irrigation Planning, Irrigation Rehabilitation (at local, national, and international levels), and studies focusing on the interaction of soil, crops, and water quality.

Locate construction activities, including storage of materials, vehicular access and parking, and placement of utilities on areas of previously disturbed soils.

P4.8 – Optimise biomass

- Design greenfield sites to minimise disruption to existing vegetation.
- Green walls can be used to increase BDI without altering the site footprint.
- Select shade- and sun-tolerant species that will adjust as trees and shrubs mature:
- Utilise trees, green roofs, and vegetated structures such as trellises to cover non-vegetated areas and manage stormwater.
- Review biome tables before design to avoid adding unnecessary vegetation layers for credit.



P4.10 – Use vegetation to minimise building energy use

windbreak

Shade 30% of the surface area of east, southeast, southwest, and west building facades and 30% of the total roof area within 10 years of installation.

P4.5 – Conserve special status vegetation

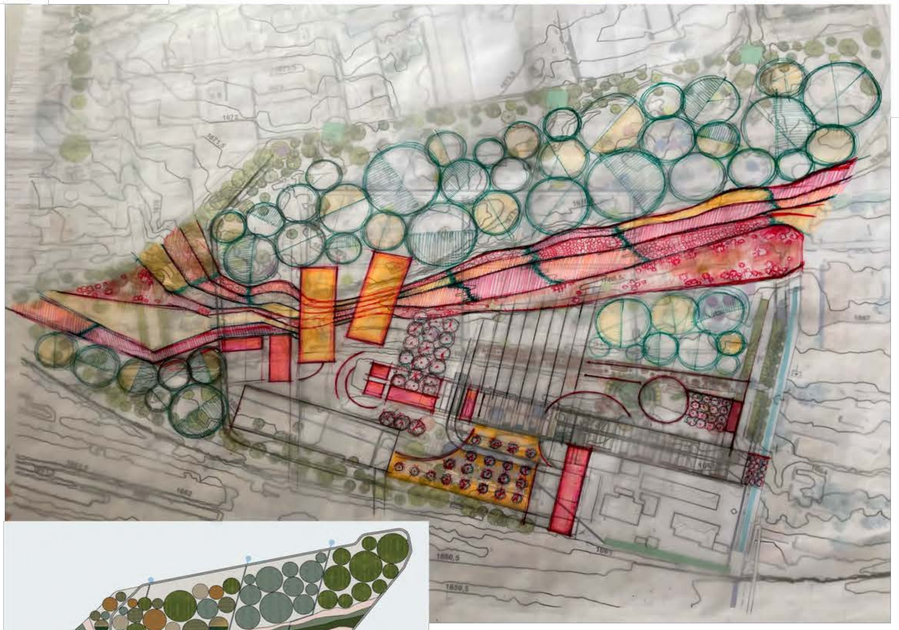
Existing Species

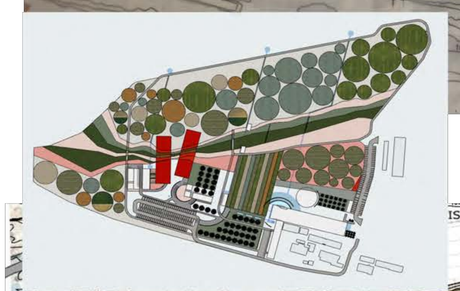
Protected

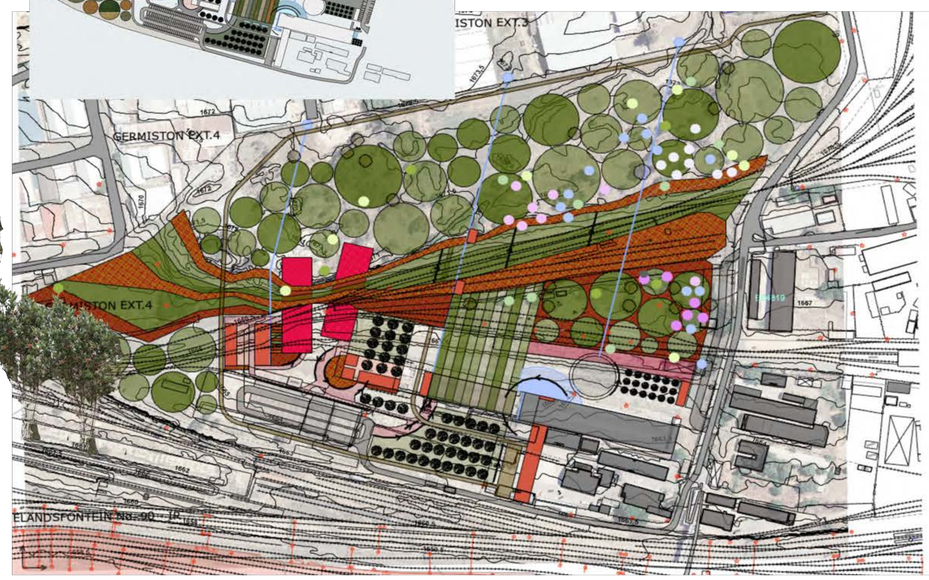
Alien Invasives on site

P4.2 – Control and manage invasive plants

SITE DESIGN –SOIL + VEGETATION







DESIGN DEVELOPMENT

LANDSCAPE LEGEND

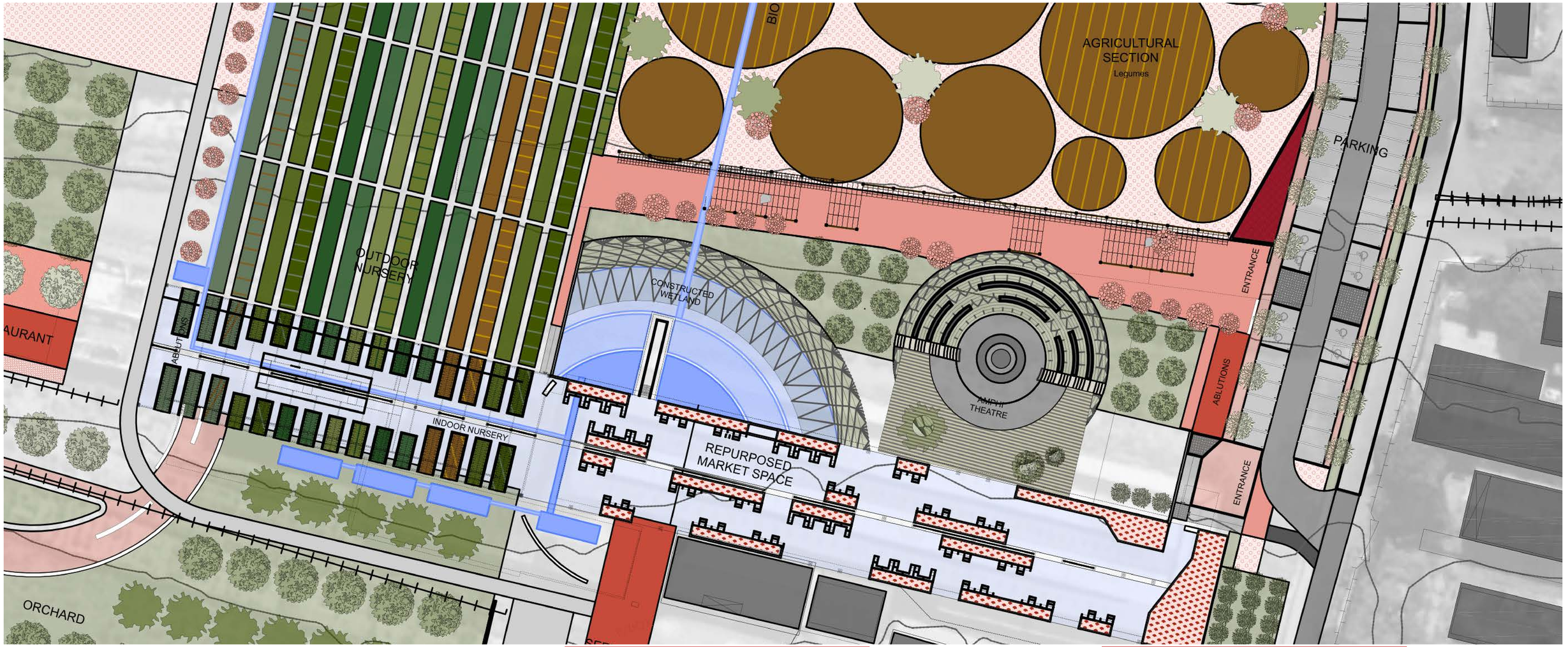
- Tree: Vachellia sieberiane I Paper Bark
- Tree: Buddleja saligna I False Olive
- Tree: Searsia leptodictya I Mountain Karee
- Tree: Pappea capensis I Jacket Plum
- Tree: Kigelia africana I Sausage tree
- Tree: Harpephyllum caffrum I Wild plum
- Tree: Dodonaea viscosa var. angustifolia I Sand Olive
- Tree: Buddleja salviifolia I False Olive
- Tree: Grewia occidentalis I Cross - Berry
- Tree: Bauhinia petersiana subsp. macrantha I Kalahari Bauhinia
- Tree: Nuxia congesta I Common Wild Elder
- Tree: Dombeya rotundifolia I White Pear
- Agricultural Section Brassica
- Agricultural Section Brassica
- Agricultural Section Brassica
- Agricultural Section Leafy Crops
- Agricultural Section Legumes
- Pollinator Floral Mix A
- Pollinator Floral Mix B
- Pollinator Floral Mix C
- Pollinator Floral Mix D
- Pollinator Floral Mix E
- Pollinator Floral Mix F
- Pollinator Floral Mix G
- Parking Paver Mix: Bosun Grass Blocks 600 x 400 x 100mm. With mixed aggregate infill. Colour: Grey.
- Walkway Paver Mix: Bosun bevelbond paver 200x100x50mm. 90° Herringbone. Colour Grey
- Walkway Paver Mix: Bosun Grass Blocks 600 x 400 x 100mm. Interlock. Colour: Grey.
- Walkway Paver Mix: Bosun Limeo Small Paver 300 x 120 x 80mm. Common bond. Colour: Stone Grey
- Reconstructed Concrete Floor
- Bioswale + Wetland Watersystem

GERMISTON EXT.3
GERMISTON EXT.4
GERMISTON EXT.4
BIORETENTION PONDS
BIORETENTION PONDS
BIORETENTION PONDS
BOSWALE
BOSWALE
BOSWALE
BOSWALE
AGRICULTURAL SECTION Leafy Crops
AGRICULTURAL SECTION Brassica
AGRICULTURAL SECTION Brassica
AGRICULTURAL SECTION Brassica
AGRICULTURAL SECTION Legumes
AGRICULTURAL SECTION Brassica
FLORAL RESEARCH PATCH
POLLINATOR CORRIDOR
POLLINATOR + FLORAL RESEARCH PATCH
OFFICES
EDUCATION
TOILETS
ORCHARD
TOILETS
KITCHEN
RESTAURANT
HARVEST
ORCHARD
ORCHARD
PARKING
PARKING
PARKING
REPURPOSED MARKET SPACE
AMPHITHEATRE
SERVICES MAINTENANCE
SERVICES ENTRANCE
EXISTING
SUBWAY
STORES ROAD
E04819
CONC.
M/H
BINS
ELANDSFONTEIN No. 90 - IR
GEORGETOWN
MSX0491J
KNIGHTON
DELMORE

SITE LAYOUT PLAN

Scale: 1 :600

MASTERPLAN



REPURPOSED AREA : INDOOR NURSERY & MARKET SPACE

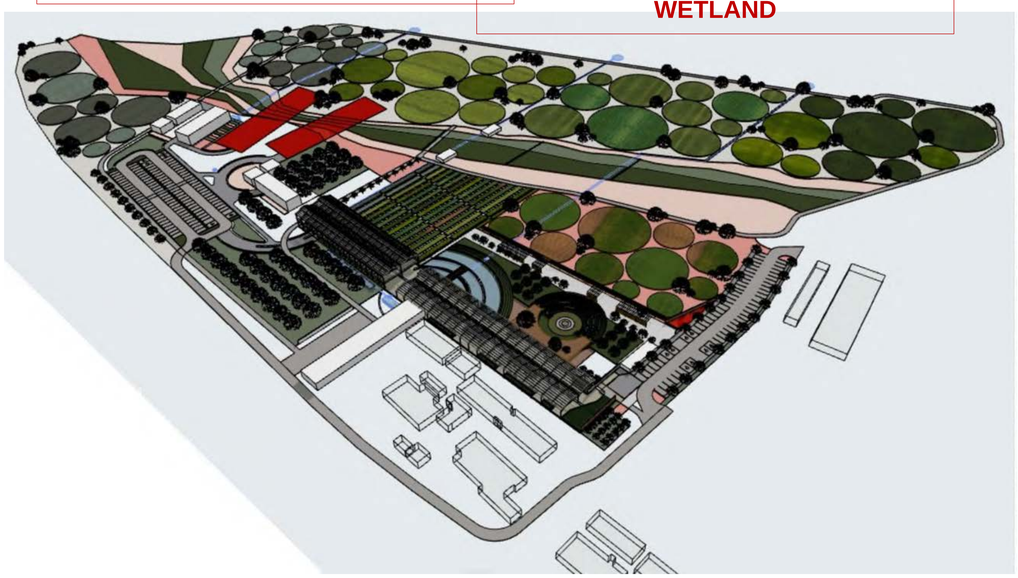
CONSTRUCTED BIODETENTION WETLAND

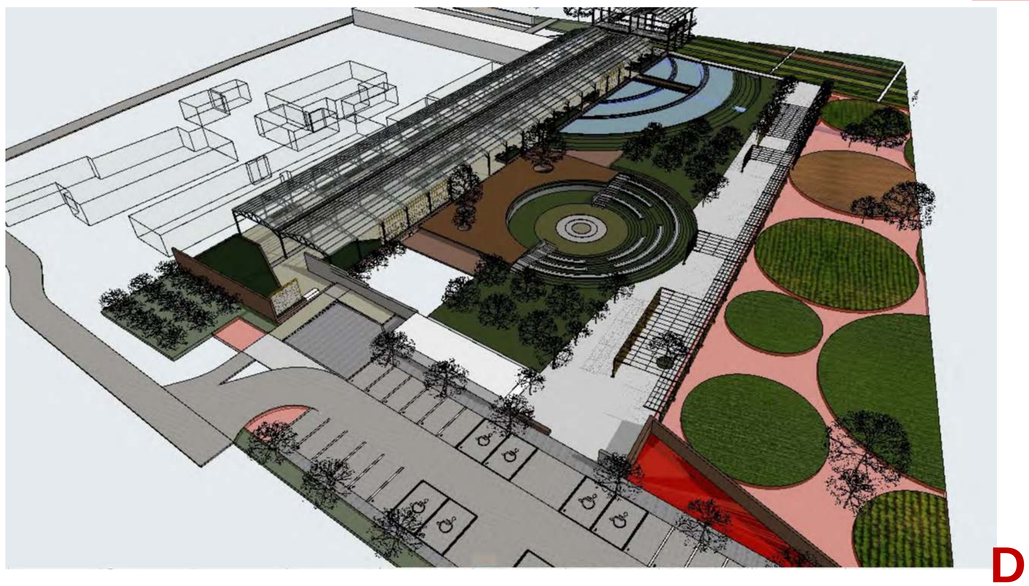
REPURPOSED AREA : MARKET SPACE

AMPHITHEATRE & DECK

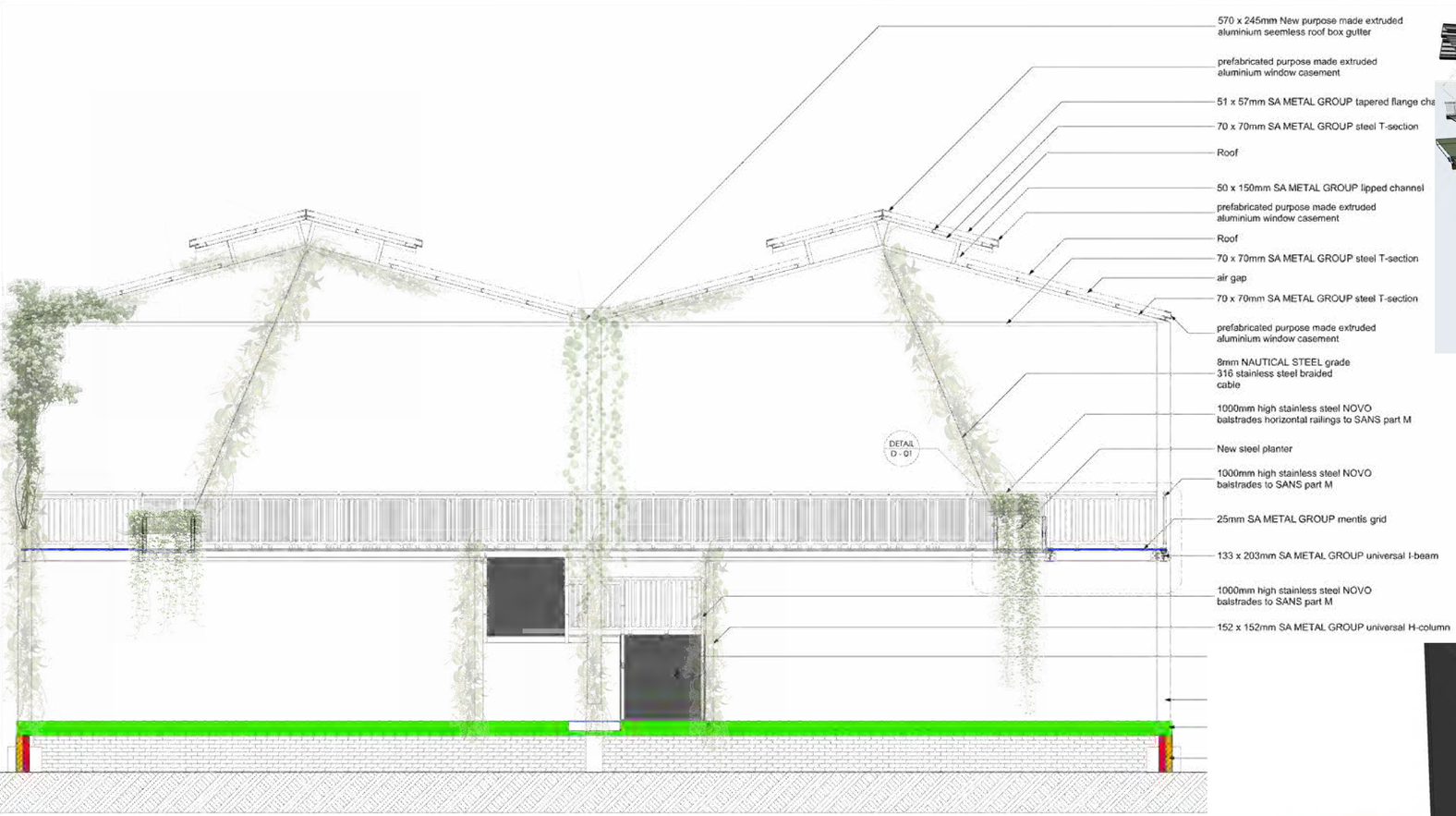
ENTRANCE

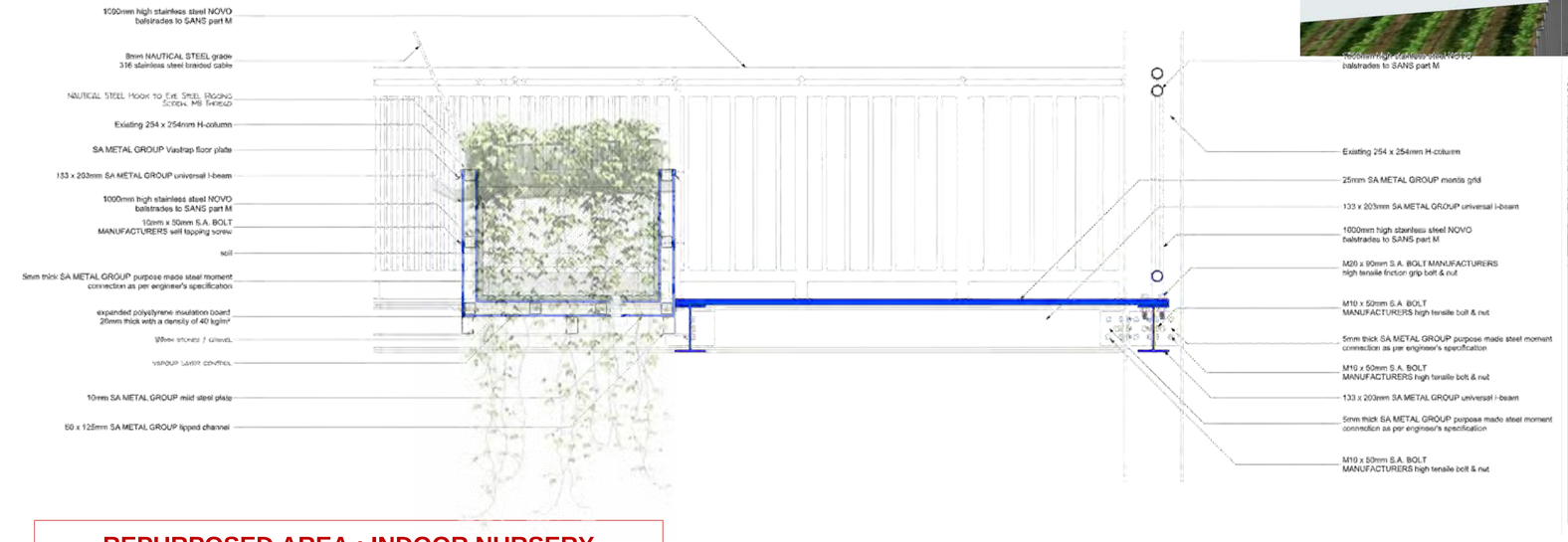
PARKING





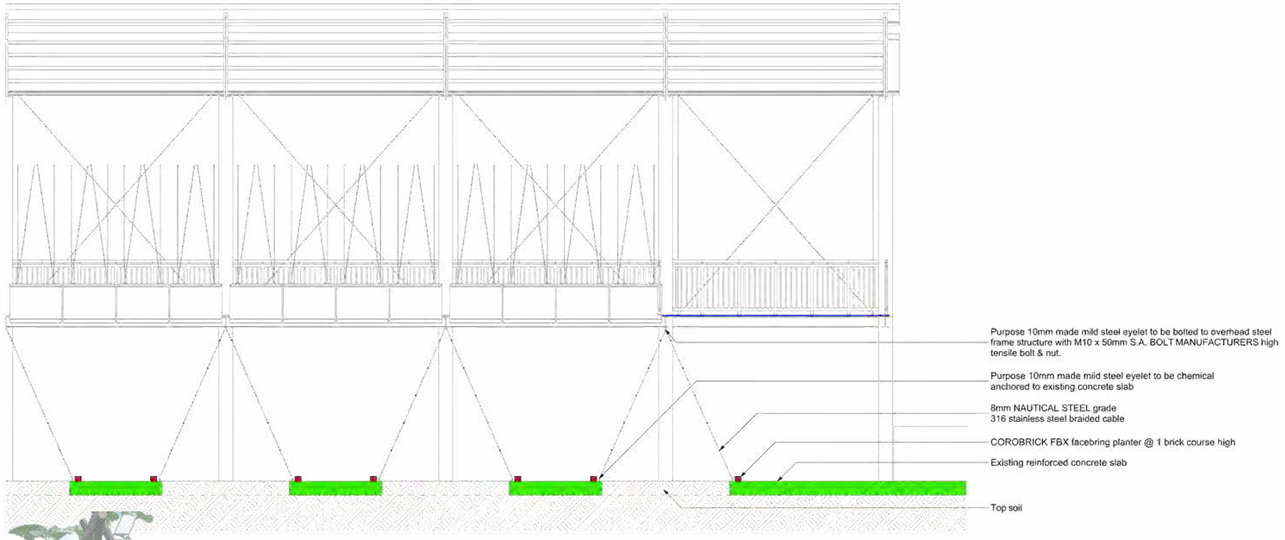
DETAILED DESIGN

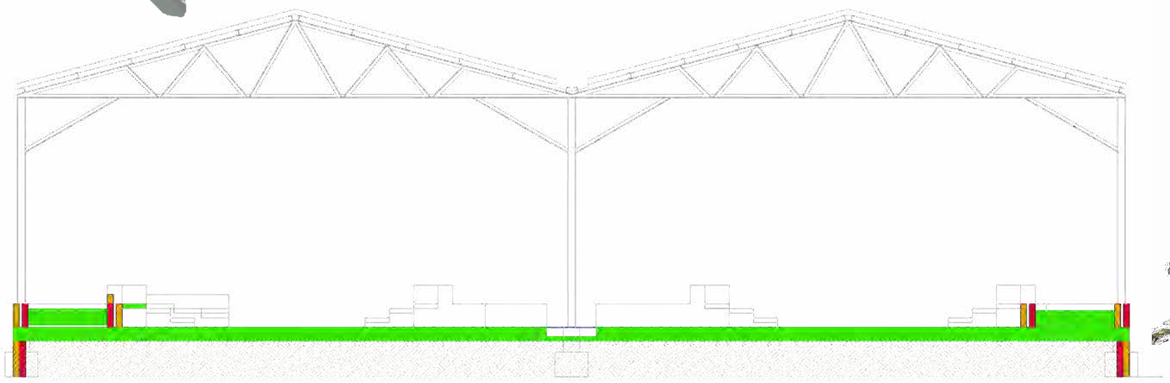




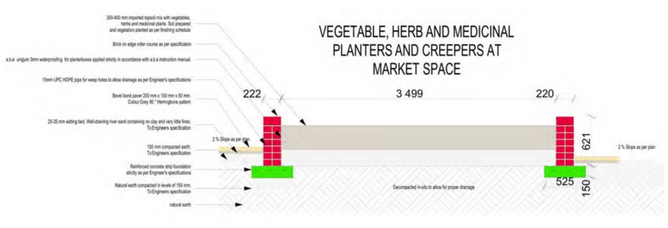
REPURPOSED AREA : INDOOR NURSERY

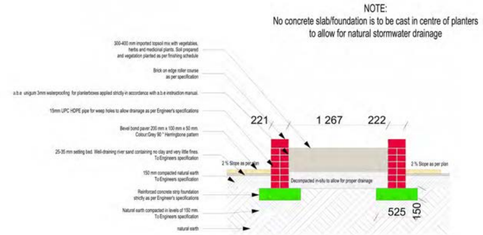
REPURPOSED AREA : INDOOR NURSERY



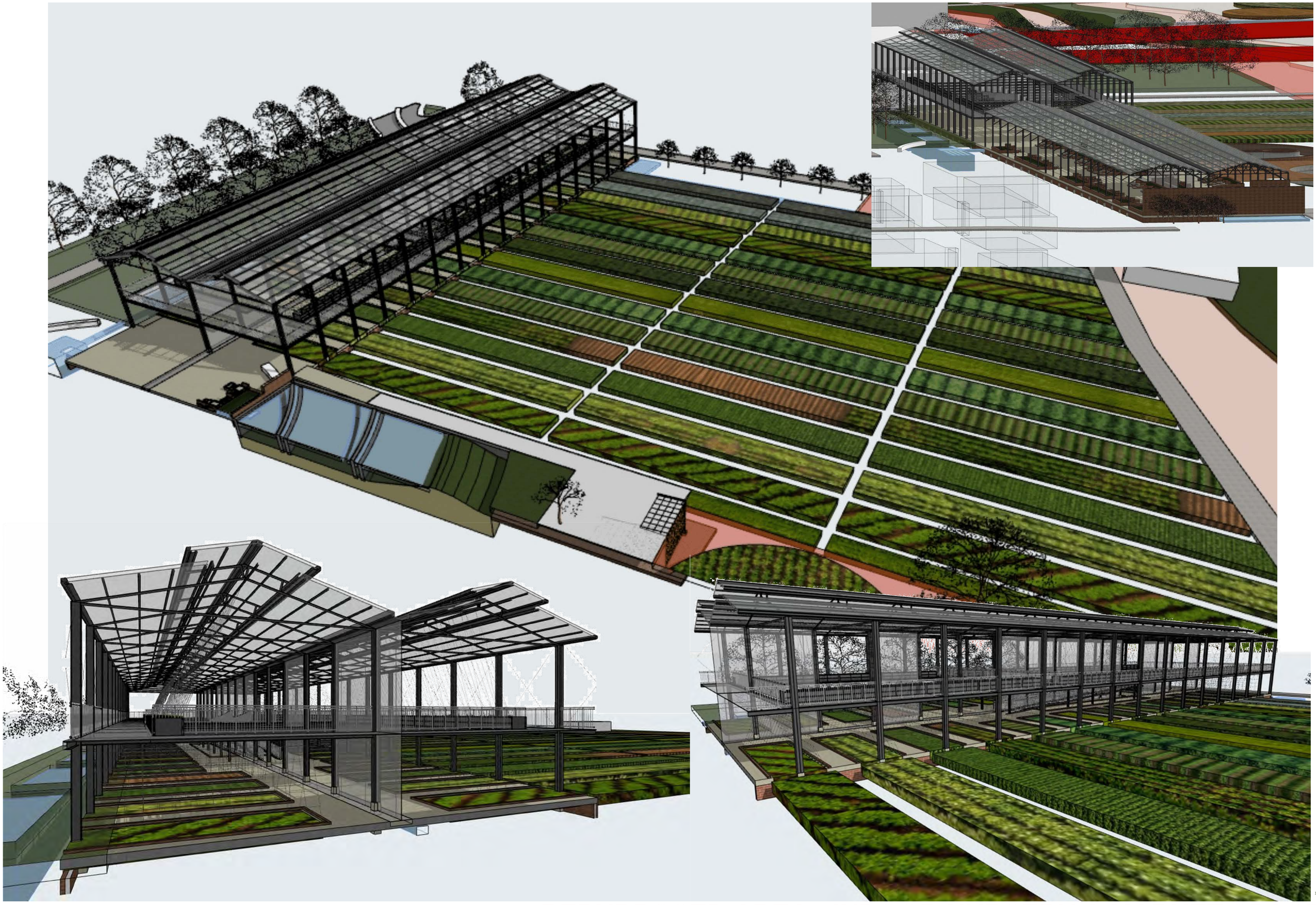


REPURPOSED AREA : MARKET SPACE





REPURPOSED AREA : MARKET SPACE



REPURPOSED AREA : INDOOR NURSERY & MARKET SPACE

TREES

FOOD FOREST

SHRUB LAYER

SEMI-SHADED LAYER

SPRAWLERS

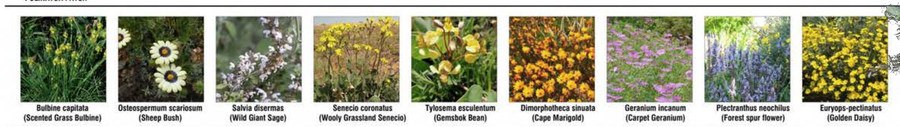
CLIMBERS

HERBACIOUS LAYER

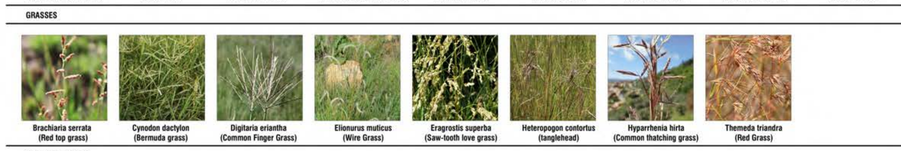
RHIZOSPHERE LAYER

CROPS

POLINATOR PATCH



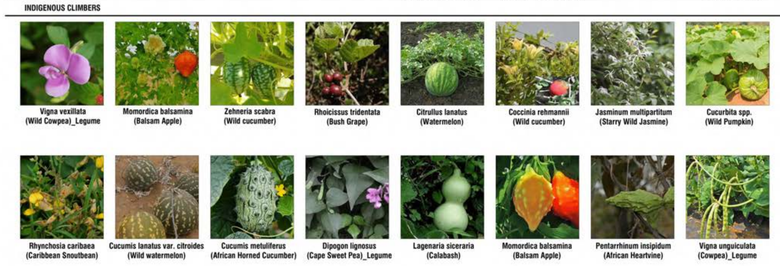
GRASSES

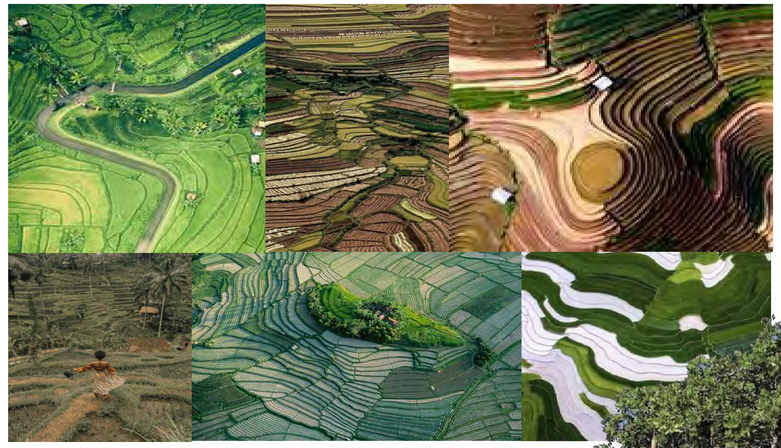


WETLAND SPECIES

EXOTIC CLIMBERS

INDIGENOUS CLIMBERS





STRIP CROPPING

A method of **alternating strips of crops**, usually a combination of erosion-resistant and erosion-prone crops, **along the contours of the land**. According to studies by the World Bank, strip cropping can **reduce soil erosion by up to 75%,** depending on the crop rotation, strip width, and slope gradient. The practice is highly suitable for areas where contour farming alone cannot effectively control erosion, and it often complements other **conservation measures like terracing,** (Choudhary et al., 2024).

Reduces soil erosion Improves water retention Prevents nutrient loss Increases agricultural productivity Mitigates sedimentation Promotes biodiversity Improves soil stability Supports sustainable land use " (Potts et al., 2010)

ENHANCED **POLLINATION SERVICES** (KREMEN ET AL., 2007; POTTS ET AL., 2010)

BIODIVERSITY CONSERVATION (DICKS ET AL., 2016)

ECOSYSTEM **STABILITY** (POTTS ET AL., 2010)

CLIMATE **REGULATION** (HALL ET AL., 2017)

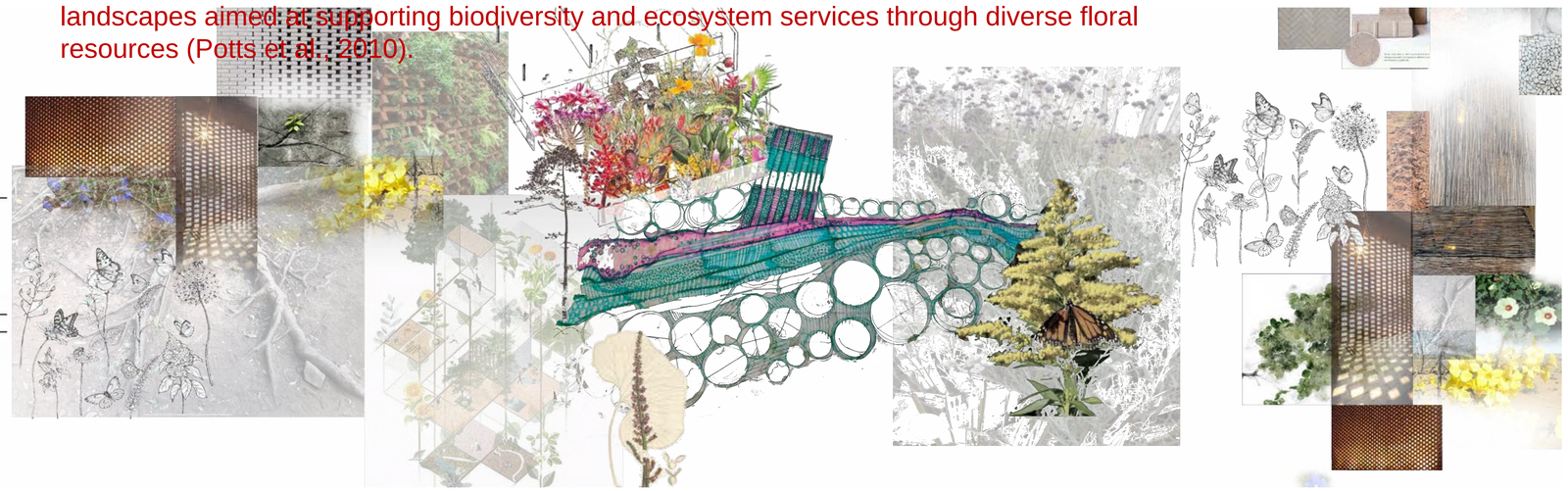
SOIL HEALTH IMPROVEMENT (KREMEN ET AL., 2007)

AESTHETIC & EDUCATIONAL VALUE (DICKS ET AL., 2016)

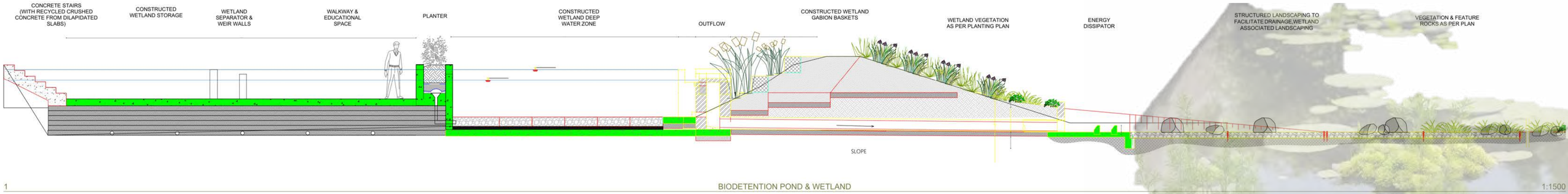
SUPPORT FOR RARE & **ENDANGERED SPECIES** (HALL ET AL., 2017)

IMPROVED WATER MANAGEMENT (POTTS ET AL., 2010)

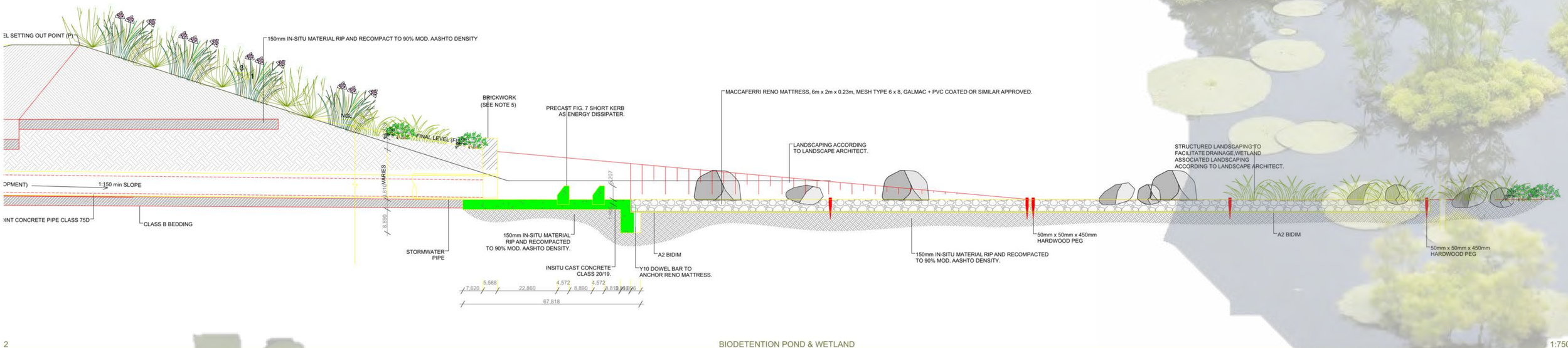
•**"Floral resource patch"** or **"nectar corridor"** are scientific terms that describe managed landscapes aimed at supporting biodiversity and ecosystem services through diverse floral resources (Potts et al., 2010).



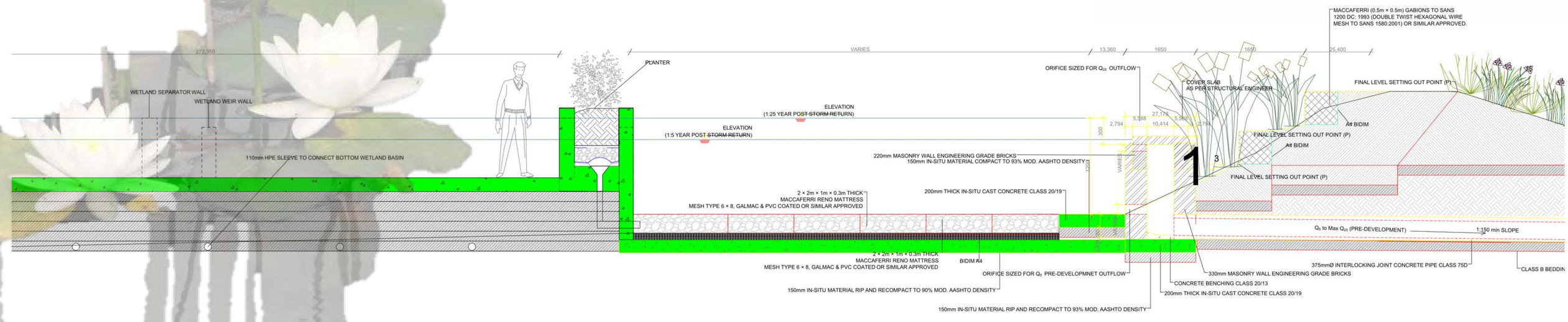
CONTOUR STRIP CROPPING & FLORAL RESOURCE PATCH



1 BIODETENTION POND & WETLAND 1:1500

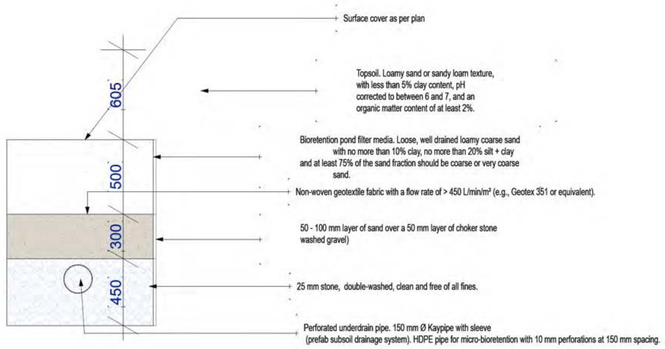


2 BIODETENTION POND & WETLAND 1:750



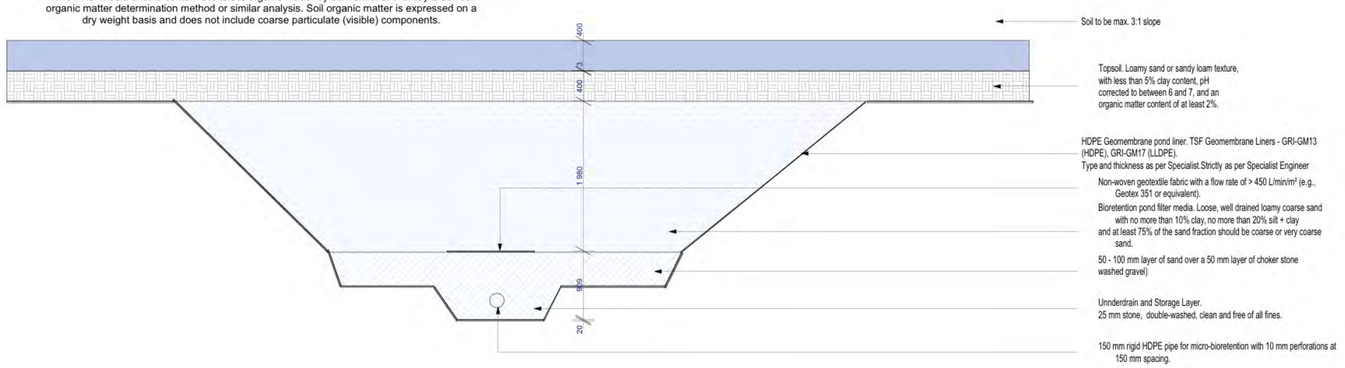
3 BIODETENTION POND & WETLAND 1:750

BIODETENTION & WETLAND POND



TYPICAL BIOSWALE DETAIL

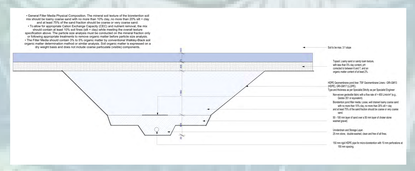
• General Filter Media Physical Composition. The mineral soil texture of the bioretention soil mix should be loamy coarse sand with no more than 10% clay, no more than 20% silt + clay and at least 75% of the sand fraction should be coarse or very coarse sand.
• To allow for appropriate Cation Exchange Capacity (CEC) and nutrient removal, the mix should contain at least 10% soil fines (silt + clay) while meeting the overall texture specification above. The particle size analysis must be conducted on the mineral fraction only or following appropriate treatments to remove organic matter before particle size analysis.
• The Filter Media should contain 3% to 5% organic matter by conventional Walkley-Black soil organic matter determination method or similar analysis. Soil organic matter is expressed on a dry weight basis and does not include coarse particulate (visible) components.



TYPICAL BIOSWALE RETENTIONM POND DETAIL

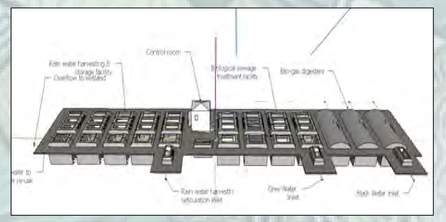
DIAGRAM : WATER TRAVELLING ON SITE (AUTHOR, 2024)

WATER SCARCITY IS A SIGNIFICANT PROBLEM IN EKURHULENI, INTENSIFIED BY POLLUTION AND INSUFFICIENT STORMWATER MANAGEMENT INFRASTRUCTURE. KANOSVAMHIRA (2023) UNDERSCORES THE SIGNIFICANCE OF WATER CONSERVATION IN AGROECOLOGICAL FRAMEWORKS. WATER SCARCITY IS A SIGNIFICANT PROBLEM IN EKURHULENI, INTENSIFIED BY POLLUTION AND INSUFFICIENT STORMWATER MANAGEMENT INFRASTRUCTURE. KANOSVAMHIRA (2023) UNDERSCORES THE SIGNIFICANCE OF WATER CONSERVATION IN AGROECOLOGICAL FRAMEWORKS. THIS PROJECT'S SUSTAINABLE WATER MANAGEMENT STRATEGIES ENCOMPASS BIOSWALES, BIORETENTION PONDS, AND RAINWATER HARVESTING, EFFECTIVELY FILTERING AND RETAINING WATER, HENCE DIMINISHING RELIANCE ON MUNICIPAL SYSTEMS. THIS PROJECT'S SUSTAINABLE WATER MANAGEMENT PRACTICES INCLUDE BIOSWALES, BIORETENTION PONDS, AND RAINWATER HARVESTING, WHICH NATURALLY FILTER AND RETAIN WATER, REDUCING DEPENDENCE ON MUNICIPAL SYSTEMS. BY INCORPORATING STORMWATER INFRASTRUCTURE THAT CAPTURES AND TREATS RUNOFF, THE LANDSCAPE DESIGN MITIGATES FLOODING AND RECHARGES GROUNDWATER, ADDRESSING IMMEDIATE AND LONG-TERM WATER SCARCITY ISSUES (RAYMOND ET AL., 2017).



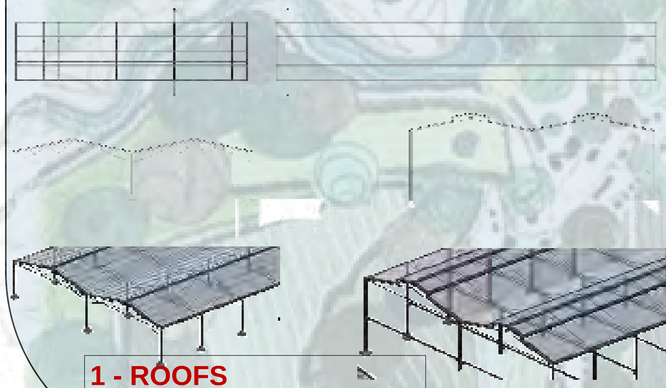
1-3 - BIORETENTION BASIN

2 - RAIN TRELLIS

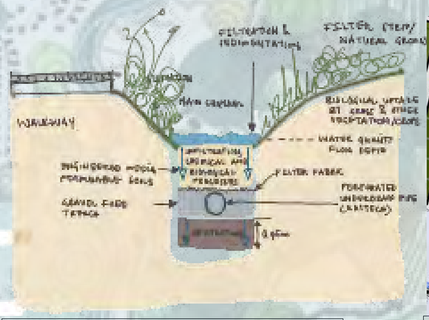


6 - BIOGAS DIGESTER

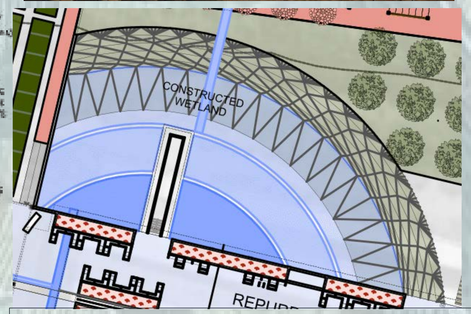
7 - IRRIGATION



1 - ROOFS



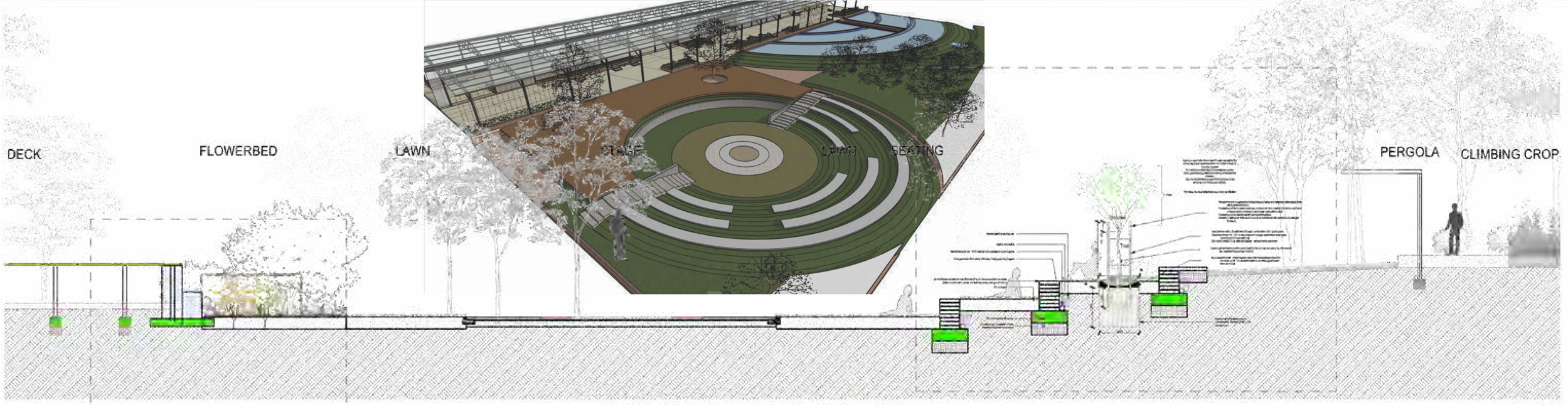
3 - BIOSWALE



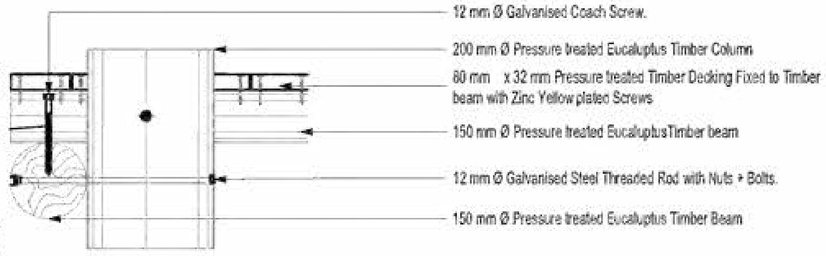
4 - CONSTRUCTED DETENTION WETLAND

5 - STORAGE TANKS

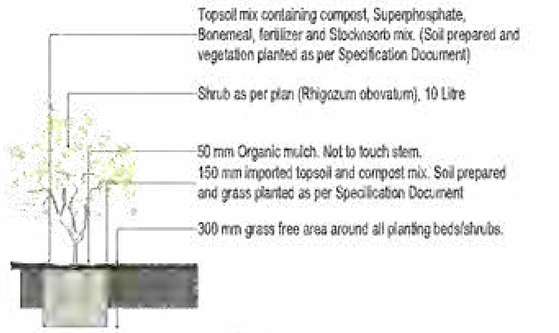
SITE DESIGN - WATER



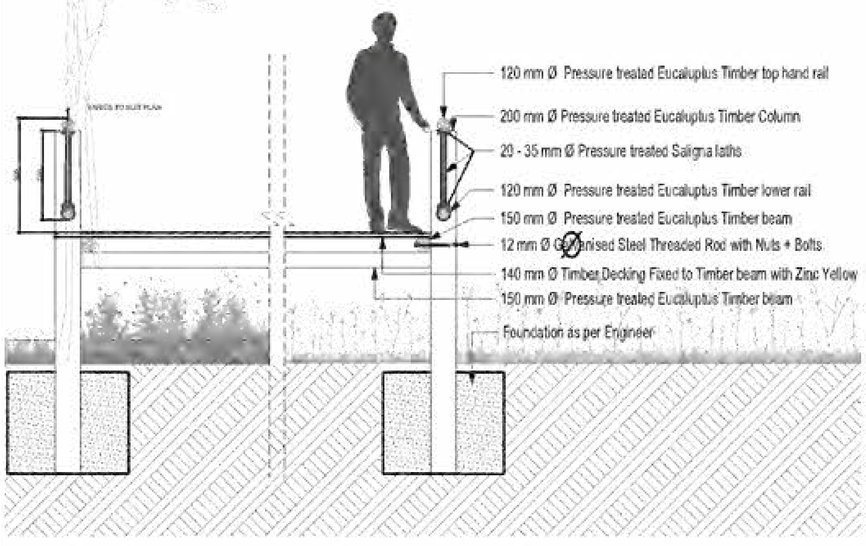
SECTION AMPHITHEATRE & DECK 1:100



DETAIL DECK 1:10



DETAIL SHRUB 1:50



SECTION TIMBER DECK 1:50

Dig a large square hole at least twice the width and depth of the nursery bag (as per specification)The tree in detail is simply for illustration purposes
The installation method stays the same between species.
(trees, groundcovers, graminoids etc varies), unless specified otherwise.
SEE SPECIFICATION DOCUMENT FOR INSTALLATIONMETHOD FOR TREES AND SHRUBS

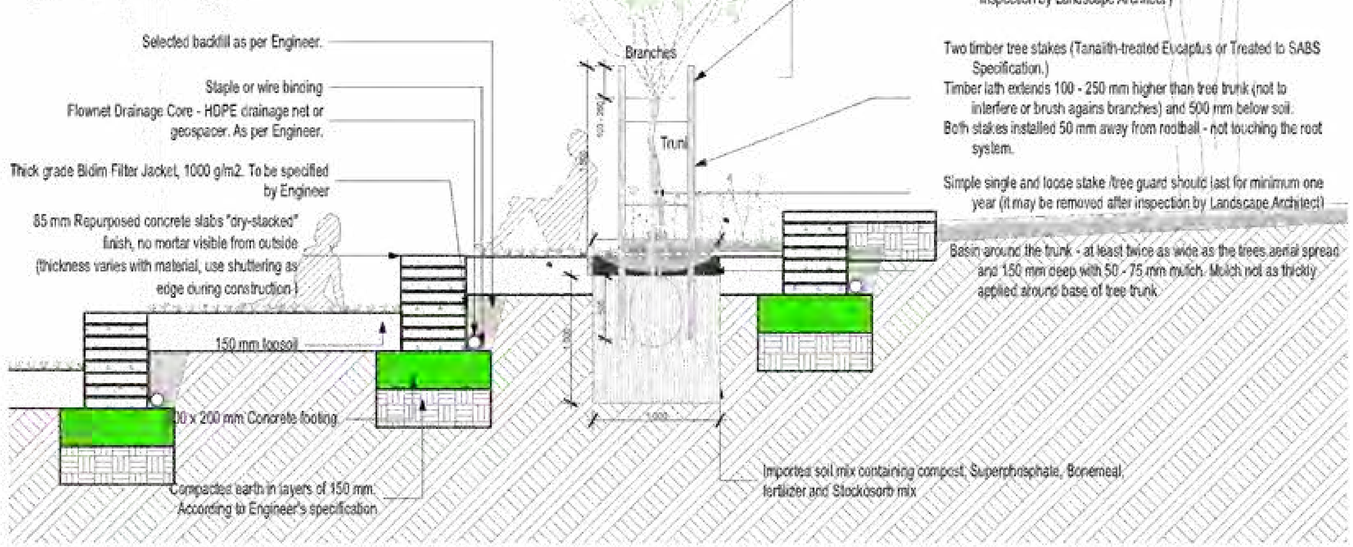
Tree crown, trunk and rootball sizes vary as per Specification

Chainlock tree ties as approved by theSouth African Nurseryman's Association (alternatively Plastic Nylon reinforced tree tie)
The binding must have a broad contact area and must not rub or constrict (the binding must not be done over-tightly) Tree must be able to move lightly with the wind.
The binding must be checked annually and loosened/adjusted.
Anchoring should last for minimum one year (it may be removed after inspection by Landscape Architect)

Two timber tree stakes (Tanalith-treated Eucaplus or Treated to SABS Specification.)
Timber lath extends 100 - 250 mm higher than tree trunk (not to interfere or brush agains branches) and 500 mm below soil.
Both stakes installed 50 mm away from rootball - not touching the root system.

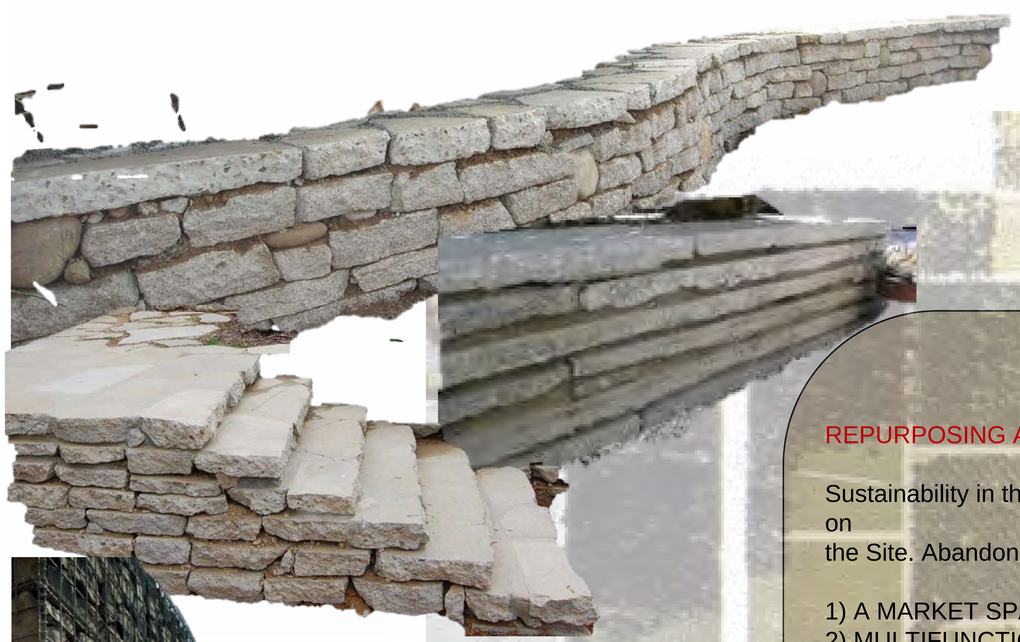
Simple single and loose stake /tree guard should last for minimum one year (it may be removed after inspection by Landscape Architect)

Basin around the trunk - at least twice as wide as the trees aerial spread and 150 mm deep with 50 - 75 mm mulch. Mulch not as thickly applied around base of tree trunk.



DETAIL AMPHITHEATRE 1:50

AMPHITHEATRE & DECK



REPURPOSING AND RECYCLING OF OLD STRUCTURES

Sustainability in the Agro Hub extends to the adaptive reuse of old structures on
the Site. Abandoned industrial buildings are repurposed as

1) A MARKET SPACE,
2) MULTIFUNCTIONAL OPEN SPACE
3) SURFACE FOR PLANTER BEDS
4) CONCRETE SURFACES RE-USED TO CREATE GABION PLANTERS.
5) POLLINATOR GARDEN EDUCATION SPACE WITH HISTORY OF RAILWAY

Adaptive reuse conserves resources and energy, as demolishing and constructing
new buildings would entail significant environmental costs. According to the Sustainable Sites Initiative (SITES, 2019), repurposing minimises resource use,
reduces waste, and preserves the cultural character of the area. By preserving historical architecture, the Agro Hub minimises its carbon footprint while honouring
Germiston's industrial background, harmonising past and present through deliberate landscape architecture (Friedman, 2007).

This adaptive reuse strategy corresponds with the UN's Sustainable Development
Goals about responsible consumption and production, highlighting effective resource utilisation and the reduction of environmental impact. Repurposed structures also serve as educational examples, illustrating sustainable building practices and reinforcing the Agro Hub's role as a model of urban sustainability.

REPURPOSE CONCRETE SLABS INTO:

- FOUNDATIONS
- MARKETSPACE SEATING
- AMPHITHEATRE SEATING
- GABION STRUCTURES

REPURPOSE ON SITE MASONRY INTO:

- MARKETSPACE PLANTERS
- ENTRANCE PLANTERS
- ENTRANCE WALLS
- CONSTRUCTED DETENTION WETLAND

REPURPOSE STEEL STRUCTURES INTO:

- PERGOLAS
- CLIMBING GRID
- RAIN TRELLIS
- STEEL ROOF STRUCTURE

SITE DESIGN - MATERIALITY

Pergola

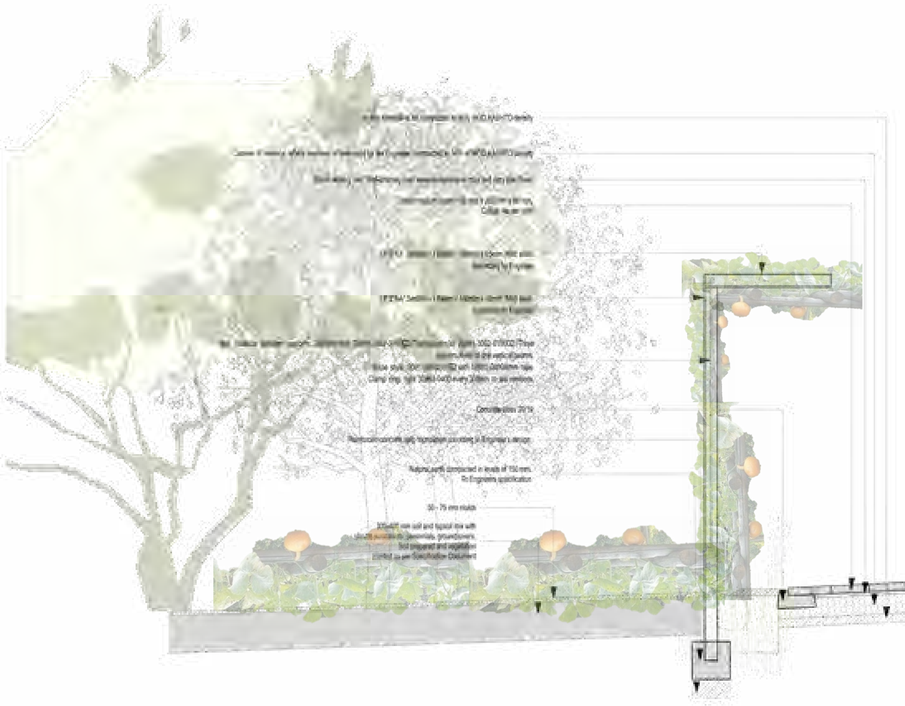
Pergola

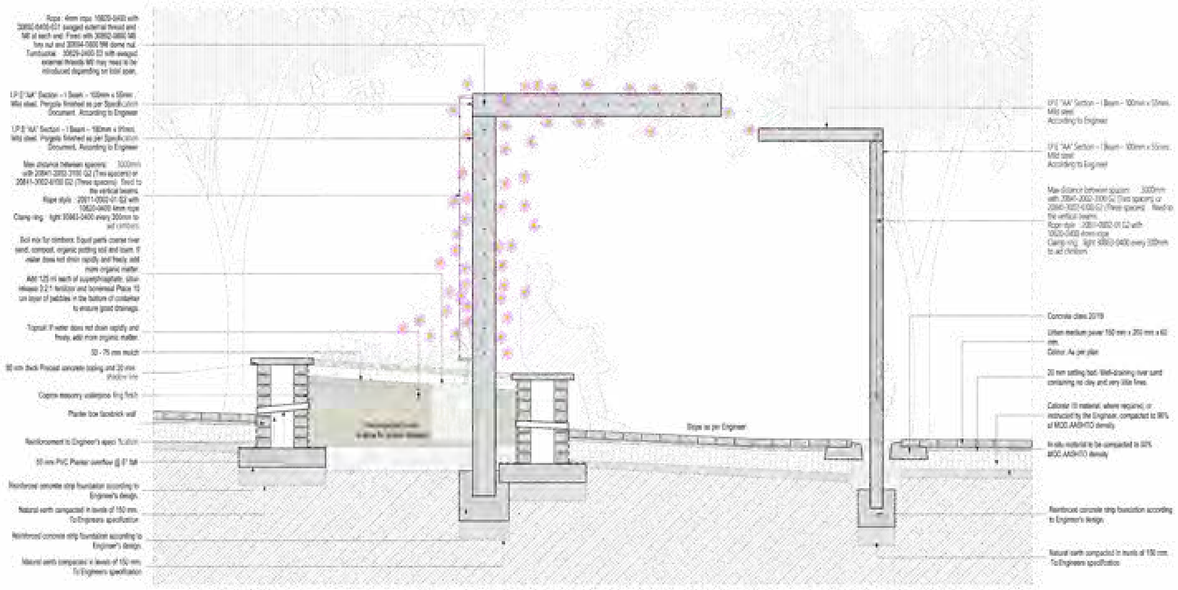
Walkway

Tree &
Flowerbed in
Paving

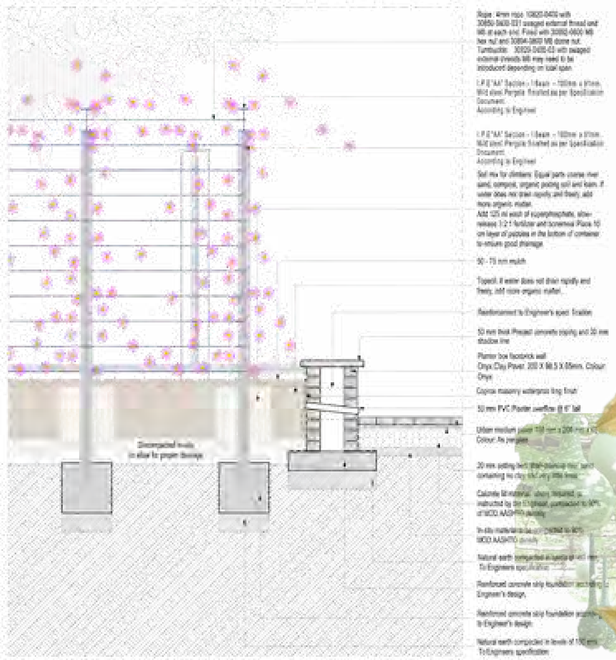
Pergola
Recycled
Steel Pergola

Crops





DETAIL 06 PLANTER SEATING & PERGOLA
SCALE : 1:20



DETAIL 07 PLANTER SEATING & PERGOLA
SCALE : 1:20

CLIMBERS


Rhynchosia caribaea


Cucumis lanatus var. citroides


Cucumis metuliferus


Dipogon lignosus


Lagenaria siceraria

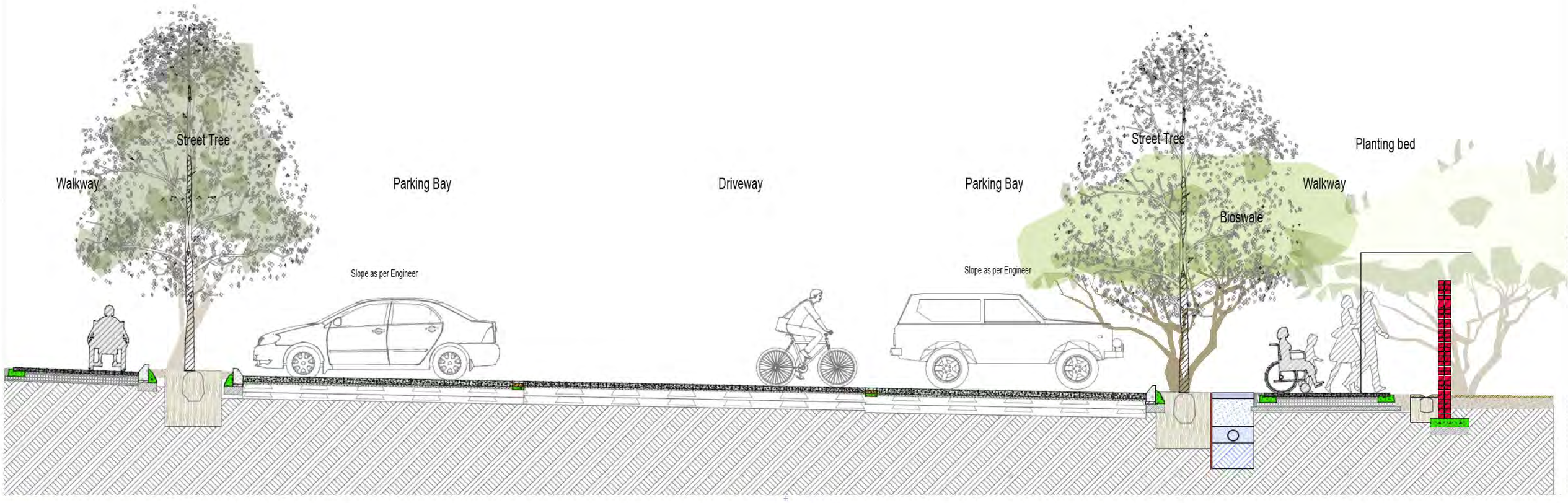

Momordica balsamina


Pentarrhinum insipidum


Vigna unguiculata


Vigna vexillata

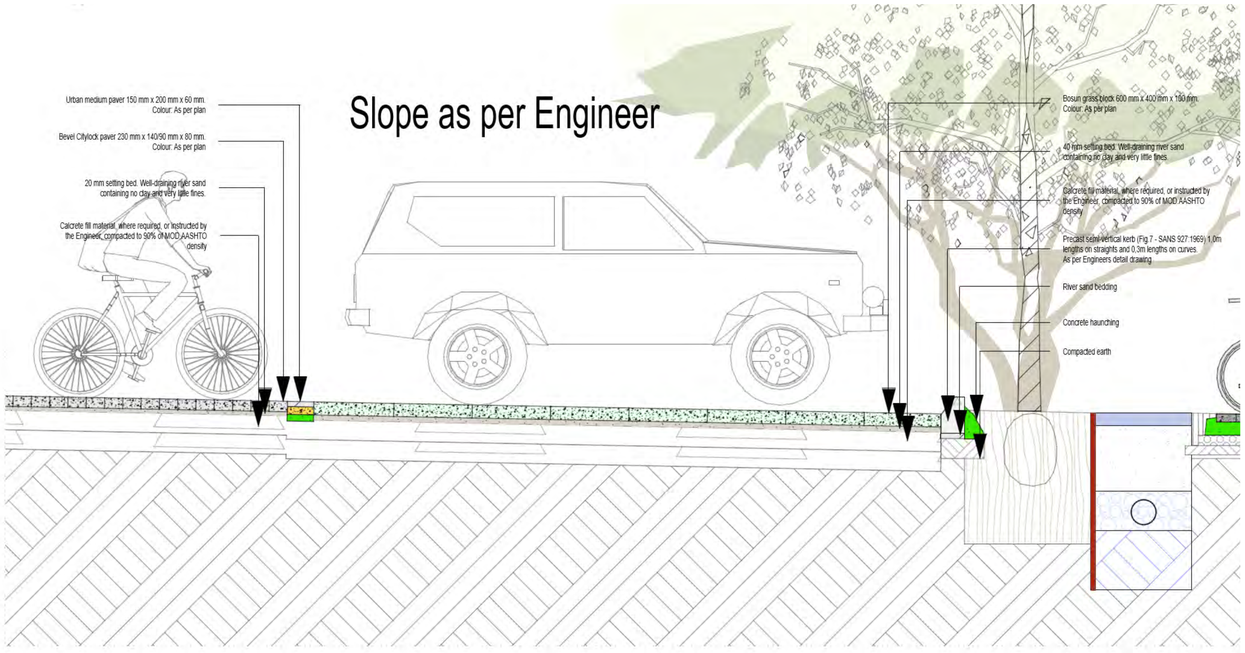
ENTRANCE



SECTION

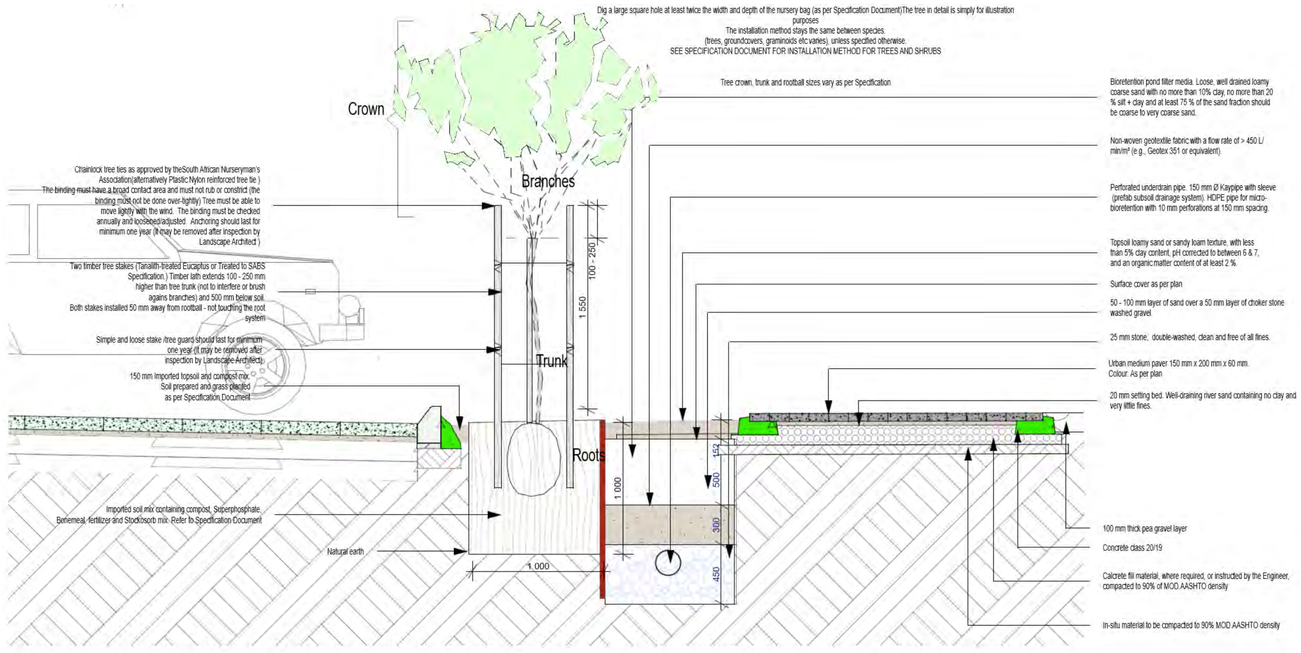
PARKING & ENTRANCE

1:35



DETAIL

PARKING



DETAIL

TREE + BIOSWALE IN PARKING & PAVING

1:25

PARKING @ ENTRANCE