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A Conservationist Menagerie: Redefining The Johannesburg Zoo Through A Multi-Species Educational Facility

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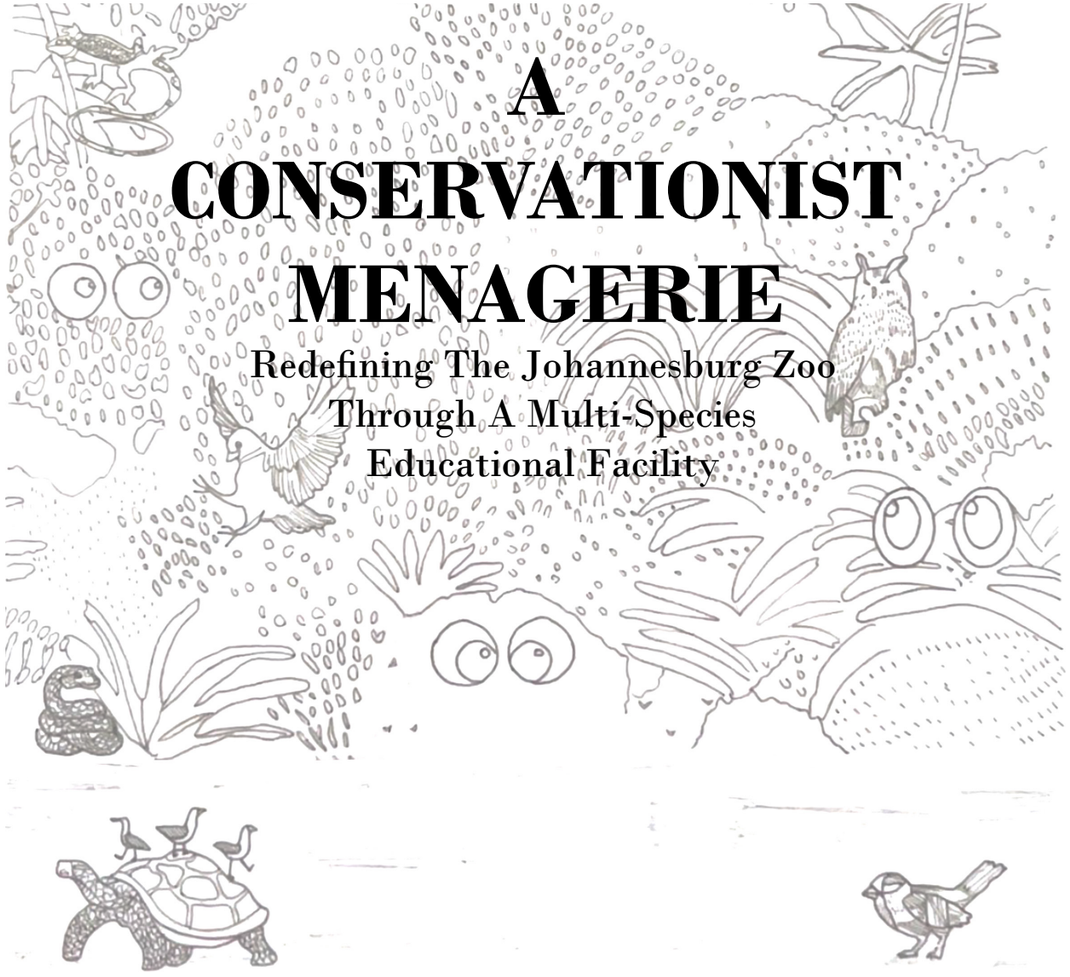

A
CONSERVATIONIST
MENAGERIE
by Anneline Jacob

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Ajacob

Anneline Jacob
27 February 2025



A CONSERVATIONIST MENAGERIE

Redefining The Johannesburg Zoo Through A Multi-Species Educational Facility

Anneline Jacob | 1901368

This document is submitted in partial fulfillment for the degree: Master of Architecture (Professional) at the University of the Witwatersrand, Johannesburg, South Africa, 2024.

"Any glimpse into the life of an animal quickens our own and makes it so much larger and better in every way."

John Muir
Book of Animals
2015

For Mom

Conservationist Menagerie

(noun)

A sanctuary where all animals are cherished.

Abstract

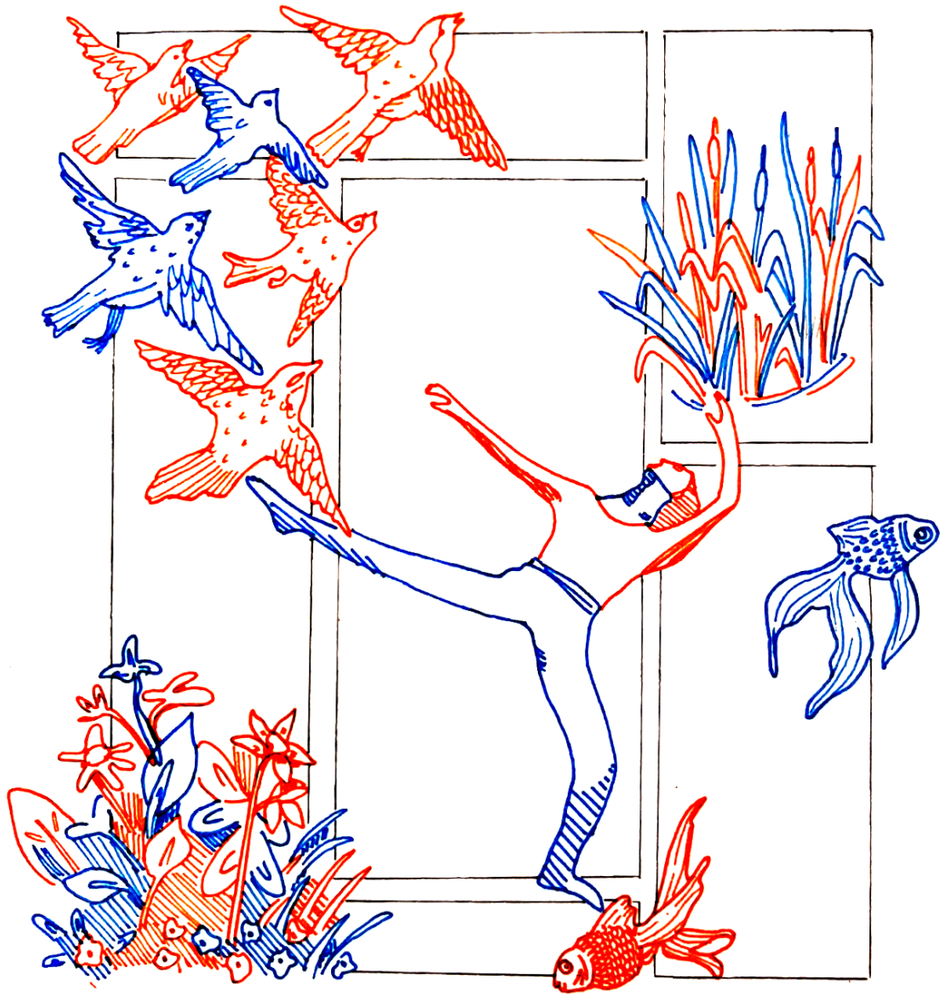
This architectural project seeks to rectify the injustices that the human-wildlife conflict has had on captive, injured and displaced wildlife and their welfare. Throughout the years human have exerted their dominance over wildlife and the current relationship between humans and animals is described as hierarchical and demonstrates a power dynamic whereby humans view themselves as superior to wildlife. This dynamic and the absence of animals which used to be a part of daily life has resulted in a lack of tangible experiences between species resulting in a knowledge gap and poor understanding of animal welfare.

This research project will explore the relationship between humans and wildlife in the context of the Johannesburg Zoo which has faced increasing disapproval from the public as its current design fails to provide adequate landscape habitats and ecological aware facilities for animals, thereby decreasing the educational value and overall experience for the animals and visitors, threatening the welfare of the animals. The zoo represents the ideal testing environment due to its possession of animals in stimulated environments. As one of the largest sites that house wildlife within an urban landscape, it facilitates daily human interactions and is the ideal space to observe co-habitation and multi-species relationships. This will facilitate the development of an alternative zoo model which aims to draw lessons from the precedent "Multispecies Design" by Daniel Metcalfe to influence a shift in the power dynamic by creating interactions that will promote respect between humans, wildlife and nature. This will facilitate reconciliation enabling learning so that humans and animals develop a kinship that fosters coexistence and coadaptation to eliminate conflict and captivity, building wildlife welfare and maintaining resources for future use.

The research will be directed through an explorative approach that will include a series of photographs, mapping, and research tabulations to gain an understanding of wildlife habitats and how they may be adapted and recreated in the urban landscape. The research will make use of film and comic-like graphics to illustrate the design and spaces representative of a utopian world, which may be created but has not been accomplished yet.

Figure 0.1 & 0.2:
Cover Page & Inside Cover.
(Collage created by Author, 2024; adapted from Anjjaemi, 2023; AntiquePrintMarket, n.d; "Bird in flight drawing", n.d; Demuro, 2014; Jiang, n.d; Ledesma, 2019; Majewski, 2021; Molly, 2022; and Sudowoodo, n.d)

Figure 0.3:
The newfound excitement and freedom in fostering a deeper relationship between humans and animals.
(Collage created by Author, 2024; adapted from Cairns, 2018; "Cattails in Pond 1352G", n.d; Cisco, n.d; Duarte, 2022; and "Flying Birds Free Background Sheets Swallows Bluebirds Robins Starlings Blue Jay", 2014)



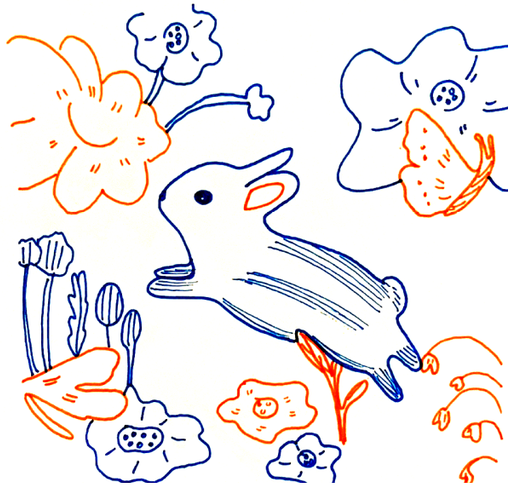


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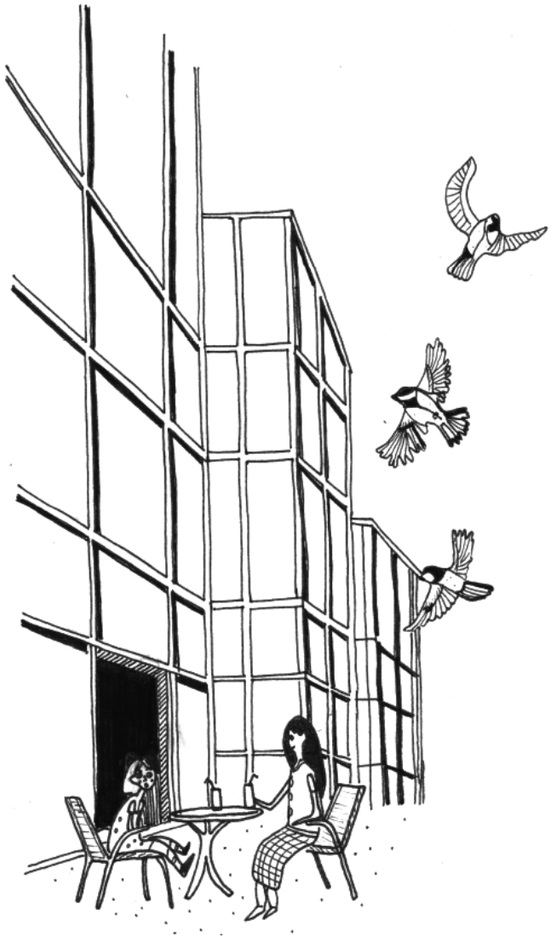
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On a sunny day, a girl sat at a café with her mom, enjoying the sight of birds soaring high above. She noticed one bird with bright blue feathers that seemed to be playing a game of catch with the wind.

1.
Preface

Introduction to Research

In recent years, the human-wildlife conflict has become a widespread issue debated across the world. The conflict arises when the needs and behaviours of humans negatively affect natural wildlife habitats and welfare. This is a direct link to human dominance, which has produced rapid urbanization rooted in human population growth, increased agriculture to sustain this demand, and increased infrastructure. As the demand for resources grows, the frequency and intensity of such conflicts increase as humans assert dominance and begin to encroach onto wildlife habitats. As a result, the populations of those animal species are forced to evacuate to unsafe landscapes where they can be hunted, captured, and traded. These animals are often unable to adapt to these altered habitats and decline in numbers.

In previous years the human-wildlife conflict has been aided by the establishment of zoos and updated conservation parks in urbanized areas, which embraced the protection and care for wildlife to curb the decline and extinction of animal species. These zoos according to (Spooner, 2023), ideally represented four pillars namely, conservation, education, research, and recreation to create a balanced environment for multispecies development. However, in recent years zoos and parks alike have failed to adapt to these pillar requirements and have failed to represent the advancements in species and society. This has led to disinterest among humans with zoos receiving vast criticisms of poor living conditions, neglect, abusive treatment, and the depression of kept wildlife. This has driven the human-wildlife conflict further as zoos remain stagnant, preventing sufficient education and awareness around animals and their biological and physical needs. Allowing humans to retain their dominance over animals hindering their growth, habitats and well-being (Spooner et al, 2023).

This research topic was chosen to preserve the livelihood of humans while ensuring the welfare of wildlife. This study aims to reflect on the criticisms faced by zoo and parks to rebuild the pillars of education, conservation, research and recreation to represent the present day urban environment with the aim of changing zoos from keeping animals to rescuing and rehabilitating them enough to return to the wild. Spooner (2023) explains that a new zoo model should allow humans to interact with wildlife animals in a way that exposes and educates them on the protection and care of the animals.



Figure 0.4:
Free rabbit jumping over the flowers
(Drawing by Author, 2024; adapted from Binney, 2023)

Figure 1.1:
Short story panel 01
(Drawing by Author, 2024, adapted from Aksol, 2019; Asmakar, 2020; and Royan, 2013)

Figure 1.2:
Location of Johannesburg Zoo, in relation to major cities and contrast of green/ animal spaces versus city/ human spaces
(Author, 2024)



Therefore, this study will conduct its research within the Johannesburg Zoo. The zoo represents the ideal environment to build upon due to its possession of animals in stimulated environments. As one of the largest sites that house wildlife within an urban landscape, it facilitates daily human interactions and implements conservation policies. Due to this the zoo is the best space to observe co-habitation and multi-species relationships while addressing concerns of sustainable animal awareness and welfare within the urban landscape.

The research document will present its findings and new model suggestion as a short graphic novel layout, with traditional structure. The story will be woven through various chapters with a narrative element that introduces a playful, imaginative layer, inviting readers to explore the new world of human and wildlife co-existence. The document's visuals are inspired by comic art, and emphasize the evolving relationship between humans and animals. Initially, the reader will experience both species as unidentifiable figures, with them gradually becoming more distinct and recognizable as the relationship deepens and the story unfolds. This transformation is echoed in the colour scheme, which shifts from stark black and white to vibrant blue and orange, symbolizing a journey from a high-contrast, two-dimensional view to a richer, more colourful understanding of co-existence.

The new model put forward through this research study will aim to generate a multi species environment reflective of natural wildlife habitats that supports animals and allows humans to experience them in organic environments, with their eventual release back to free living. Through this, zoos will able influence society on all levels encouraging learning so that humans and animals develop a kinship that fosters coexistence and coadaptation to eliminate conflict, build wildlife welfare and maintain resources for future use.

Research Aim

This research aims to examine the core pillars of zoos namely conservation, education, research, and recreation, within the urban environments. It seeks to explore how the current stagnation of zoos, as described by Spooner (2023), has prevented progress in fostering positive relationships between humans and animals. Through deconstructing the traditional dynamics of human-animal interaction in zoos, this study aims to develop a new, mutually beneficial framework that prioritizes animal welfare over entertainment. The research aims to develop a new framework for zoos that emphasizes rehabilitation and the reintroduction of captive animals into protected natural habitats that aims to promote progressive evolution and safeguard endangered species. The research seeks to transform the zoo visitor experience shifting the focus of the dominant gaze to that of education and interconnectedness. This approach seeks to reduce the focus on human entertainment to enhance public understanding of animal welfare, and cultivate a vested interest in maintaining healthy habitats for wildlife, eradicating the need for animal captivity. Through this, the research intends to reduce human-animal conflict, fostering a harmonious coexistence and coadaptation between humans and wildlife.

Main Objective

To reimagine a new framework for zoos that prioritizes animal welfare, conservation, and education, shifting away from entertainment-based practices to foster a mutually beneficial relationship between humans and wildlife, that promotes rehabilitation in the context of modern urban environments.

Sub Objectives

- To assess the current state of zoos and identify the shortcomings in meeting the four foundational pillars of conservation, education, research, and recreation.
- To evaluate zoos' role and value in the current socio-cultural context, in relation to animal welfare standards.
- To deconstruct the existing human-animal relationship in zoos and explore potential systems of change that would promote animal welfare over human entertainment.
- To explore the potential of a new zoo model that eliminates traditional enclosures and introduces captive animals into protected natural habitats, ensuring both animal welfare and progressive evolution.

Methodology

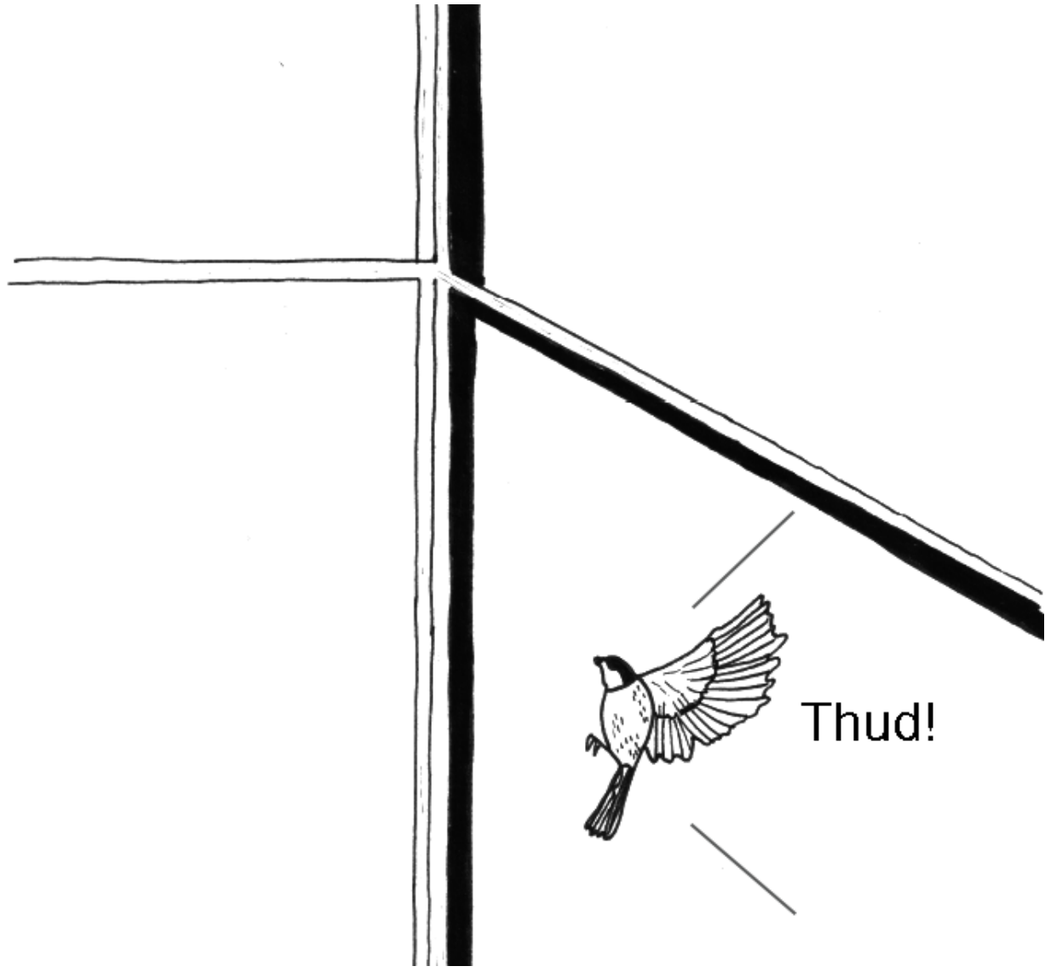
The methodology used in this study incorporates qualitative research and data collection methods to explore the core themes of wildlife welfare and the potential for architectural interventions in zoos.

Data was gathered from research journals, books, articles, and other educational resources to examine different perspectives on wildlife welfare theories and conservation actions. This review of existing literature allowed for an understanding of varying opinions and helped identify how these theories could be applied to a practical architectural design. Through comparing related precedents and evaluating their success, the study aimed to inform the design approach for zoos in urban environments.

A qualitative research approach was employed to gather additional insights with representatives from several conservation organizations. This provided an understanding of both the challenges and ongoing efforts in the field, as well as the practical aspects of animal care and the everyday functioning of conservation spaces. This research study made use of interview surveys to collect data from the responding organisations. The questionnaire was prepared with open-ended questions and was administered both online and in person. In addition, the analysis of existing materials such as academic journals and books highlighted the negative effects of traditional zoo enclosures and poor animal welfare, which were critical in shaping the study's overall objective and the proposed architectural intervention.

Qualitative data was also collected through surveys and observations to assess the current dynamics of human-animal relationships in zoos. This analysis aimed to identify how these relationships can be altered and improved through specific architectural tools such as viewpoints, materiality, and spatial design. Various precedents were studied to explore how these tools have been applied effectively in similar settings. The combination of these methodologies allowed for a comprehensive understanding of the issues at hand and provided a foundation for developing a new, more humane and effective zoo model.

All the respondents signed consent forms before participating in the research. The confidentiality of respondents will be respected to keep the research unbiased.



Suddenly, a loud thud interrupted their peace—the blue-feathered bird had collided with the large glass window of a nearby building

2.
Taming the Wild

Taming the Wild

In the early ages humans and animals existed side by side and maintained a close relationship that developed due to consequential co-dependence. This close proximity provided in-depth knowledge among the species and allowed for meaningful and tangible experiences fostering a mindset of tolerance and acceptance. However, in recent years the human-wildlife relationship has turned into conflict and is now a global concern in both the conservation and built environment fields. The conflict rose as humans progressed and the demands of a growing population grew greater, as humans begun to set themselves up for the mass production of food and shelter to cope with the increasing demand of their population, they expanded into the natural environment, and animals became livestock that were hunted, confined and controlled. This saw the once co-dependent personal relationship shift to alienation and where human dominance was exerted over animals often leaving wildlife and domestic animals displaced or endangered as urbanisation flourished.

According to Ainsile (2002), as the human population continued to rise and the demand for resources grows, the intensity and frequency of such conflicts increased leading to negative and undesirable consequences for both humans, wildlife and nature as all species competed for resources. The current relationship between humans and animals is described as hierarchical and demonstrates a power dynamic whereby humans view themselves as superior to wildlife. This dynamic and the absence of animals which used to be apart of daily life has resulted in a lack of personal tangible experiences between species causing a gap in understanding as all learned behaviour and knowledge has become conceptual through literature, television and controlled interactions forcing humans to accept this habit of seeing the world, nature and animals. This approach has caused detachment from animals and wildlife as they are now perceived to be external from human society and only valued as a resource. To eliminate this dynamic and perceived detachment coexistence must reform, whereby humans and wildlife must co-adapt to living in shared landscapes that foster multispecies urbanisation with shared resources and preservation for the future (Ainsile, 2002).

In previous years the human-wildlife conflict was fuelled through the establishment of zoos. Zengin (2019), explains that zoos were among the sites where the power relations between humans and animals became apparent as human dominance and

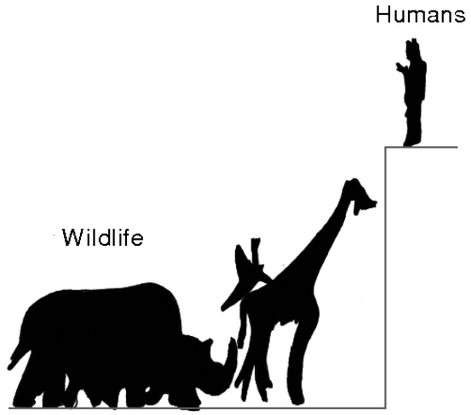


Figure 2.1:
Short story panel 02
(Drawing by Author, 2024 adapted from Aksol, 2019)

Figure 2.2:
The human perspective of power over animals
(Drawing by Author, 2024 adapted from "How Does Language Make Humans Different?", n.d)

Figure 2.3:
Effects of humans'power result in the death of animals and the destruction of their habitats
(Wood, 2016)



power were normalized and informed by the ideology of speciesism as it gave consent over the capture, confinement, trafficking, and breeding of animals by humans, making animal captivity justified. However in recent years, the focus of zoos have been reformed to aid the human-wildlife conflict through updated conservation parks in urbanized areas, which embraced the protection and care for wildlife to curb the decline and extinction of animal species in the hopes of minimising the effects of human dominance in the past.

These zoos according to Spooner et al (2023), should ideally represent four pillars namely, conservation, education, research, and recreation to create a balanced environment for multispecies development. Zoos were once viewed as the pivotal contributor to animals wellness. As Boyle (2017), states that zoos sought to not only entertain and educate their visitors, but also to conserve and sustain threatened species and support other welfare organisations (Boyle 2017). Though in recent years zoos and parks alike have failed to sustain to the four pillar requirements and have failed to represent the advancements in species and society. This has led to the deepening of the human animal conflict and disinterest among humans around the exploitation of animals. Due to this zoos have received vast criticisms of poor living conditions, neglect, abusive treatment, and the depression of kept wildlife.

The zoos and conservation parks alike have failed to adhere to the main goal of caring for their animals in the best possible way, as the focus is on entertainment for visitors and less on education, the institutions struggle to help to conserve wild populations beyond their structural walls. This is

fuelled by zoo infrastructure and technology not progressing at the same level of the urban environment, it remains stagnant, preventing insufficient education and awareness around wildlife adding to the conflict between humans and animals thereby hindering animal well-being (Spooner et al, 2023).

In order to preserve the livelihood of humans and the welfare of wildlife animals, it is critical to reflect on the criticisms faced by zoo and parks to rebuild on the pillars of education, conservation, research and recreation to represent the present day urban environment and decrease conflict. Spooner (2023) explains that a new zoo model should consider urbanisation and incorporate technology to create an immersive environment that allows humans to interact with wildlife animals in a way that exposes and educates them on the protection and care of the animals. The new model should create a multi species environment reflective of natural wildlife habitats that supports animals in a free environment, while allowing humans to experience this.

The new model will seek to explore the eventual free roaming of animals discouraging captivity with the aim to integrate animals back into naturalist environments through designing controlled built environments as similar as possible to their natural counterparts eradicating captivity. It aims change the function of zoos from housing and breeding animals to rehabilitating them and preserving their species for future generations. It aims to increase the welfare of animals while fulfilling their needs and improving their lives. To achieve this zoos enclosures and animal habitats need to be examined from its evolution to its current state in order to understand how best to serve animals and support their welfare. The site for this study will be the Johannesburg Zoo. The zoo also holds a rich historical and social presence within the city, from its humble beginnings of a menagerie with few animals to a well-functioned, well-visited zoo by both tourists and locals, it poses a great opportunity for change and influence over the cityscape. Therefore, this site was chosen as its existing power dynamic between animals and humans in an urban context will allow us to examine the current relationship and develop a symbiotic relationship to better animal welfare and educational awareness.

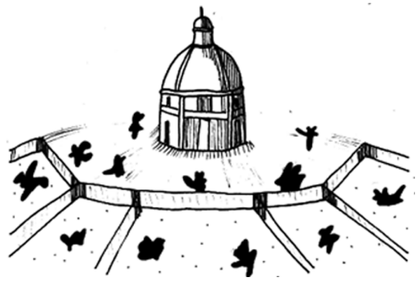
This essay examines zoo enclosures from the formation of zoos through to its current environment within the Johannesburg Zoo. It explores the three animal welfare concepts against three scenarios of captivity spatially identify current enclosures that within the chosen site that facilitates human dominance, to enable learning so that humans and animals develop a kinship that fosters coexistence and coadaptation to eliminate conflict and captivity, building wildlife welfare and maintain resources for future use (Spooner et al, 2023).



First phase
Food production



Second phase
Leisure activities



Third phase
Menageries

Figure 2.4:
The first three phases in the development of enclosures
(Drawing by Author, 2024 adapted from Colosseum of Fools, n.d, Trusova, 2019, and Sahlins, 2021).

Zoo Enclosures | How Human and Wildlife Conflict Resulted in Zoo Formation

The Human-wildlife conflict (HWC) as described by Somu & Palanisamy (2022), occurs when interactions between humans and wildlife lead to negative outcomes, such as the loss of livelihoods, property, and even life. In the past as the demand for food and space grew with the human populations, wildlife and humans increasingly competed for land and resources, leading to displacement and habitat loss for wildlife often resulting in the vast decline or eradication of animal species. Human communities experienced threats to health and safety, food security, with severe property and financial losses. The human-wildlife conflict was, therefore, a humanitarian, development and conservation concern, which lead society, scientists and conservationists to develop enclosures as a way to protect humans while preserving wildlife separating biodiversity from the threatening urban development processes.

Initially the formation of these enclosures sought only to satisfy the needs of humans rather than house and protect wildlife. These enclosures were the first depictions of social and cultural changes in human society and it displayed the relationship between humans and wildlife, yet overtime it also showcased how the relationship evolved from need to curiosity, to enjoyment and how captivity influenced the perception of wildlife. According to Sampio et al (2020), the formation of enclosures can be divided into five phases. The first phase describes zoos as mere collections of available animals that were used to assist in food production and agricultural practices. The second phase was fuelled by curiosity as humans rebuilt relationships with animals and wanted to learn more. This lead to the enjoyment of viewing of animals and their behaviours that the wealthy exploited, collecting animals for leisure activities, hunting and even gifts. The third phase saw the formation of menageries, all animals from around the world were collected and housed in cages with little interaction in their natural environment creating conflict as humans exerted their power over animals separating them from their families and housing them to facilitate studies.



Fourth phase
Zoological garden



Fifth phase
Conservation parks.

Due to this display of power and the perception of animals only taking a conceptual form to humans, conservations and scientists decided to encourage another view resulting in a new focus of education and wellness around animals (Maulana,2018). This brought forward the fourth phase which can be seen as a transitional phase whereby menageries were renamed to zoos.

Zoos were formed as humans became more knowledgeable and sought to conduct research activities on captive animals, but yet wanted to care for the animals. It saw the implementation of a zoological garden whereby elements of a naturalistic environment such as plants were housed with the animals to mimic natural habitats. Zoos were then opened up to the public to fund research projects with the main aim of education and entertainment. The fifth and final phase saw the establishment of the modern zoo. It is still an enclosure that keeps animals captive, however zoos are now used as a place to educate while entertaining the public about animals and seeks to contribute to their wellness. Zoos have now evolved into bio parks or conservation parks. The species kept in these spaces have become increasingly valued by scientists and visitors and the focus has shifted from purely research to welfare, whereby zoos now create stimulated natural environments to foster natural behaviour and gain accurate data for projects. (Sampio, 2020). However, no matter how well natural environments are stimulated the simple act of confining animals in cages has destructive effects on their health. These natural spaces do not provide enough space for animals and they are still enclosed far from their natural habitats, preventing them from being apart of an ecological hierarchy, developing their own social orders, gathering their own food, and behaving in ways that are biological to them. Zoos often see kept animals cramped in barren cages of grass and dirt with no physical or mental stimulation. The animals are often stressed induced and exhibit neurotic behaviours such as head bobbing, pacing, weaving back and forth, and tantrum throwing of faeces at humans.

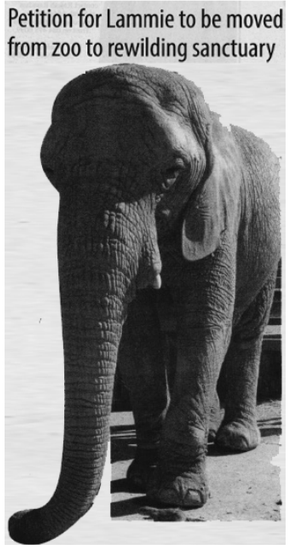
Sampio (2020), further expands that although zoos are valued

Figure 2.5:
The fourth & five phase in the development of enclosures
(Drawing by Author, 2024 adapted from Angerer, 1898, Gancharuk, n.d).

Figure 2.6:
Petition for Elephant to be released
(Koning, 2018)

for science and research, they were created to cope with the socioeconomic situations and manage the human-wildlife conflicts so that only humans were able to thrive. Zoos were strongly shaped according to the cultural bias of societies and are exploitive of kept animals. According to Zengin (2019), zoos are a display of human dominance. He describes zoos as institutions of power that serve human interests ,because although having connections to nature, zoos are spaces through which nature is transformed into culture. This is because zoos portray humans in a false sense in the natural order of life, placing them above all other life forms. This false sense of hierarchy allows zoos to implement its methods of confinement which separates humans from other animals which, in turn, transforms their bodies into objects we dominate ,to be used only for our human pleasure or purpose.

This display of dominance can be seen within the Johannesburg Zoo. The zoo was founded in 1904, by Hermann Eckstein who owned a mining conglomerate that donated the land to the City of Johannesburg as a means of recreation. At first it housed a few native animals but as it popularity grew, public perception changed to that out curiosity and wonder as visitors desired to experience greater animals in their natural environments. This led to the development of the zoo's long-term plan growth plans which sought to improve the facilities for both humans and wildlife. These plans included the upgrading old holdings and the creation of new enclosures which allowed zoos to participate in breeding programmes. This saw culture driving the confinement of animals within South Africa and the wealthy using the zoo as a means to generate profit from the captivity of animals as it served the economic growth of the city, as the zoo drew thousands of visitors yearly opening 365 days a year. It was due to this increased status that the zoo came under fire for poor welfare and living conditions of animals resulting in stressed and depressive behaviour in their kept animals as many were dying or refusing to interact.





Protest at Joburg zoo

JZO. OEVTS,N

RACINE EDWARDES

racinee@caxton.co.za

ZOO visitors were greeted by the Ban Animal Trading Organisation as they entered the premises for the How'loween event on the weekend.



Joburg Zoo under social media fire

ASHTYN MACKENZIE

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A Facebook post by a Johannesburg Zoo visitor who was disgusted with the facilities has gone viral.

The visitor took the family out for a trip to the zoo in December and was left with "more questions than answers", the post garnered over 15 000 shares and over 5 000 comments. The post in question complained about the ageing and dilapidated facilities such as the ablution blocks and the old polar bear enclosure. The poster continued to comment about large piles of litter as well as "filthy" water in the "leaking other pool, filled with green water".

"Half the enclosures didn't even have occupants and the five tigers were out of their enclosure and cramped up into a 5x5 cage, which they had to be visitors to get up close with," read the post.

Other complaints ranged from a tree that damaged the crocodile enclosure, rubbish staff, questions around the safety of a children's playground and rats inside the baboon enclosure.

Responding to the post ranged from shock disgust towards the zoo and a call to shut down all zoos with a sprinkle of "non-defenders". After a flood of requests for comment, Johannesburg Zoo invited The Gazette to visit the zoo's facilities and allay any concerns. The overnight visit was opened by the new Member of the Mayoral Committee (MMC) for Community Development Margaret Arnolds and Bryan Mashaka, the managing director of Johannesburg City Parks and Zoo.

"It has not escaped the Gazette, that a visit of this nature is not impromptu. On arrival, dozens of wood eaters and lawn mowers could be seen cutting the long grass; cleaning enclosures and fixing the zoo's management, asking whether this type of a visit is an organic and accurate reflection of the 110-year old facility.

The Johannesburg Zoo has since faced constant disapproval from the public, as its current design fails to provide adequate landscape habitats and ecological awareness facilities for animals. The Johannesburg City Parks and Zoo has had many petitions on social media alleging that the zoo has been neglecting their animals needs and restricting their freedom stating there are underweight lions, giraffes eating sticks and depressed dry and thin elephants, triggering concern for the treatment and welfare of the animals in these holdings. The zoo has since denied all allegations and continues to dominate over animals, exploiting animals by offering to host shows, rallies and birthday parties that distract animals and expose them to harmful artificial sounds, lighting and forced interactions, thereby adding to the stress and abuse experience by them (Bakharia, 2023).

According to Zengin (2019), zoos can be viewed a metaphors of human dominion and institutions of power. Zoos in the climate of today are seen as anthropocentric spaces which only serve humans. This is because although zoos boast having connections to nature and wildlife, these elements are transformed into culture thus facilitating a false place for humans in the natural order of the world. Zoos flaunt this through means of confinement used for separating humans from other animals which then in turn transforms their bodies into things there just for human enjoyments and to be used for human purposes. Zoos treat animals as objects with no inherent value, depriving them of living for themselves only as spectacles showcased as testaments of human triumph over nature (Zengin, 2019).

Although there are the four principles at the base of the modern zoo. These principles of entertainment, research, education and lately conservation need to take social responsibility and release human dominance over animals. The conservation principle should ensure zoos seek to eradicate the human wildlife conflict by acting as wildlife conservation centres. It should contribute positively to the protection of natural habitats, through the facilitation of programs for the reintroduction of species and exposing their animals to naturalistic sites to eventually end animal captivity through rehabilitation and balancing the power dynamic between humans and wildlife (Sampio, 2020).

Figure 2.7: Newspaper article showing protest against animal captivity in the Johannesburg Zoo (Edwardes, 2014)

Figure 2.8: Newspaper article showing protest against animal captivity in the Johannesburg Zoo (Mackenzie, 2020)

Figure 2.9: Comparison of the London Zoo Penguin exhibit in 1936 & 2011. The design has improved but the human gaze is still prioritised (Drawing by Author, 2024; adapted from Xu, 2021)





Zoo Enclosures Understanding the Welfare of Animals in Zoo Captivity

Although conservation is at the forefront of zoo environments, zoos are still being criticised for the mistreatment of animals adding to the human-wildlife conflict currently plaguing the world. This has caused animal welfare to take primary focus in zoo conservation strategies as they are now governed by guidelines on animal care and wellbeing. These guidelines aimed to facilitate conservation efforts worldwide by requiring enclosures to serve animals specific physiological and biological needs while also providing intellectual and social stimulation. Zoos have since set out to achieve this through adapting animal holdings to be reflective of their natural habitats. This act of naturalism is described by Boyle (2017), is the design of a space that resembles as closely as possible the habitats of wildlife based within it. Naturalistic formations should encourage organic behaviour, breeding and normal parenting to achieve optimal animal wellbeing (Boyle,2017).

Animal wellbeing is then explained by Boyle (2017), as a measure of how well an animal may cope with challenges in its environment. It is described in zoos as a combination of physical and psychological features that attribute to optimal welfare. It is seen as animals being healthy, well-nourished and able to express typical species behaviour (Boyle,2017).

Modern zoos have adapted the conservation guidelines into the holding's and have replicated natural habitats to foster animal welfare, and although the conditions of their natural habitats are similar to the holdings it is not a true reflection of the climate, distribution and actual interaction of animals in situ. This sees humans and their zoos still maintaining dominance and exerting exploitive behaviour over animals as humans still exert their power over animals through the control of movements, choice of interactions and the element of gaze, or line of sight in their holdings.

Milstein (2009), describes zoos as the ultimate display of power

from humans over wildlife, as total control is exerted by humans over animals through all movements and actions, creating no opportunities for the animals to exercise its own priorities or preferences. Milstein (2009), further states that this gives zoos two main themes, that of gaze and power. She describes these themes as a function of the zoos and how humans process power, stating that the gaze of a zoo worker/visitor is a dominant power as it leaves animals powerless and subjected to an unwanted gaze. In this context although zoos have the intention to foster welfare and generate naturalistic environments to advance subject to subject engagement, the zoo animals will always remain the captive object. Although these holdings have replicated natural habitats, animals still suffer psychologically as the power lies with the human as they are allowed to freely leave yet the animals are always confined. This display of subject to object control and gaze is an example of the dominance exerted by humans and fuels the conflict further as animals are abused yet through sight humans gain pleasure, knowledge and entertainment while remaining protected from the emotional feeling of vulnerability in the captive state that animals experience (Milstein, 2009).

Milstein (2009), argues that the majority of zoo animals are immune to engagement and encounters with zoo staff and visitors. She states that animals now shut down to any interaction as they are not capable in their subordinated state of reciprocating the human gaze equally. Therefore the zoological gaze is both constituted and reproduced by the exploitative tendencies of human nature dialectics and its dominance hinges upon the gaze that to humans might be rooted in connection and harmony yet holds idealism themes as it is always to the detriment of the animal as animals are only truly healthy and well when allowed to express all their behaviours freely (Milstein, 2009).

Wild life need environments that reflect the lives animals lived before captivity in order to adapt and flourish. They require to be free from constant human gaze making observations and probing to fulfil their needs. There are three welfare perspectives that explains what animals need to order to live fulfilled. These perspectives as described by Browning and Veit (2020), are biological functioning, natural living and the affected state. Each perspective has its own unique measures that determine animal wellbeing. These perspectives will be examine against zoo spatiality and the gaze of power to better understand if conservation efforts by zoos curb the negative effects on captive animals (Browning and Veit, 2020).

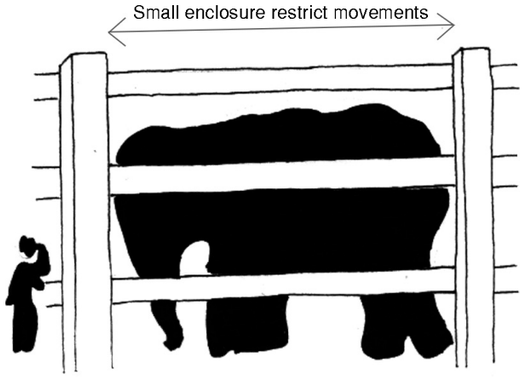


Figure 2.10:
Animal placed in captivity, with reduced space
(Drawing by Author, 2024; adapted from Gupta,2023).

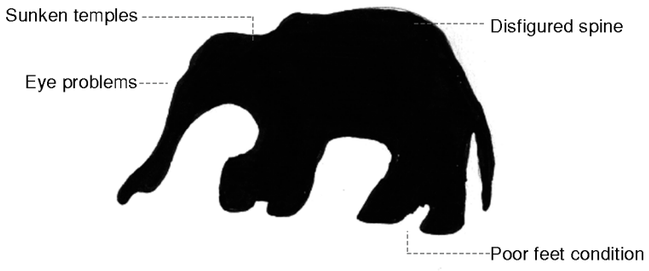


Figure 2.11:
Results of reduced space in captivity prevents biological functioning, first principle of welfare
(Drawing by Author, 2024; adapted from Gupta,2023).

The first perspective as illustrated by Browning and Veit (2020), is biological functioning. The perspective depicts that the biological functioning directly focuses on visible physical attributes of an animal. This consists of top line physical health, reproduction and its growth rate. They further explain that the perspectives centres around humans perceptions and ethics, whereby biological functioning is determined by animals ability to reproduce and to perform labour tasks that allow good performance in economic markets. When adapted in the zoo environment the biological perspective is determined by how animals employ physical methods to adapt to their captive environment to achieve stability (Browning and Veit, 2020).

In zoo enclosures, animals are confined in designated spaces with little to no interaction with other spaces or animals. This spatial confinement as stated by Estevez (2006), imposes behavioural restrictions and prevents natural functioning due to the limitation of movement and overuse of the space. Sueur and Pele (2019), explain that if a gap exists from an animal's organic environment to its stimulated environment, it will exhaust itself while trying to adapt. Estevez (2006), states that confined animals are affected by the structural characteristics of the environment as well as the size of the enclosure. The barriers and walls within the enclosure greatly depict the way animals move and often produce a "rebounding effect" on their movement patterns creating the feeling of being trapped. This often results in the loss of spatial complexity driving minimal movement patterns such as the frequent pacing that is stereotypically observed in captive animals.

Therefore even if animals display normal biological functioning, they are often under stress as their captive environment is not visually or structurally comparable to their wild environment. In this perspective, the animal interacts greatly with structures and objects in its environment, even if they are not similar to features that it would encounter in its natural habitat. Therefore conservation efforts within zoos to mimic natural environments to foster animal welfare are often unsuccessful as animals are often able to identify artificial stimuli which in turn causes greater stress. Normal displays of physical functioning are often misunderstood for good welfare as an animal can be entirely fit and healthy, but experience stress triggers that cause feelings of frustration, confusion and even loneliness and boredom, thus resulting in poor overall welfare (Sueur and Pele, 2019).

The natural biological perspective is further strained through the gaze of power. The captive environments of animals although meant to represent natural environments often all look the same for similar or grouped species. Humans exert their power by allowing themselves to believe as long their eyes can see natural elements within the holdings that the animals will function normally and adapt to these elements. This was evident as the Johannesburg Zoo where the owl enclosures sit 500mm above ground level. They all feature a single row of clearvu fences, which is divided into 12 columns with each featuring an owl species. The individual exhibits contain a single tree or less, a single wooden perching station towards the back and a set of wooden blocks fixed into the back wall to provide mock enclosed sleeping spaces for the owls.

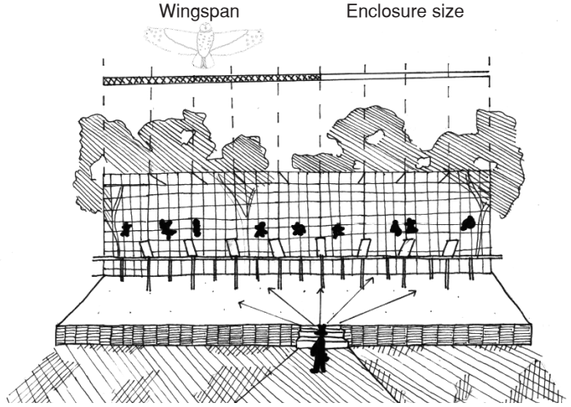


Figure 2.12:
Owl enclosure at Joburg Zoo, showing direct views into the enclosures and a comparison of the owl wingspan to the enclosure size
(Author, 2024)

Figure 2.13:
Animals in natures fear response to natural sound, temporary stop in feeding
(Drawing by Author, 2024; adapted from Levy, n.d.)

This attempt at representing the natural habitat of owls fails as the owls have no other real environmental features and are even prevented from interacting with each other. The row of cages allow a direct human gaze meeting all species variants head on and allowing no escape for the captive birds. This further showcases that conservation efforts within zoos to mimic natural environments that foster animal welfare are often unsuccessful as the conservation messages are in conflict with spatial, visual, and design systems of the exhibits and these conflicts reveal tensions within exploitation idealism between humans and animals forcing them once again to be objects under the human gaze (Milstein, 2009).

The second perspective as indicated by Browning and Veit (2020), is the natural living perspective. This perspective has a set focus on the wild state on animals. It is described as an animals natural ability to function as they have been shaped through evolution. The perspective maintains that behavioural, physical and psychological interests are coded into animals during evolutionary development. This outlook draws on animal ethics as it emphasizes the importance of animals needing to express their natural self's. When adapted in the zoo environment the natural view is determined by the ability of the animal to display specific behaviours that the species has evolved to perform. This is considered to a high value measure of a flourishing healthy animal.

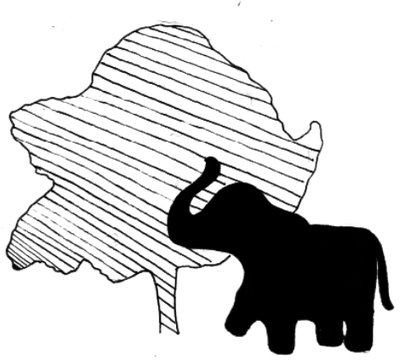
Sueur and Pele (2019), explains that the naturalist approach encourages animals to live its natural life and perform its typical species repertoire. By applying this approach, the aim within zoos is to recreate environments that are parallel to an animal's natural ecosystem to instinctively bring out



Startled by natural sound



Temporary awareness



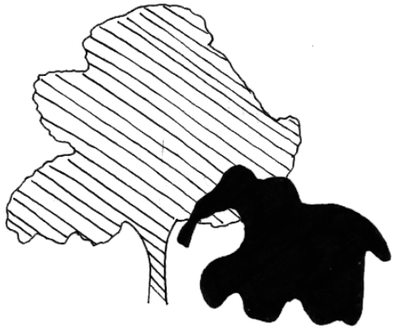
Temporary reduction in feeding



Startled by human sound



Permanent awareness



Permanent reduction in feeding

these species behaviours. This is often achieved through the adaption of environmental enrichment which includes stimulating natural weather, sounds and landscape elements. These techniques aim to improve an animals ability to cope in captive environments yet often result in sensory stress. The stress is displayed through abnormal behaviours only displayed by the species in a captive environment, these stressors are not depictive of typical species behaviour and often damages the mental capacity of the enclosed animal. This is due to the naturalistic cage seeking to recreate the animals natural habitat in visual terms, however it lacks in other aspects and therefore prevents the animal from completing its normal behavioural activities such as: foraging for food, moving away from sound or moving to a different temperature or coverage. Animals are often deprived of distinctive species activities as they are held captive outside of their packs with new species and partners generating loss of autonomy and choice resulting in a lack of will to live (Sueur and Pele, 2019).

The natural perspective is further rationalized through the gaze of power as seen at the fox exhibit within the Johannesburg Zoo. The holding features a naturalistic, no glass exhibit. It uses grass, trees, rocks and other plantings to showcase the captive foxes. The exhibit displays a low barrier that is set up in a straight line, which at eye level becomes invisible to the visitor allowing them to fully immersive themselves in the context. This exhibit is grouped together with other dogs and their relatives species. As you walk down a trail you can see all these species together, checking them of your list. This feeds the human dominance stance as the exhibit allows the visitor to be in the exhibit seeing directly into it, though zoo visitors may have the intention of engaging with animals organically

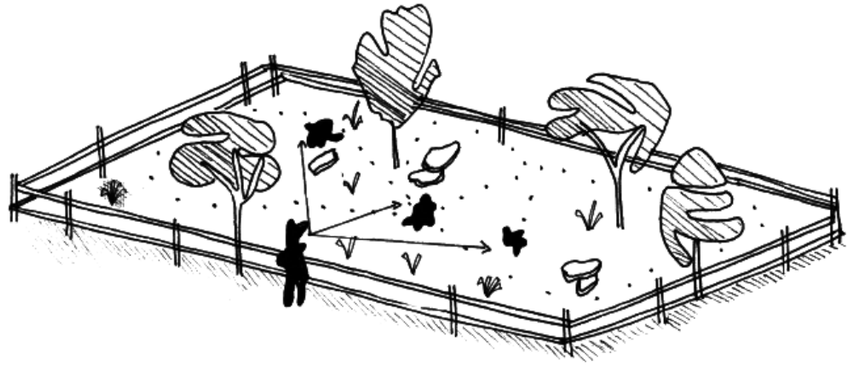


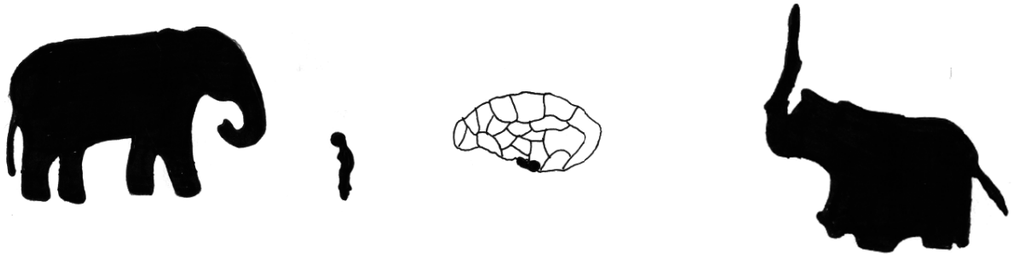
Figure 2.14:
Animals in captivity's fear response to human sound, lasting stop in feeding
(Drawing by Author, 2024; adapted from Levy, n.d.)

Figure 2.15:
Fox enclosure at Joburg Zoo, showing direct views into and all sides enclosed in a naturalistic enclosure
(Author, 2024)

to have a subject-to-subject encounters, the zoo animal remains a captive object to the human subjective gaze. Dominance is exerted as the gaze is actually one way, subject to object, creating a one way subjective vision, striping the object(animal) of any choice (Milstein, 2009).

This approach is often is criticised by welfare organisations as zoos often group together what they deem as like species to foster natural behaviours, yet most of these animals find it hard to adapt to each other and compete for territory suffering immensely from its stress effects. According to Magan and Tromburg (2006), the reduction of control and over exposure to a number of environmental variables brings with it a host of stressors for animals in captivity, largely in the form of forced interaction and restricted choice. Whether in agricultural settings laboratories or zoos, animals in captivity are limited in their ability to retreat from human caretakers and onlookers, their freedom of movement, and even the timing and nature of their food and mate choices, thereby generating overall poor welfare (Magan & Tromburg, 2006).

The third perspective as suggested by Browning and Veit (2020), is the affected state. This perspective states that animal welfare is dependent on an animals mental state. The perspective considers how an animal is feeling. Stimuli in zoo enclosures often elicits specific emotional responses that can be categorised into positive and negative feelings. Positive feelings can be described as comfort which increases welfare, whereby negative feelings such as limited freedom or hunger can decrease welfare. Welfare can therefore



Stress inducer | Increased cortisol levels | Highly aggressive or depressed

be seen as a function of the number of positive and negative emotions experienced by an animal over its lifetime. This perspective is rooted within a practical ethics outlook, that considers the moral importance of suffering or pleasure experienced by animals (Browning and Veit, 2020).

Enclosures have adapted this perspective by striving to design environments that complement an animals mental state aiming to ensure that they are free of prolonged negative emotions such as frustration, pain and fear. The designs seek to encourage an ongoing positive state and this can occur when an animal s physical needs of health, nutrition, clean and functional environments are met. A positive mental is what zoos aim to produce. As an unequal combination of different states experience by an animal in one environment can make the difference between whether an animal is simply coping with the environment it is in, or is actually thriving in the environment (Pierce and Bekoff, 2018).

According to Salas and Manteca (2017), The mental state of animals in captivity is greatly affected by the presence of visitors/ caretakers inside the facility, nearby the enclosure or in close proximity with the animals. The presence of unfamiliar people, smells, movements and sounds generates a stress response in the animals which often negatively impacts their welfare. Zoos have tried to mitigate this issue through the use of moats which creates a barrier of space between the visitor and the animals, however the animals have proven to be more perceptive to being watched and have reacted by hiding from visitors, triggering a range of negative emotions (Salas and Manteca, 2017).

The affected state is further expanded through the gaze of power as seen in the lemur exhibit within the Johannesburg Zoo. The lemur exhibit is an enclosed exhibit. It features various plants, trees with wooden and rope elements for enrichment. The exhibit is built from stone finished walls and contain two windows that allow the visitor to gaze directly into the exhibit. Power is displayed as the exhibit is closed off with only two windows to view

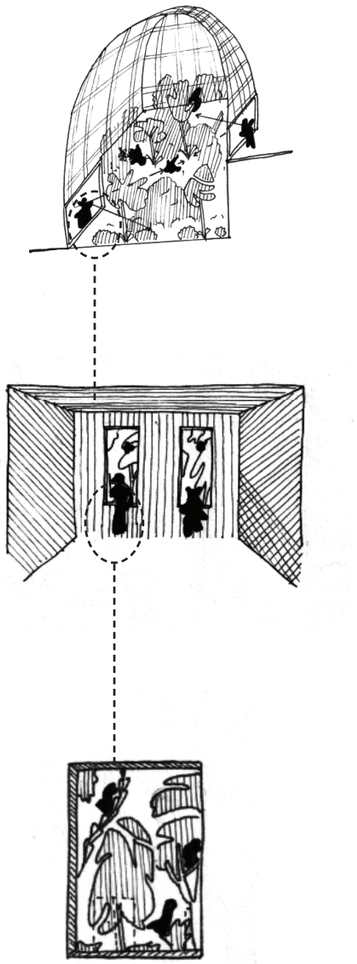


Figure 2.16:
Animals brain response when facing a stress in captivity. Releasing chemicals that result in aggressive or depressed behaviour
(Drawing by Author, 2024; adapted from Mota-Rojas et al, 2022)

Figure 2.17:
Lemur enclosure at Joburg Zoo, showing two opposite window views into enclosure blocked by naturalistic elements
(Author, 2024)

into the space, it controls what people see, allowing them to view only the animal and the landscape features not connecting it to any human activity or surroundings. These exhibits are designed so visitors and caretakers never see or connect with each other when looking at the animals. All viewing areas are angular so humans never face each other. The intent of the design is to encourage visitors to feel as if they have seen life like representations of animals in their natural habitats depictive of the wild and therefore to feel as if they are protecting the animals and creating a complete ecosystem. However while these aspirations and intentions are noble they do position as wellness threats for the animals, as these naturalistic yet sophisticated designs serves to mask the inauthenticity of the zoo experience, as the animals are still experiencing mental aggravation from onlookers and humans entering and leaving their space at will. Animals are not able to move or hide away from the gaze or intrusion of humans leaving them exposed and vulnerable and making all encounters with humans negative and conflicting (Milstein, 2009).

When considering animal welfare the animals affected state should be a focus point and necessary perspective for zoos to measure themselves against. Sueur and Pele (2019), define animal welfare as an animal presenting no negative emotional stress states. The animal should have a social and physical

environment that allows it to maintain its homeostasis and express its full behavioural repertoire. In order for zoos to meet the conservation guidelines and combat the human wildlife conflict its development must allow the animal to enjoy daily enrichment activities that satisfies its cognitive, physiological and physical needs, which will result in the reduction of abnormal behaviours thereby increasing in behavioural diversity and overall welfare (Maulana,2018).

Currently zoos are not reaching these goals as animals lack the freedom to express typical behaviours due to poor facilities, insufficient space, and no interaction with real environments and other animal species that belong in their ecosystem. This has resulted in animal depression and conservationist protests and petitions to end captivity thereby further promoting the human-wildlife conflict (Rabb, 2004). It can be said that zoos present themselves as a disguise for exploitation and as a means for humans to retain dominance over wildlife through expressing an illusion of natural spaces environmental ideals. These institutions fuel the human-wildlife conflict mas they allow captive animals to be stripped of their autonomy and independence. The current zoo models hinders any growth by striping them of their ability to make choices too. The zoo models limits opportunities for these animals to develop socially and genetically as it prohibits movement and interactions with other animals. Animals are forced into stress induced environments and often suffer from depression or zoochosis (Nature Safari India Guide, 2024).

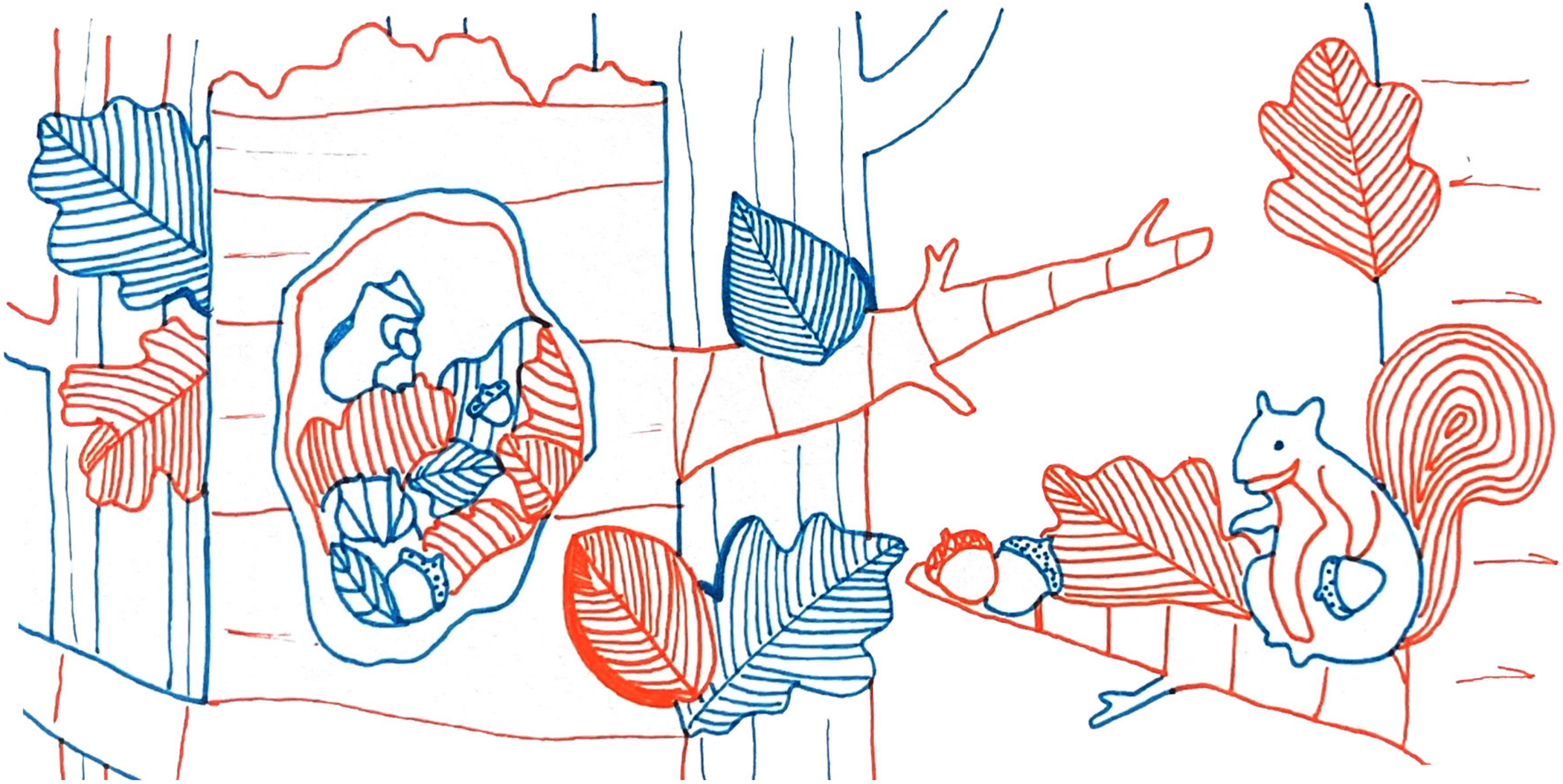
Milstein (2009), states that zoos insist that continuing to keep captive animals



Figure 2.18:
Elephant experiencing zoochosis, swaying side to side.
(Fridolin, 2016)

is necessary, as they can provide valuable and practical information which may be difficult to gather from their species in the wild. Zoos claim that they need this information to aid and develop its conservation efforts and principles that can be applied to all animals wild or domestic world-wide. However zoo critics, argue that zoos are conserving little to nothing at all, this is due to most conservation efforts being aimed at the breeding of species that zoos have a vested interest in displaying rather than those most in endangered. Zoos claim to ease species decline yet they contribute to it by not breeding endangered animals to release eventually into the wild but rather to fulfil the need of empty enclosures. Wildlife needs are extremely complex and calves bred in captivity have a higher mortality rate than those of the their free living counterparts. Zoos are ill equipped to provide the natural range wildlife requires to fulfil behavioural and nutritional needs. This insufficiency presents itself in the physical and mental health of the animals, through weight loss, sickness, dental and bone issues and suicide of animals trying to escape. The research conducted on captive animals is often not relevant or applicable to their wild counterparts thereby not servicing the animal or beneficial to the human need for new information (Milstein, 2009).

Zoos can be seen as institutions that promote the human-wildlife conflict by reinforcing destructive practices for humans to be able to relate to nature and animals. Zoos teach visitors that animals are available at our convenience to be used for our purposes and are not independent beings with the right to choose their own pattern of life. This prolongs the power struggle between human and animals, hindering animal well-being and draining the livelihood of captive animals. The zoo's claims on conservation for saving animals and educating future generations can be seen as ploy to sustain profit and entertainment for zoo industries far more than it sustains wild animals. These efforts may serve to divert well-meaning public concern yet fails to rectify or reverse the ongoing rapid destruction of wild animals and their habitats. It seems that all animals born and bred from zoos will die in zoos, they will not be released into the wild. While zoo visitors may be comforted to believe the local zoo is saving the world's endangered species, this create a dangerous sense of complacency as it hides the real threats facing these species in the natural habitats. It is imperative that power and dominance be shifted from humans to support and protect animals in the natural ranges with the aim of solving their struggles through free living (Milstein, 2009).



Zoo Enclosures | The Future of Animals in Zoo Captivity

Through the past years, the human wildlife conflict has been aided by the captivity of animals. Although initially used to cater for human needs, animals have evolved in the heart and minds of humans as they have been collected, studied and cared for. Humans and wildlife have since built a relationship and are developing a Kinship. Although the conflict still exists humans now seek to protect wildlife instead of fighting against them. Humans have developed a sense of duty and responsibility to animals which has in turn resulted in a focus on animal welfare to provide for them better life quality and eventual freedom from captivity (Lindholm, n.d).

Due to this development and increased concern from the public around animal welfare in zoos, conservationists have now shifted their view of what the zoo setting should look like. Spooner (2023), explains the four founding zoo pillars of education, conservation, research and recreation fails to mirror the now multi-faceted range of activities that zoos should engage with. Spooner (2023), expands by stating that the pillar model neglects to acknowledge the interdependent system in which zoos, humans and animals function, leading them to viewed in isolation rather than apart of society.

According to Boyle (2017), modern zoos are still viewed as separate to society despite strong commitments and beliefs towards environmental stewardship, and with the goal of education and conservation, it is still viewed as a means of entertainment and not an integrated part of life. Although zoos have since evolved from past menageries that just collected animals to fully fledged organisations that now consider naturalism and animal welfare, and even with the modern zoo implementing a number of natural elements to support animal wellbeing. These efforts are still insufficient as it is not consistent naturalism which is cohesive to in situ conditions, instead it is stimulated naturalism which does not harmonize with the basic needs of the animals in enclosures, resulting in animals suffering from illness and eventual death (Boyle,2017).

Therefore it can be said that the zoo's historic pillars model does not represent the current conservationist climate and has become out of date, this has resulted in the perception of zoos being underrated and undervalued. Due to this zoos are now overlooked in conservation decision making regardless of the wealth of knowledge and resources they claim to have to offer, the organisation is not trusted by the public as zoos often masks the fact that the vast majority of captive zoo animals are neither endangered or threatened in the wild. These animals often are not even apart of world-wide conservation programmes..

Figure 2.19:
Squirrel in trees foraging
(Drawing by Author, 2024; adapted from "Leaves Autumn Pop-Up Book", 2024)

Figure 2.20:
Visitors seeing lions at the Kruger National Park, in a natural environment
(Silverman, 2020)

Through previous years conservation efforts in zoos have aimed to focus on breeding programmes that preserve species with the intent to reintroduce them into the wild however, these were unsuccessful as captive breed species are often ill suited and ill equipped to survive in the wild. It was found that because of inbreeding captive animals where not genetically matched to their free living counter parts and struggled with adaptability often unable to interact with like species, avoid predators or even look for food. Conservationist also argue that even if zoos are able to generate the right genetic makeup and teach wildlife independent behaviours, to much energy has been focused on the animals and reintroduction will be futile as no preservation or restoration efforts have been given to wild habitats (Houck, 2021).

Therefore the key question asked is what will be future of zoo design, and what will this mean for animal captivity? Boyle (2017), suggests that the future lies in a new conservation models that incorporates species and society that finds new ways to exist and learn from each other together in shared habitats. The new zoo model will focus its efforts on wildlife rescue and rehabilitation placing a new zoo design at the centre of the human wildlife network, so that the model can be reflective of the areas that zoos can work across with shared knowledge and the levels of influence it can obtain. This will include reimagining the traditional zoo enclosure setting and increasing naturalistic environments so much so that it becomes actual nature. The new model design will seek to increase the amount of space given to enclosed animals, changing the original design to enclose visitors rather than animals, essentially allowing them to roam free in protected natural spaces to facilitate growth of species and to generate functional ecosystems. This model can be seen adapted in places like the Kruger National Park, which covers nearly five million acres of land in Mpumalanga, South Africa.



The parks highlights the movement from enclosures to wilderness is that is managed although contained on some scale. The park allows guided visitors into the animals organic habitats to observe them without interrupting their daily schedule or habitual behaviours. Visitors come in hopes of seeing some of the more elusive species, but seeing any particular animal is never guaranteed as you enter natural wildlife habitats and animals are not forced under the visitors gaze, they have the choice and ability to move freely only giving of themselves what they chose changing the power dynamic between humans and animals (Boyle,2016).

The new alternate zoo model seeks to create a naturalistic multispecies educational facility and rehabilitation centre that encourages human engagement and participation with animals. Through this facility it will adapt the zoo landscape to act as a sanctuary for captive or injured wildlife in the hopes of reintroducing them into wild habitats. Through this rehabilitation setting humans will be allowed to gain education value and meaningful interactions between themselves and various species encouraging relationships to form thereby resulting in shifting their focus from dominance to support and protection creating new views of balance and equality to facilitate a future of multispecies living.

This type zoo model can be seen at the Elephant Sanctuary in Tennessee. This is a non-profit organisation that was designed especially to house sick elephants that were retired from zoos and circuses. The sanctuary provides three natural and protected environments for the elephants, allowing them to live out the reminder of their days. The





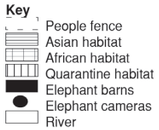


Figure 2.21:
Elephants in The Elephant Sanctuary are managed in a Protected Contact system, this uses positive reinforcement training to treat and care for elephants
("The Elephant Sanctuary in Tennessee", 2020)

Figure 2.22:
The layout of the elephant sanctuary plot
(Drawing by Author, 2024 adapted from "The Elephant Sanctuary in Tennessee", 2020)

Figure 2.23:
Satellite technology and tracking to aid in conservation efforts
(Wang et al, 2019)

sanctuary features various caretaker facilities, medical services and a people perimeter around the site. They also participate in educational outreach through their discovery centre and have an internship and volunteer programme allowing humans to interact with animals in an organic way and not by exerting their power of gaze. Through this the elephants are able to live the rest of their lives freely and peacefully while humans support and learn from them in meaningful way. The sanctuary has also created an innovative healthcare and treatment centre that aids humans understanding of how they might recognise and help injured animals while teaching them how to sustain and nurture their natural environment. This sanctuary demonstrates that rehabilitation can be achieved and a new space can be developed where animals can be healed from their past traumas and humans can eliminate the control and need for power building a new community that facilitates multispecies living.

The introduction of a new zoo model must seek to minimise the human-wildlife conflict for future generations across species. Wildlife in natures faces great threats from human activities. These include illegal poaching and wildlife trade, habitat destruction and the spreading of invasive species and diseases. The new zoo model can reduce these threats through leveraging readily available technology to gain a deeper understanding of ecology. These can be achieved through the use of technology that is available to all conservation networks and include satellite imaging and tracking, and assisted breeding developments to enhance animals welfare as well as educate and influence visitor awareness (Pacheco, 2018).





According to Pacheco (2018,) these implementations in the new zoo model can aid to integrate both in situ and ex situ and conservation efforts, radically increasing motives to improve animal welfare, through increasing understanding of animal behaviour and cognition. Technological applications are useful in promoting conservation education, and zoos are the ideal organizations to be a critical player in global conservation efforts of equality and education of the public as they receive millions of visitors annually ranging in all age groups and can be a defining factor in generational growth.

As zoos move into the future the ultimate goal conservationists wish to achieve is the end of animal captivity. It is evident that animals don't need to be captive, instead they can be studied and observed from their natural habitat, giving researchers and visitors a more authentic and reliable experiences and data. The Nature Safari India Guide (2024), states that wildlife animals deserve the opportunity to engage and roam freely in natural habitats, participating in hunting and migrating behaviours

This allows for evolution to take place as it grants the opportunity for animals to develop survival skills and reach greater genetic diversity and adaptability than those in captivity.

In the 21st century the need for a new zoo model is imperative to animal health. Animals ought to be reintroduced back into protected natural environments as there is now no pressing need to keep them captive. Technology has granted us with innovative alternatives to traditional zoos delivering immersive experiences that are both educational and entertaining. This new direction allows for positive ways to interact with animal and their habitats promoting conservation, research and wildlife protection while ensuring the optimal health physically, emotionally and mentally for wild life animals.



Figure 2.24:
Robotic geese designed for OOZ, and interactive zoo model.
(Jeremijenko, 2003)

Conclusion

Zoos have evolved from institutions functioning for pure entertainment to organizations making an effort to help animals through conservation and education. This paper has examined how zoos were formed and how they have strived to improve animal welfare and naturalism over the years. This paper has explored zoo efforts to introduce naturalistic environments into their enclosures and identified the implications of these efforts on wild life animals. It is evident that although zoos have incorporated welfare aspects into their programs, animals are still not supported and cannot thrive in captivity where continuous exposure to stressors exist. This paper has established that there is a need for zoos to redefined its current four pillar model and to reestablish itself a centres of conservation and education with the goal of eliminating enclosures and reintroducing captive animals into new protected natural habitats that foster progressive evolution yet safe guard endangered species(Pierce and Bekoff, 2018).

I believe that zoos should no longer serve the function of entertainment or demonstrations of wealth but must strive to improve the quality of life for animals mentally and physically. Zoos in a perfect world would promote conservation to minimize the suffering and maximize the pleasure of animals, treating them as themselves showing their value and respecting their rights, all while still benefiting the conservation effort as a whole to enable learning so that humans and animals develop a kinship that fosters coexistence and coadaptation to eliminate conflict and captivity, building wildlife welfare and maintain resources for future use.



The bird fell swiftly to the ground.

3.
The Future of Zoos

The Future of Zoos

Zoos as the previous chapter has established are institutions of dominance and power exerted by humans over wildlife through the practices of gaze, objectivity and captivity. They disguise themselves under the pillars of research, education, recreation and conservation yet fail to demonstrate compassion by confining animals to cages that are destructive to their welfare. The previous chapter examined this power dynamic within the zoo context to understand the conception, development and current state of this human wildlife conflict struggle and how zoos are driving it. Through that body of work it has been identified that humans exercise their dominance over animals through control using them to serve their own interests and treating animals as if they not have any inherent value and as being separate from them, leading to poor welfare conditions for animals. Since then zoos have partnered with conservationists to implement strategies that diminish the management and control of animals, shifting efforts to developing the interrelations of nature, humans and animals. Despite this, traditional conservationism remains anthropocentric compared to more eco-centric environmental approaches. This is still evident at zoos, as its conservation messages often clash with the designs visual and spatial aspects of the zoo's environment (Milstein, 2009).

According to Milstein (2009), Popular animals like lions and elephants are placed in exhibits that simulate their natural habitats, with these simulated environments extending into the visitor areas. These exhibits aim to foster a personal connection between the visitors and animals, by minimising the visibility of other viewing people. This approach aims to enhance the naturalistic design, helping visitors feel as if they are observing animals within their natural habitats. This only serves to mask the artificiality of the zoo experience creating a false sense of responsibility in humans for feeling like they are protecting the animals' entire ecosystem, as they imagine they are in the wild and not in a simulated exhibit, thereby ignoring the effects of the exhibit on animal welfare (Milstein, 2009).

Zoos further expand on the approach by claiming to educate the public about environmental and habitat destruction to increase visitor awareness. However, they also aim to create immersive experiences that generate excitement and ultimately profit. While they offer suggestions on how visitors might contribute to conservation efforts, the educational displays and leaflets often fall short in conveying the true risks associated with these institutions. Zoos also fail to clearly communicate how



Figure 3.1:
Short story panel 03
(Drawing by Author, 2024; adapted from SeemaLotion, n.d)

Figure 3.2:
The current dominant zoo gaze, and the alternative zoo gaze of rehabilitation and witnessing
(Author, 2024)

Visitors can play a meaningful role in improving animal welfare and achieving genuine conservation outcomes. (Milstein, 2009).

Milstein (2009), states that the new zoo model can be reworked to be leaders and healers of the human animal relationship and eradicate the current conflict. The new zoo model would introduce alternative possibilities to control and the dominant gaze, shifting from one that is dominant and objectifying to one that is witnessing, rehabilitating and loving. This shift will transform the conflict from one of exploitation to one of harmony, connection, and idealism, moving away from the previous anthropocentric views of conservation. Instead, focusing on a mutual, eco-centric approach centered on restoration (Milstein, 2009).

According to Milstein (2009), to transform the zoological gaze into a shared, subject to subject interaction, visitors must identify with the protection and rehabilitation of ecosystems and wildlife. Visitors should be encourage to care about maintaining healthy habitats for the potential reintroduction of animals into the wild. Through fostering encounters with animals and nature that reflect back on visitors, it will promote a mindful and meaningful mutuality. Although there will always be some degree of observation between humans and animals, the power of observation can be redefined to focus on non-dominating, non-objectifying perspectives. The goal would be to witness interdependency and support equal relationships, resisting the habitual dynamics of exploitation (Milstein, 2009).

In the case study Animal- human bonds, Hernandez Wolfe(2021), explains that humans are able to grow and learn from the ways they help animals recover from abuse. He further states that the interconnectedness developed in the rehabilitation process transforms and shapes a bond between the two. The act of caring and protecting confronts the destructive perceptions caused by previous humans and encourages change that is rooted in the in the relationship that humans have with the environment and all those who inhabit it. Rehabilitation allows the human animal bond to experience joy, pain, and hope together, facilitating physiological and

psychological growth within the same environment. This aids to expand the human social consciousness, leading to greater acceptance of other living beings on our planet. As humans extend their empathy and support outward, they foster interconnectedness with animals, restoring balance and building networks of repair among all species (Hernandez Wolfe, 2021).

According to Yerbury & Weiler (2020), contact with animals contributes to human wellbeing and nature connection, allowing humans to realise their effects on nature and wildlife. They further state that experiences in nature may enhance a sense of meaning and interactions with animals triggering emotional responses. Therefore, as people spend time in nature and with wildlife, they develop stronger attachments which elevate caring, empathy and participation in behaviours that seek to protect the environment, resulting in humans being able to see the viewpoint of nature and wildlife and begin to restore the damage that has been done to the earth and wildlife. Care and love for animals can shift an anthropocentric perspective, where humans see themselves as the central focus, to an eco-centric view that respects and values all parts of the ecosystem. This shift enables humans to recognize animals, plants, and other species as integral components of the ecosystem, deserving of care and capable of contributing positively to the environment. Rehabilitation wildlife experiences encourages human to redefine their dominance and the conflict in the world and consider the effects of humans on nature and wildlife. This promotes an ideology of reciprocity that goes beyond individual environmental actions, connecting the well-being of humans, nature, and wildlife into a mutually beneficial way of existing. Through the acknowledgment of the inherent worth of animals, we can collaborate with them to develop new structures or elements using technology for the built environment. (Yerbury & Weiler, 2020).

This approach can be seen in the work of Neri Oxman (2013), who



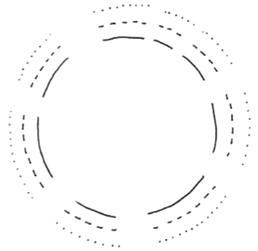
Worm silk
Robot silk
Support structure

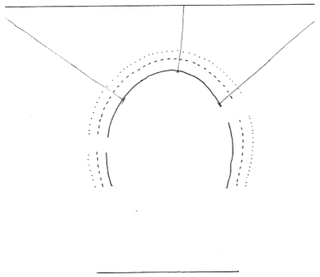
Figure 3.3:
Eco-centric human perspective of power over animals
(Drawing by Author, 2024 adapted from "How Does Language Make Humans Different?", n.d)

Figure 3.4:
The silk pavilion | Neri Oxman | 2013

Compares the systems of the Silk Pavilion to natural systems and current human systems
(Drawing by Author, 2024 adapted from Oxman, 2013)

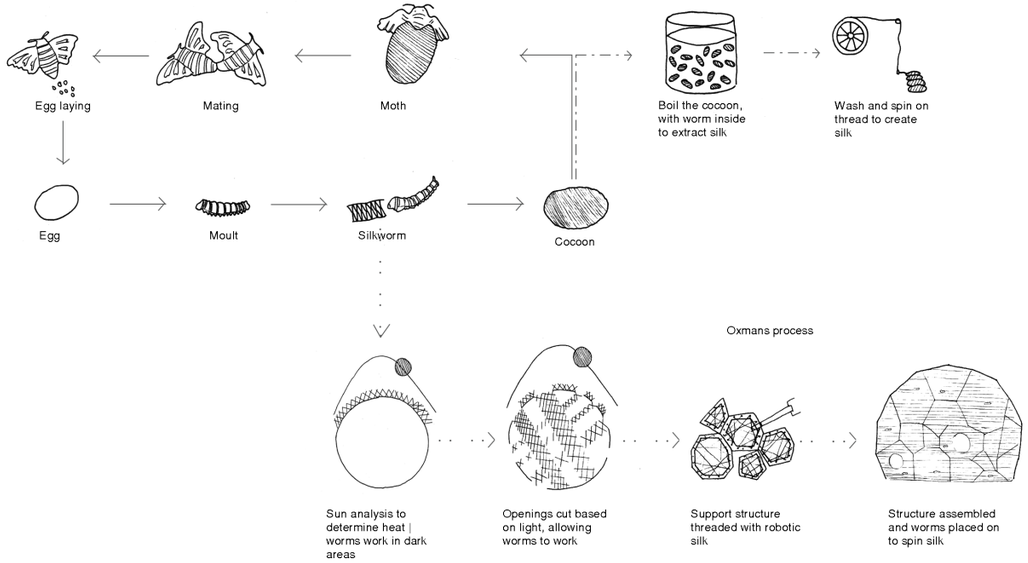






Natural process

Human process

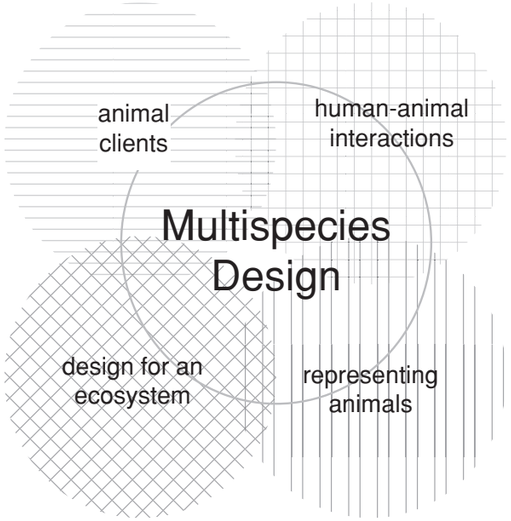


explores the relationship between digital and biological construction. In her Silk Pavilion project, Oxman proposed methods that integrated biological and robotic processes to extract silk. Traditional silk extraction involves boiling larvae alive to harvest silk, but the project implemented a method which allowed the larvae to live and transform into moths, thus preserving their role in the ecosystem. This approach demonstrates how respecting the value of animals in the ecosystem can lead to innovative and mutually beneficial collaborations that enhance both human and animal well-being (Oxman, 2013).

The project, therefore, proposes an alternative zoo model. This model will seek to create a multispecies educational facility and rehabilitation centre, that aims to act as a sanctuary for injured wildlife or wildlife unable to return to the wild. Through this wildlife rehabilitation model humans will be allowed organic interaction between themselves and the animals with the aim of being educated on the real issues around animal welfare combating old perceptions created through past conflict and ushering in new thoughts and creating new perceptions of care and equality to facilitate a future of multispecies living. This will assist the fight against human and animal conflict leading to the preservation of species, habitats, and resources for the future. (Hernandez Wolfe, 2021).

The adoption of this new model perspective inclusive of animals within the ecosystem, allows for the integration of species more meaningfully into the design process. The designs will go beyond simply creating spaces for animals; it will seek innovative measure to align with the natural world. Through multispecies and animal-aided design principles, designs can create environments that address the needs of humans and animals while also considering the wider environmental impact of the built form.

This alternative zoo model will draw learnings from the Multispecies Design framework by Daniel J Metcalfe. According to Metcalfe (2015), design has and continues to assert human dominance over other species and acts as a tool for animal domestication. Metcalfe (2015) states that early design and architecture has always been used to reinforce anthropocentric values from humans, delimiting animal spaces and controlling animal life. Design has only been focused on improving human conditions to the detriment of animals.



Metcalf (2015), reimagines a new model where design can be used to change the power dynamic between humans and animals acting as a tool for reconciliation by fostering interactions that promote empathy and respect between wild animals, humans and nature. This shift in design practices aims to include more attention to the needs of wild animal species and aims to presents a way of sustaining biodiversity within human-dominated habitats, and creating more opportunity for humans to interact with other species in a meaningful and respectful way within human-dominated environments. The alternative zoo model will examine the principles of multipurpose design together with precedent studies to identify how the framework may be applied to the design of the zoo education and rehabilitation centre (Metcalfe, 2015).

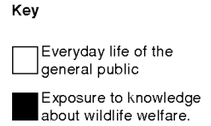
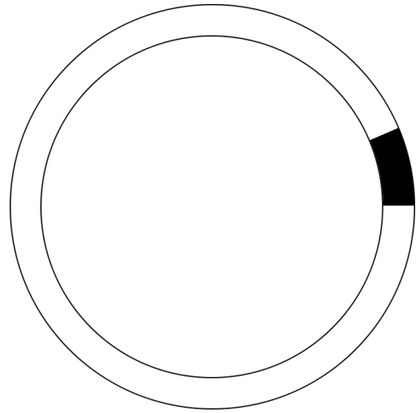


Figure 3.5:
The four principles of multispecies design from Metcalfe thesis (Drawing by Author, 2024 adapted from Metcalfe, 2015).

Figure 3.6:
Chart showing the relationship between the general public's everyday activity and their exposure to knowledge of wildlife welfare (Drawing by Author, 2024)

The first principle explored for a multispecies design was getting to know animal as clients. This focused of the education aspect of the model. Metcalfe (2015) suggests a strong background should be established to decentralise human design strategy and refocus it on animal welfare. This can only be achieved through a sound knowledge of the factors influencing animal welfare and how humans perceive it. This principle was explored through multiple site visits to the Johannesburg Zoo to understand its current design model and examine each exhibit and the design elements. Further research was conducted through interviews with zoo staff and outside welfare organisations, the findings state that the general public are often not exposed to wildlife welfare as it is not a part of their everyday life, because of their lack of knowledge around the matter they fail to recognise signs of abuse in animals in the zoo landscape. Zoo staff seem to think that welfare is prioritised at the zoo, but the focus of the animals are more scientific and aims at breeding and protecting endangered animals rather than rehabilitation and rehoming captive wildlife. Findings state that humans only think about welfare when they actively seek out opportunities of learning or it is resented to them in everyday life. Therefore, it is critical for designs to create opportunities of learning to create interactions where welfare may be emphasized (Metcalfe, 2015).



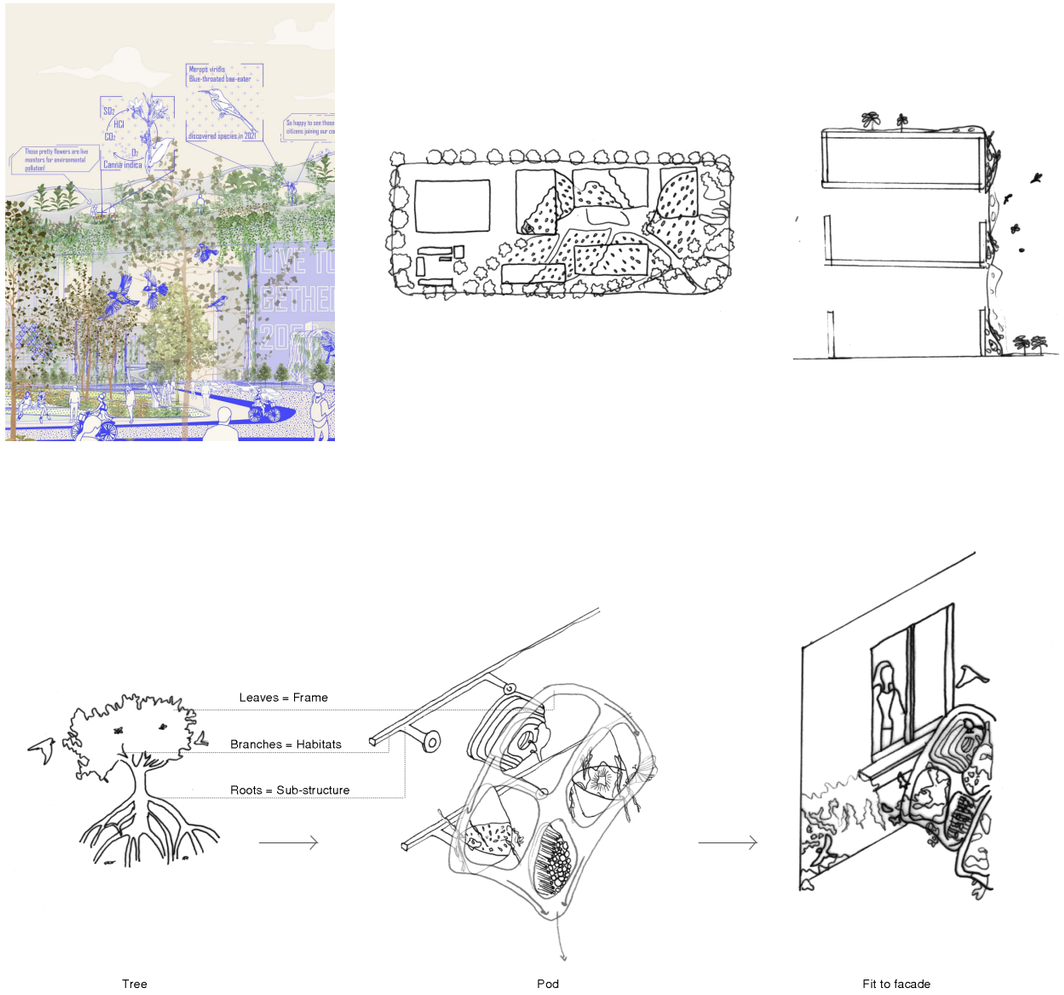


Figure 3.7:
Live together: towards multi-species coexistence | Ziting Wang | 2022

Translation between a tree, to a facade system to create human and animal interactions
(Drawing by Author, 2024; adapted from Wang, 2022)

The second principle explored for a multispecies design also focused on education as it asked the question; can design help make the presence of urban wildlife more visible in cities, by highlighting the needs creating awareness and thereby highlighting the benefits of living amongst animals? This approach encourages designers to extend the same care, responsibility, and attention to animals, ensuring that their habitats are preserved and their needs met within the built environment.

According to Metcalfe(2015), as urban design favours green, sustainable designs they become more appealing for wildlife which have been shown to migrate into urban areas around the world (Metcalfe, 2015). In some cities the population of certain wild animals exceed that of their counterparts in the wild. Therefore, planning for and facilitating the integration of these wild animals into urban environments can help ease human-animal conflicts, enhance urban biodiversity, and offer city residents more meaningful opportunities to connect with the natural world. The precedent study Live together: Towards multi-species coexistence, by designer Ziting Wang in Shenzhen, China canters an urban design on the relationship between humans, technology, and nature. The design integrates non-human species in the definition of citizenship, moving away from a human-centred society toward regenerative coexistence. The project redefines the boundaries created in the urban city by introducing wildlife and nature into the design of the city resulting in an increase in biodiversity and developing a new ecosystem. The project explores how the ground can become the facade of the building and the roof, each supporting the ecosystem by creating space for urban wildlife and nature. The project used a series of pod systems, on ground-these pods support trees and digital help desks while on the facade these pods transform into bird and insect habitats, with planters and digital screens providing real-time views into the species, and on the roof these pods transform into a roof garden for office workers to enjoy creating awareness and opportunity for learning. This precedent design creates spaces for both humans and animals, ensuring that urbanization does not destroy habitats but rather makes room for coexistence. The project's approach to integrating wildlife into urban spaces is relevant to designing the public space in the new zoo model. The use of facade systems and landscaping to create a unified environment for humans and animals can inform the development of a new urban ecosystem that supports multispecies coexistence (Nonarchitecture, 2022).

The third principle explored for a multispecies design is focused on enabling human animal interactions as it asked the question; What is the existing relationship between humans and the animals in the sociocultural context? It forces designers to challenge

misconceptions and misunderstandings regarding the animals, generating new narratives that foster co-habitation and reconciliation, thereby designing for a sustainable ecosystem. Metcalfe (2015), explains that human-animal interaction is the only way of transforming anthropogenic systems both in physical infrastructure and shifting systems of culture and belief to support a greater diversity of species (Metcalfe, 2015).

The precedent Liberty Wildlife Campus, by designers Weddle Gilmore Architects in Phoenix, Arizona is a clinic focused on raptor rehabilitation. The project acts as an expansion of the Liberty Wildlife Clinic, furthering the organisations educational ad rehab influence. Located on a Brownfield site, the project faces the city northwards and the Rio Salado Habitat southwards. The position of the building, the programming and the design of both building and landscape allows the project to connect with nature, restoring the area to the lush riparian corridor it once was. The project incorporated numerous design elements that aid the environment and the ecosystem. First, as the project is located partially on the Rio Salado habitat, a strategy was developed to bring the outlying landscape into the site and create a series of bioswales to manage stormwater. Second, the project aimed to make water conservation strategies highly visible to provide educational opportunities, so they located two rainwater-harvesting cisterns at the front of the entrance. Third, the project uses the entire roof to fit solar panels, decreasing the electricity use while incorporating daylighting on the north facade and shading devices and less surface area on the southern facade. The project also incorporates a series of recycled material into the design of the building, including copper panels, river rocks to form gabion walls and timber. Lastly the project contributes to the community and wildlife rehabilitation as its design elements aid its work with raptors, the project also donates their feathers and carcases to the indigenous groups who use these in rituals (Jacques, 2017). The project offers insight into how ecosystems can be regenerated and connect with existing habitats. The programming layout and the sustainability principles, such as water conservation and material reuse, which can be applied to the new models design to create a structure that supports both the ecosystem and the community.

Designing a multi species ecosystem should merge the habitats of both humans and animals. This approach will promote deeper interactions and enhances the human-animal bond by creating shared, in-between spaces that blur the line between interior and exterior. This concept involves incorporating spatial layers into the architectural design, resulting in areas that cannot be classification as either indoor or outdoor. Instead, these spaces blend elements of both, creating a continuum that

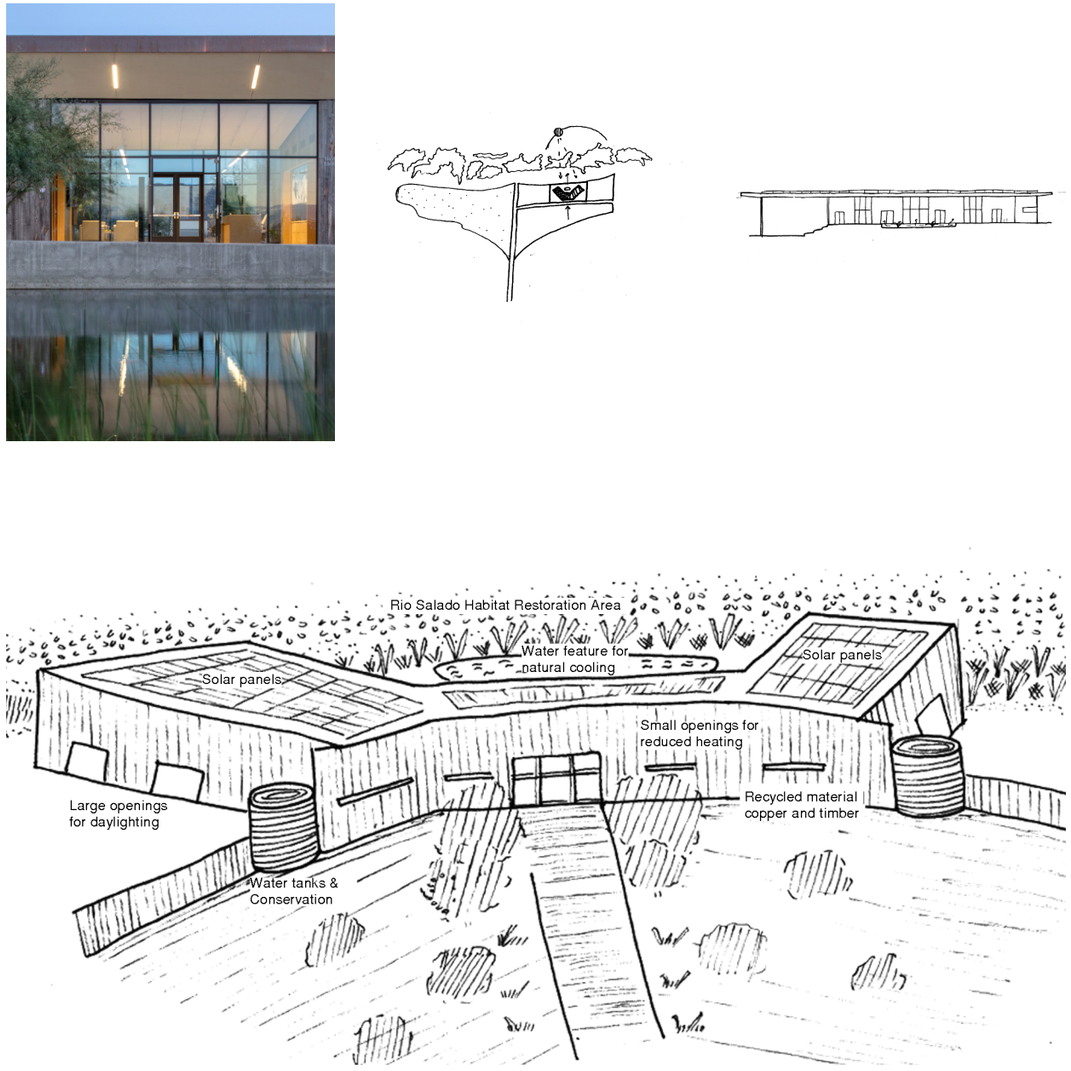
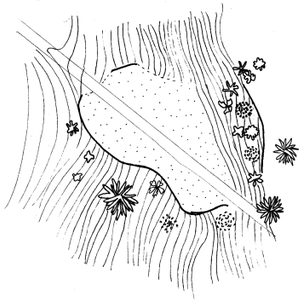


Figure 3.8:
Liberty Wildlife Rehabilitation Center |Weddle Gilmore Architects | 2017

Material and design decisions used to create a sustainable ecosystem (Drawing by Author, 2024 adapted from Jacques, 2017)







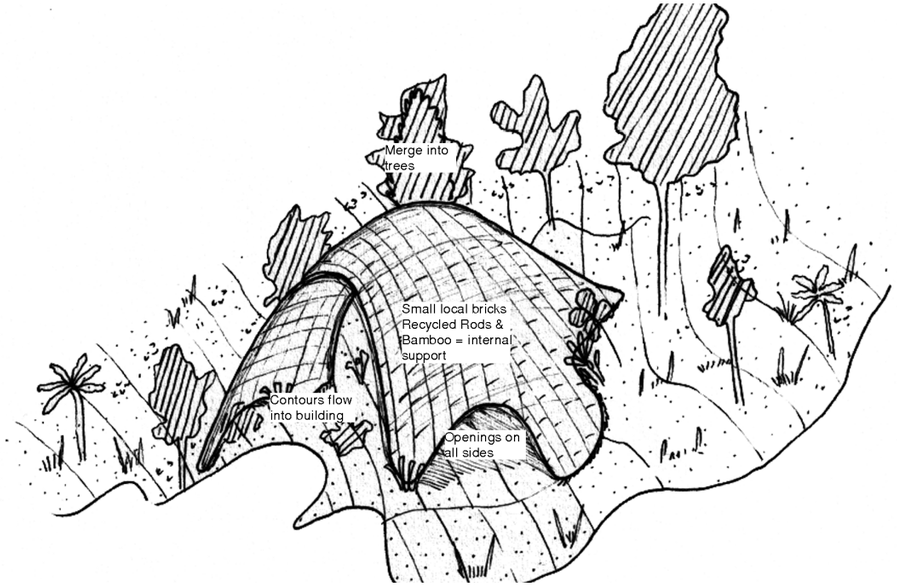
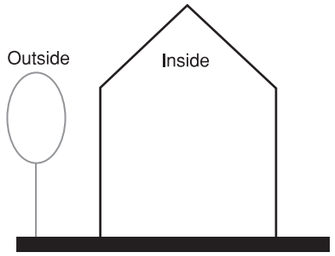


Figure 3.9:
Haven The Eternal Experience Pavilion | Earthscape Studio | 2022

Flow of exterior space into the interior, through contours, planting and openings
(Drawing by Author, 2024 adapted from Studio Iksha, 2022))



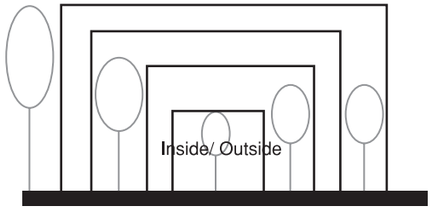


Figure 3.10:
Layering of a space to merge inside and outside space
(Drawing by Author, 2024; adapted from Krstic et al, 2016)

that encourages interaction between humans and animals These spatial layers, serve as the primary constructive components of the building, by applying sustainable design principles like natural ventilation and daylighting, the distinctions between inside and outside can be further blurred, fostering a more integrated and harmonious environment (Jovanovic, 2016) .

The precedent Cow Shelter, by designer Earthscapestudio in Peermade, India is an animal shelter designed to support the natural behaviour of animals. The shelter provides protection from harsh weather conditions while respecting climatic data and the needs of the animals. The design is simple, it contains a single element that spans from the ground up to create the roof and wall structures, acting as the structures skeleton. It has no fixed walls as is accessible from each side, allowing for natural ventilation, protection from elements and daylighting blurring the line between inside and outside spaces.

By studying the animals' basic needs and environmental conditions, and by carefully selecting natural materials and construction methods, the Cow Shelter demonstrates how a structure can serve both the environment and its occupants. This sustainable approach to design not only benefits the animals but also creates a shared space where humans and animals can coexist more harmoniously (Tuzen, 2023).

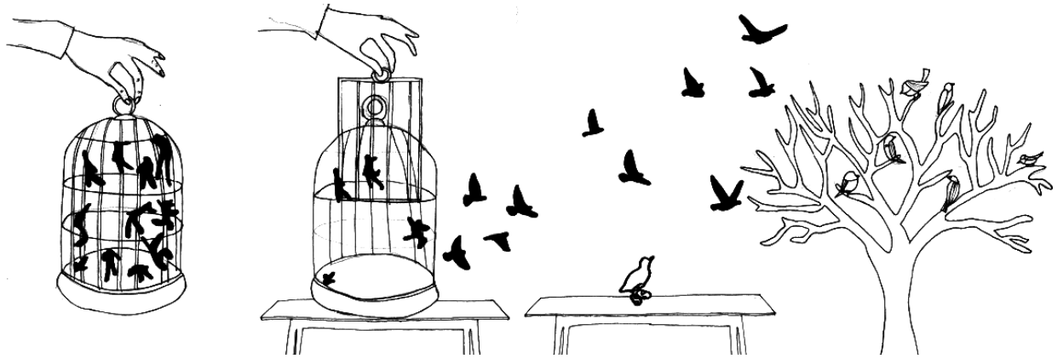
Metcalfe (2015), states that rehabilitation should be species oriented and the fourth design principle of multispecies buildings focuses on the representation of animals, as the focus of my project shifts from education of humans to fostering the rehabilitation of orphaned, abused, captive and displaced wildlife the representation of animal perspectives take priority. Non-human species have rarely been considered as potential beneficiaries of the designed outcome planning and facilitating the integration of these wild animals into urban design can help reduce human-animal conflicts, providing richer opportunities for city dwellers to engage with the natural world

and for captive animals to be rehomed within the urban landscape (Metcalfe, 2015).

According to Metcalfe (2015), the treatment of animals as design clients offers a method for integrating them into human-dominated environments by addressing their needs through the design and modification of human systems. This approach facilitates a balanced integration that respects both human and wildlife needs, helping to reduce conflicts, protect vulnerable species from human impact, and safeguard people from potentially dangerous wildlife. It also enhances public motivation to protect nature, fostering empathy and wonder for the natural world while balancing the power dynamics between species (Metcalfe, 2015).

The alternate zoo model will therefore, draw on the multispecies design principles as it fosters a new space for change. These new zoo space would be dedicated to housing animals that are unable to survive in their natural habitats, due to being injured or orphaned. These facilities would provide a space for recuperation and rehabilitation. Injuries and orphaning caused by human activities would serve as powerful educational tools, highlighting issues of human encroachment. These spaces would allow visitors the opportunity to witness or participate in the rehabilitation and care of these animals, gaining insights into interdependency, vulnerability, and the ethic of care.

The ultimate goal for these animals would be to reintroduce them into safe, wild habitats when they are ready. This approach would transform visitors' experiences by framing them within the context of human-wildlife conflict and offering experiential education about the compassionate and creative possibilities of personal and ecological interconnectedness. It would significantly reduce the focus on entertainment at the expense of animals, shifting the zoological gaze towards a reciprocal, subject-to-subject interaction. This model would connect visitors to the protection and rehabilitation of ecosystems, fostering a vested interest in maintaining healthy habitats for the animals' eventual return to the wild and reducing the need for animal captivity.



Caged Bird
by Maya Angelou

"A free bird leaps
on the back of the wind
and floats downstream
till the current ends
and dips his wing
in the orange sun rays
and dares to claim the sky.

But a bird that stalks
down his narrow cage
can seldom see through
his bars of rage
his wings are clipped and
his feet are tied
so he opens his throat to sing.

The caged bird sings
with a fearful trill
of things unknown
but longed for still
and his tune is heard
on the distant hill
for the caged bird
sings of freedom.



The free bird thinks of another
breeze
and the trade winds soft through
the sighing trees
and the fat worms waiting on a
dawn bright lawn
and he names the sky his own.

But a caged bird stands on the
grave of dreams
his shadow shouts on a nightmare
scream
his wings are clipped and his feet
are tied
so he opens his throat to sing.

The caged bird sings
with a fearful trill
of things unknown
but longed for still
and his tune is heard
on the distant hill
for the caged bird
sings of freedom."

This project explores the new model through the two central themes of healing harmony and building community. The Healing theme will incorporate two elements of healing the relationship between human and animal, and the healing(rehabilitating) of animals that were harmed because of humans. It will examine how animals may be released from captivity and identify which animals are capable of surviving in the wild and which animals would rather benefit from a sanctuary. The second theme the new model will explore is Building Community. This theme will focus on eliminating the human-wildlife conflict through the establishment of a co-dependent society where animals and humans can co-exist together. This new relationship will seek to diminish the dominate human power through educational and volunteer programs that allow humans to learn about themselves and their impact on the animals and how this can be corrected for the future.

These themes draws inspiration from the "Caged Bird" poem by Maya Angelou. The poem speaks of a "caged bird" confined to a "narrow cage," where its movement is restricted. The bird's only form of expression is its song, which reflects a yearning for the freedom it cannot achieve. This caged bird serves as a metaphor for the oppression of captive animals in zoos. Just as the bird's limited cage constrains its view, captive animals are confined to restricted spaces and limited perspectives. The captivity not only confines the bird but fundamentally alters it, stripping away its essence, much like how captivity erodes the natural lives of wildlife. The bird's song, filled with the hope of freedom, highlights the profound absence of that freedom. Though the song is filled with hope, it originates from a place of deep suffering, serving as a coping mechanism for an unbearable reality(Angelou, 1978). The new model



seeks to end this reality for captive animals offering them a chance to experience freedom throughout this and future generations.

Through this the alternate zoo model aims to integrate wild species into urban environments and introduce new considerations for other species in the planning of human habitats. This approach aims to minimize human-animal conflicts, which frequently occur when animals venture into areas not designed or suited for them. Achieving this shift involves establishing new socio-ecological balances, focusing on designs that resemble and function like natural ecosystems. It also aims to create ecosystems that blend into human environments, ensuring that these spaces are valued and respected rather than dismissed (Metcalfe, 2015).

Figure 3.11:
Animals released from captivity, rehabilitated and free in the urban wild
(Author, 2024)

Figure 3.12:
Caged bird poem by Maya Angelou.
(Poem: Angelou, 1983
Illustration: Drawing by Author, 2024; adapted from NotMuchToSay, n.d.)

Figure 3.13:
College showing the new themes of healing harmony and building community (Author, 2024)



As the girl watched in distress, people walked by, oblivious to the small, injured bird lying motionless on the pavement.

4.
Designing for Co-Existence

Integrating Human and Wildlife Spaces

Power & Dominance

Humans view themselves as superior over animals in the natural world. Through zoos they exert their power over animals, using them for profit and entertainment.
This power imbalance is shown in the way animals' lives are controlled, stripping them of their freedom and choice. Essentially, animals are reduced to objects subject to the human gaze, highlighting an exploitative relationship where human interests overshadow the well-being of the animals.

Captivity & Welfare

Captivity often leads to poor welfare for animals, as it confines them to artificial environments that restrict their natural behaviors.
This confinement can lead to physical and psychological distress, to truly support animal welfare, spaces must evolve to prioritize the well-being of animals, providing environments that allow them to express their natural behaviors freely.

Rehabilitation & Designing for Co-Existence

Rehabilitation challenges traditional power dynamics by shifting the focus from entertainment to education and conservation. It emphasizes awareness, respect, and the value of allowing animals to express their natural behaviors in enriched environments. The aim is to create habitats that reflect the complexity of the natural world, allowing animals to thrive and coexist alongside humans in more harmonious and sustainable ways.

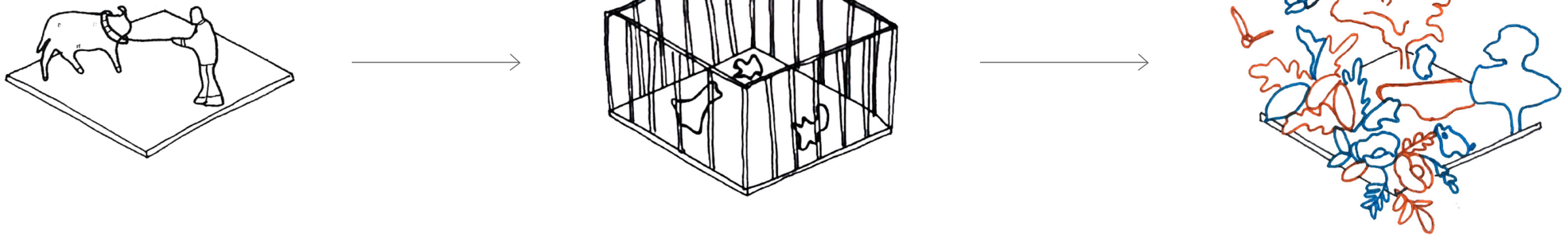


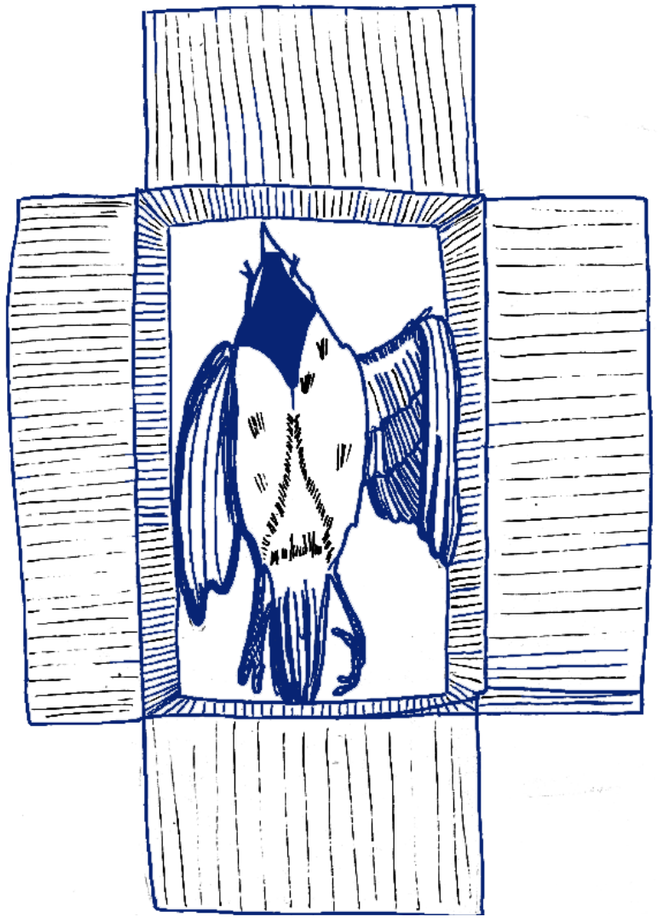
Figure 4.1:
Short Story Panel 04
(Drawing by Author, 2024; adapted from Philgreff, 2018).

Figure 4.2:
Research themes to design develpment
(Author, 2024)

Figure 4.3:
Design strategies for human and animal co-existence
(Drawing by Author, 2024; adapted from Long, 2024)

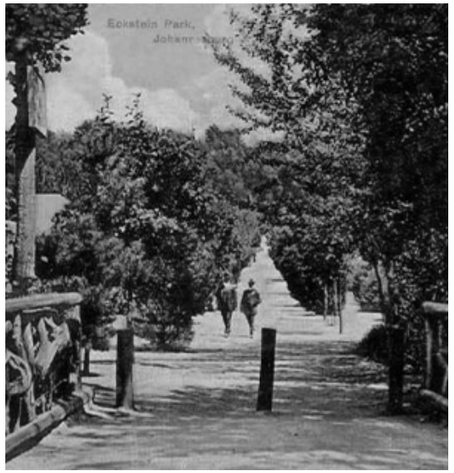

Adaptive Management
Use adaptable, modular design elements that can be adjusted in response to environmental
Water Features
Incorporate ponds, streams, and wetlands that support diverse species while improving water quality.
Design for Public and Wildlife Welfare
Include landscape elements that enhance wildlife welfare, such as feeding areas, water sources, and shaded resting spots.
Species-Specific Enrichment
Design spaces with enrichment elements tailored to specific species, such as climbing structures, perches, or basking spots.
Diverse Vegetation
Incorporate a variety of plants that support both wildlife & human.
Design for Surrounding Conditions
Orient buildings to the natural landscape, incorporating existing trees and site features to blend seamlessly with the environment and minimize habitat disruption.
Wildlife-Friendly Materials
Use natural materials that support wildlife and prevent accidental collisions, such as bird-safe glass and non-toxic finishes.
Wildlife Habitats
Replace lost habitats by incorporating features like green roofs, façade habitats, and nesting boxes directly into the building design.
Rehabilitation & Captivity
Design rehabilitation spaces that mimic natural habitats, ensuring animals in care experience minimal stress and have opportunities for enrichment.
Enhance Connectivity
Create wildlife corridors that connect fragmented habitats, facilitating safe movement and genetic flow between species.
Sustainable Access
Promote sustainable transport options like walking, cycling, or public transport to reduce carbon emissions and enhance site access.
Smaller Buildings
Designing smaller structures minimizes habitat loss, construction impact, and maintenance needs, reducing disruption to the existing ecosystem
Sustainable Design
Align buildings with climate conditions to reduce habitat damage and energy use. Use sustainable practices like rainwater harvesting and water reuse to protect local waterways.

5.
Site



She quickly jumped up and said, "Mom, we have to help the bird!" Her heart raced as she wondered if the bird would be okay. Her mom agreed, and together they gently placed the bird in a small box to keep it safe

Johannesburg Zoo Timeline



1918

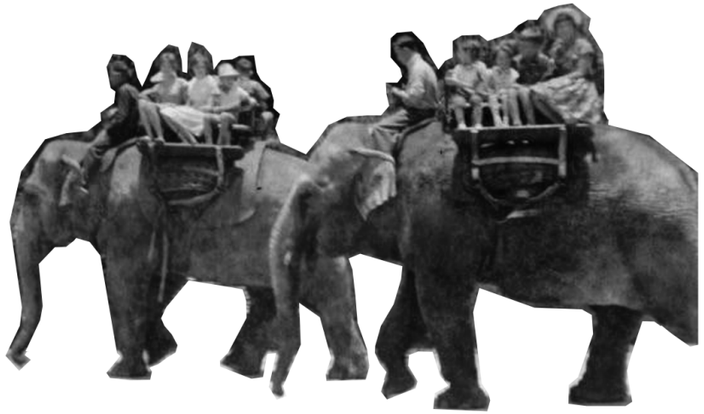
Establishment & Early Developments
The land for Johannesburg Zoo and Zoo lake, located in then Sachsenwald was donated to the city by Herman Eckstien & Co. The company requested the land to be used as a public park and be named in Ecksteins honour. A small collection of animals, including a lion, leopard, and giraffe, was donated and basic enclosures were constructed.
The Bandstand was built, which hosted popular brass band music performances.
Several new enclosures were developed, namely the stone elephant and rhino houses. Animal rides also began with an elephant and a camel.

1933

Expansion and Infrastructure Improvements
The zoo expanded with new buildings to accommodate animals from Pretoria Zoo via animal exchanges. An open lion enclosure was constructed with a moat, and fences were erected around the entire site. Separate amenities were introduced for European and non-European visitors, reflecting the segregation policies of the time. A blue gum tree plantation was cleared to make way for recreational areas.

1948

Entertainment and Animal Welfare Initiatives
Elephant, llama, pony, and donkey rides became popular attractions. After the death of Sally the elephant, rides were temporarily stopped until new Asian elephants were introduced and trained. An animal hospital was built, and the zoo received a large donation of birds, significantly expanding its aviary collection.



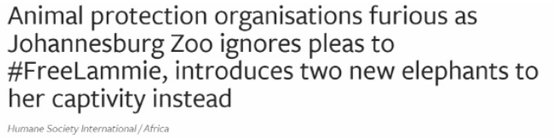
1963

Modernization and Public Engagement
The zoo introduced entrance fees for visitors. During this period, new enclosures were built, and the zoo commissioned an overseas firm to develop a master plan. The Rietvlei Farm was acquired to serve as a breeding and recuperation facility for animals. A shift towards larger, more naturalistic habitats began during this time.



1993

Conservation and Education
The zoo became involved in conservation efforts, including successful breeding programs like that for wild dogs. Partnerships with organizations such as Caltex, Shell, the Wildlife Society, and the Nature Foundations of South Africa were established. Zoo tours were introduced, led by volunteers from the Wildlife Society. The old elephant house was re-purposed into an auditorium, and the animal hospital received significant upgrades.


Animal protection organisations furious as Johannesburg Zoo ignores pleas to #FreeLammie, introduces two new elephants to her captivity instead

Humane Society International / Africa



1978

Focus on Naturalistic Habitats
The zoo's master plan was further developed with input from animal consultants and architects, emphasizing the creation of open, large enclosures that mimicked natural habitats. This era marked the zoo's transition into a significant educational and conservation-focused institution, attracting school groups and adding rare species to its collection.



2024

Breeding Programs and Heritage Conservation
Several zoo buildings were designated as heritage buildings. The zoo launched indigenous gardens designed for disabled visitors. New exhibits such as the Great Ape House and the Animals of the Amazon were developed, and further facilities were made wheelchair-friendly. The zoo faced criticism and petitions regarding the treatment of animals from several welfare groups, reflecting the ongoing public scrutiny

Site Study



Figure 5.1:
Short story panel 04
(Drawing by Author, 2024
adapted from Penzi, 2011)

Figure 5.2:
Joburg Zoo timeline
(Timeline by Author, 2024
images sourced from
Munro, 2015; Taylor,
2022; "Rhino March",
2013; and Human Society
International, 2019)

Figure 5.3:
Joburg Zoo current
activity
(Author, 2024
image sourced from
"Johannesburg Zoo", n.d)

Figure 5.4:
Joburg Zoo activity on
weekdays and weekend
(Author, 2024)

Observations

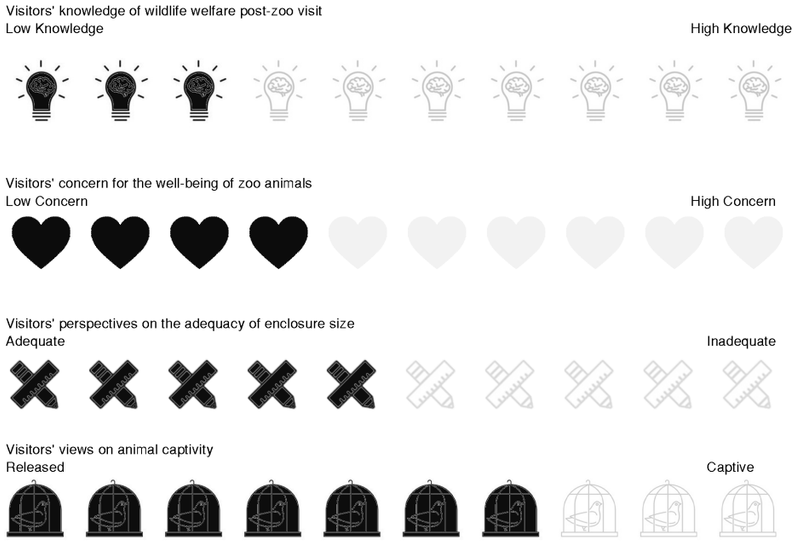
Throughout the year, I made numerous visits to the site, each time witnessing the zoo's constant activity. On weekdays, the zoo serves as an educational hub, particularly for school groups. For instance, I observed a school group touring the newly opened bird exhibition, where they also attended a talk on light laws. On weekends, the zoo transforms into a vibrant community space, hosting public events such as church group picnics and Boy Scout scavenger hunts.

Weekday Activity



Weekend Activity





Surveys

Through surveys conducted with visitors, I aimed to understand the zoo's impact on its visitors, especially concerning their understanding of animal welfare. The survey results revealed that visitors gained minimal knowledge about animal welfare and often felt little emotional connection with the animals on display. Some respondents even mentioned that they tend to avoid visiting the zoo regularly because they feel uncomfortable seeing the animals in captivity.

Analysis

The site analysis delves into the spatial dynamics from both human and animal perspectives, aligning with the theme of multispecies design. This approach allows for a nuanced understanding of how different species perceive and utilize the space.

Figure 5.5:
Graphic representing survey results
(Graphic by Author, 2024 images sourced from Bsd Studio, n.d; Chadwick, 2013; MMGraphicwork, n.d and Nickfz, n.d)

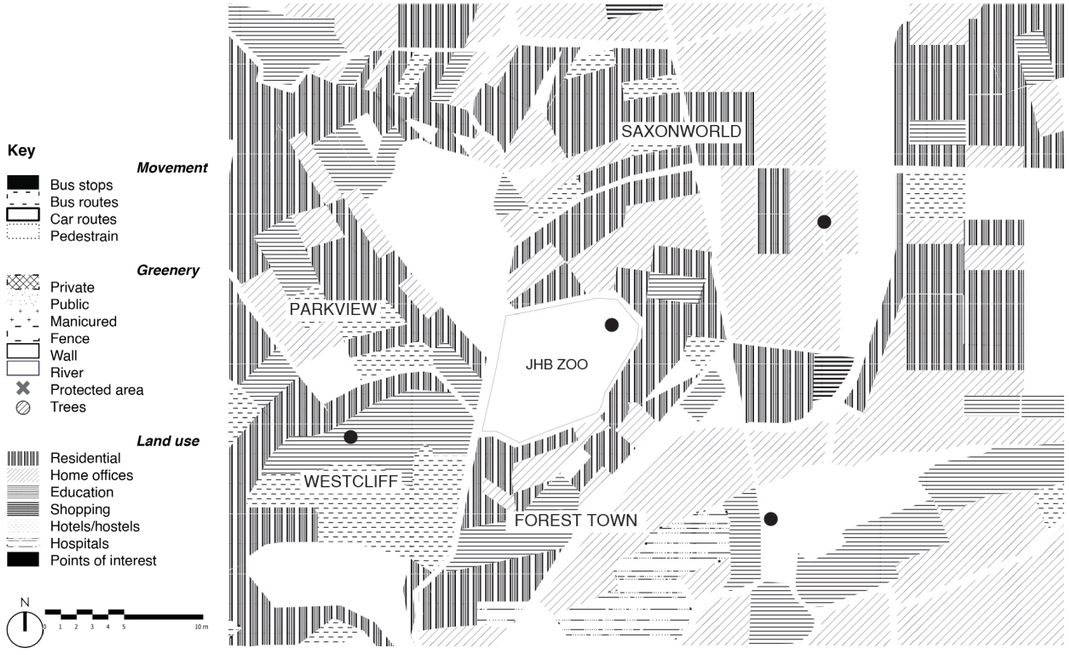
Figure 5.6:
Land use Mapping, main uses include Residential and Home offices
(Author, 2024)

Human Perspective

From the human perspective, the mapping focuses on land use and circulation patterns at an urban scale. This includes analysing heavily trafficked bus and vehicle routes, as well as pedestrian movement and high-density areas. At a more localized scale, the analysis zeroes in on the Johannesburg Zoo site, exploring the edge conditions and identifying areas of high human density around the zoo.

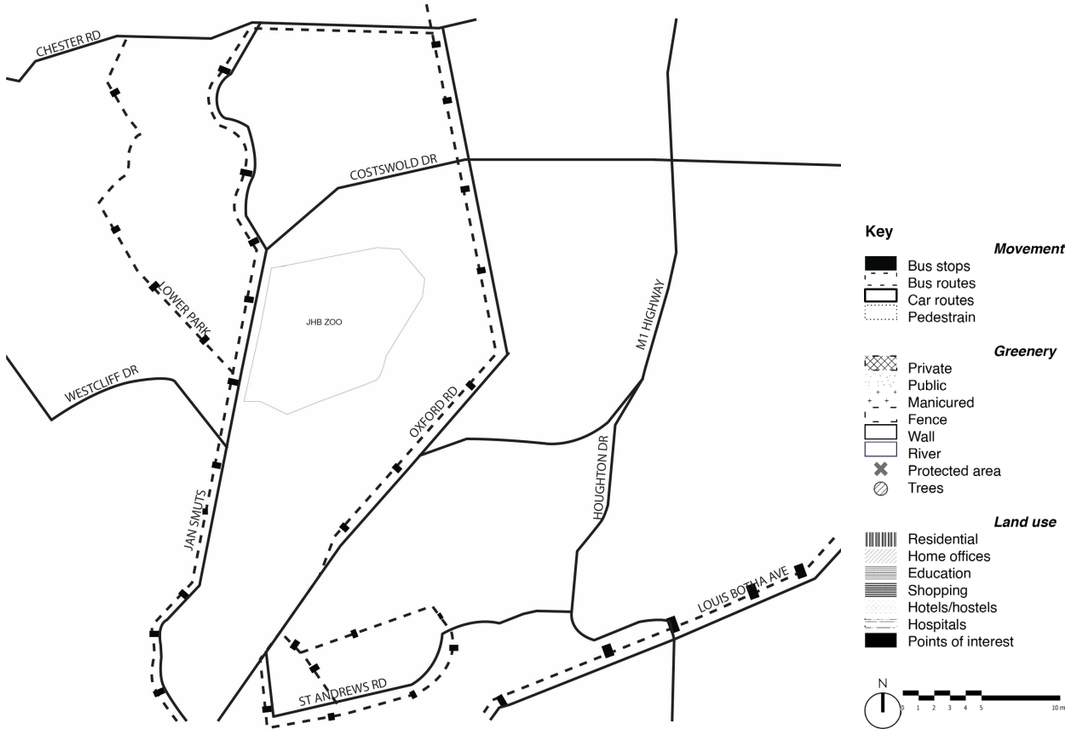
Urban Land Use

This map identifies the various programming types around the site to understand the demographic and how best to engage with them.
The analysis shows that the area is predominantly residential, with many homes also functioning as offices or businesses. The surrounding neighbourhood includes two large primary schools, a few créches, and some shopping areas.



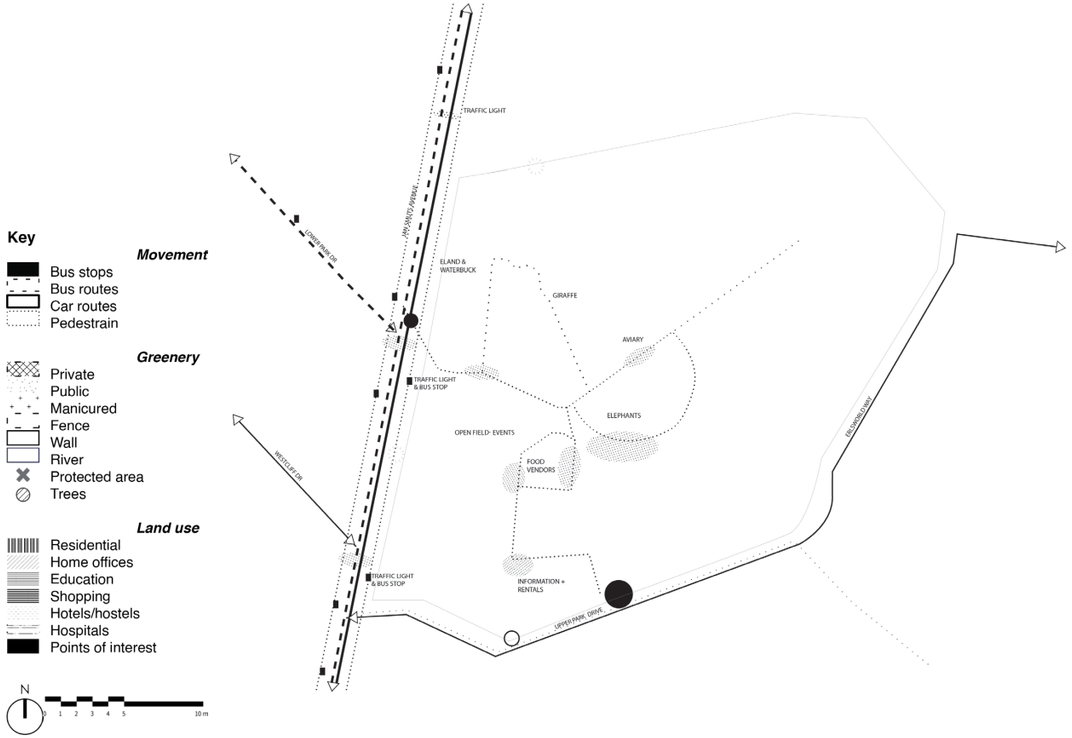
Urban Circulation

This analysis maps the high-traffic bus routes, bus stops, and vehicle roads to identify the busiest streets around the site.
The findings indicate that Jan Smuts Avenue and Lower Park Road, along Zoo Lake, experience the highest traffic flow.



Site Circulation

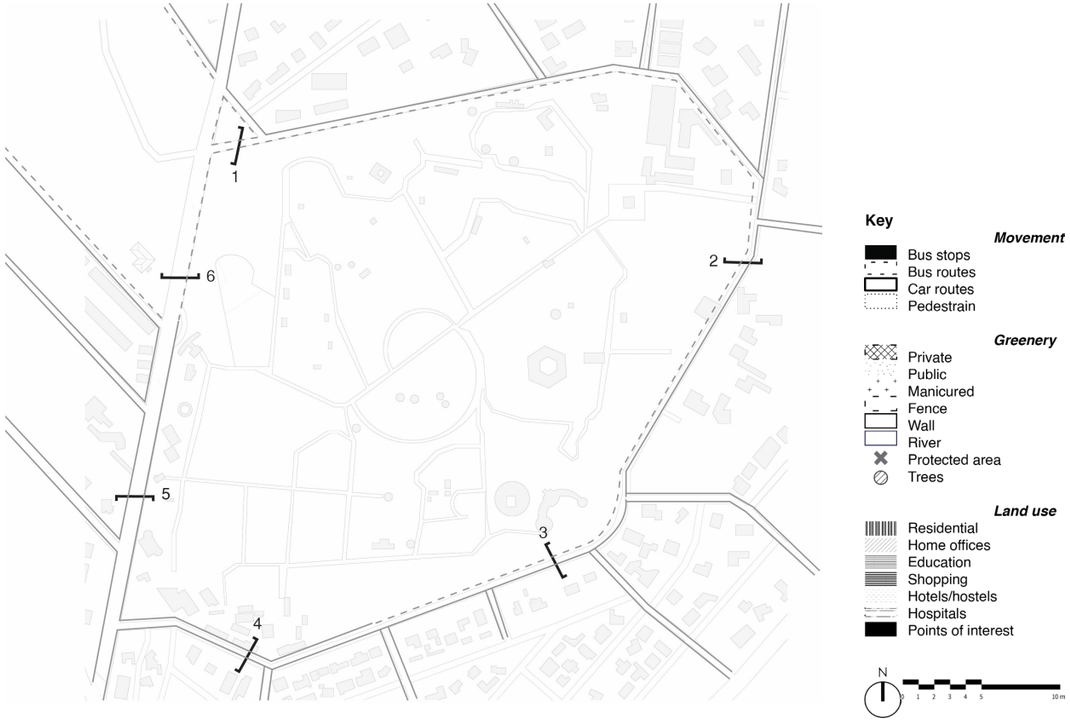
This analysis maps the high-traffic bus routes, vehicle roads and pedestrian pathways.
The results reveal the highest traffic for bus, vehicles and pedestrains on Upper Park Road and Jan Smuts Avenue.Pedestrian activity is most concentrated at intersections and near popular zoo exhibits such as elephants, and green event spaces



Site Edge Conditions

This mapping examines the boundary conditions of the zoo, detailing which areas are fenced or walled and their connection to the city. The purpose is to identify potential locations for the intervention and how it might engage with the urban environment.

The analysis reveals that the zoo is mostly walled along Lower Jan Smuts Avenue and Upper Park Road, while other sections are fenced. There is a suitable pedestrian walkway along Jan Smuts Avenue and a larger one along Upper Park Road.



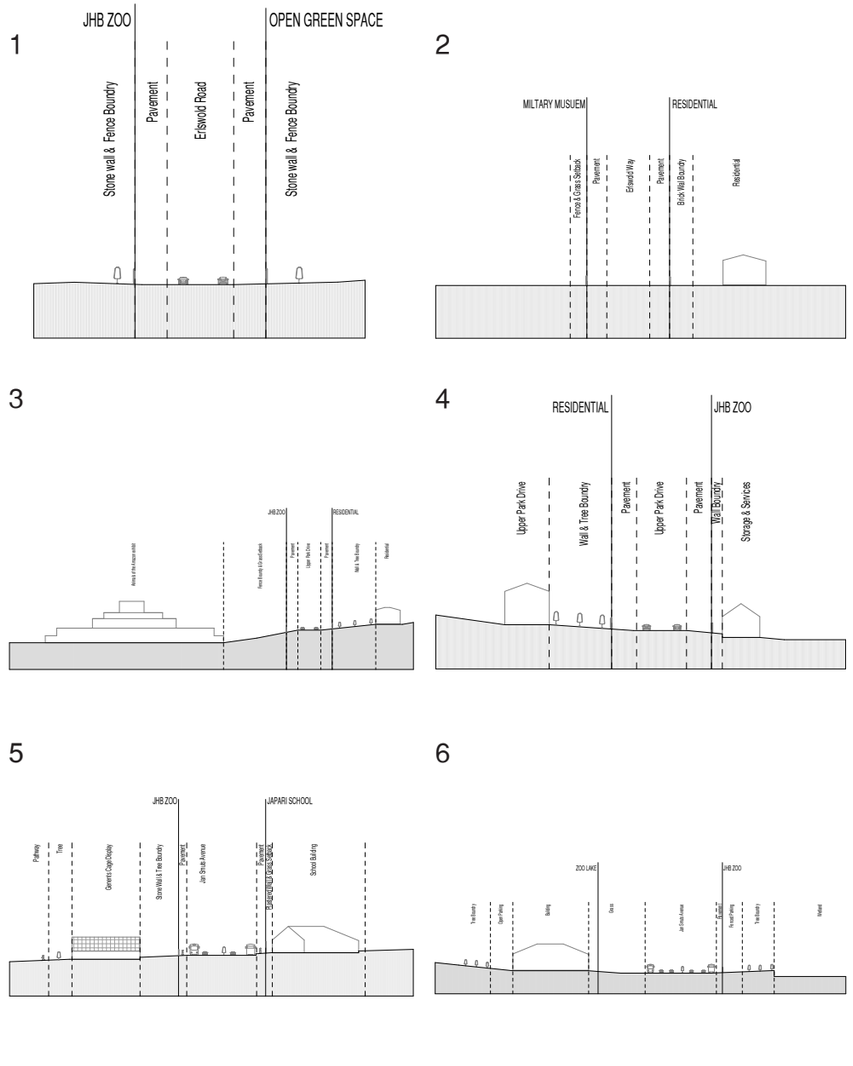
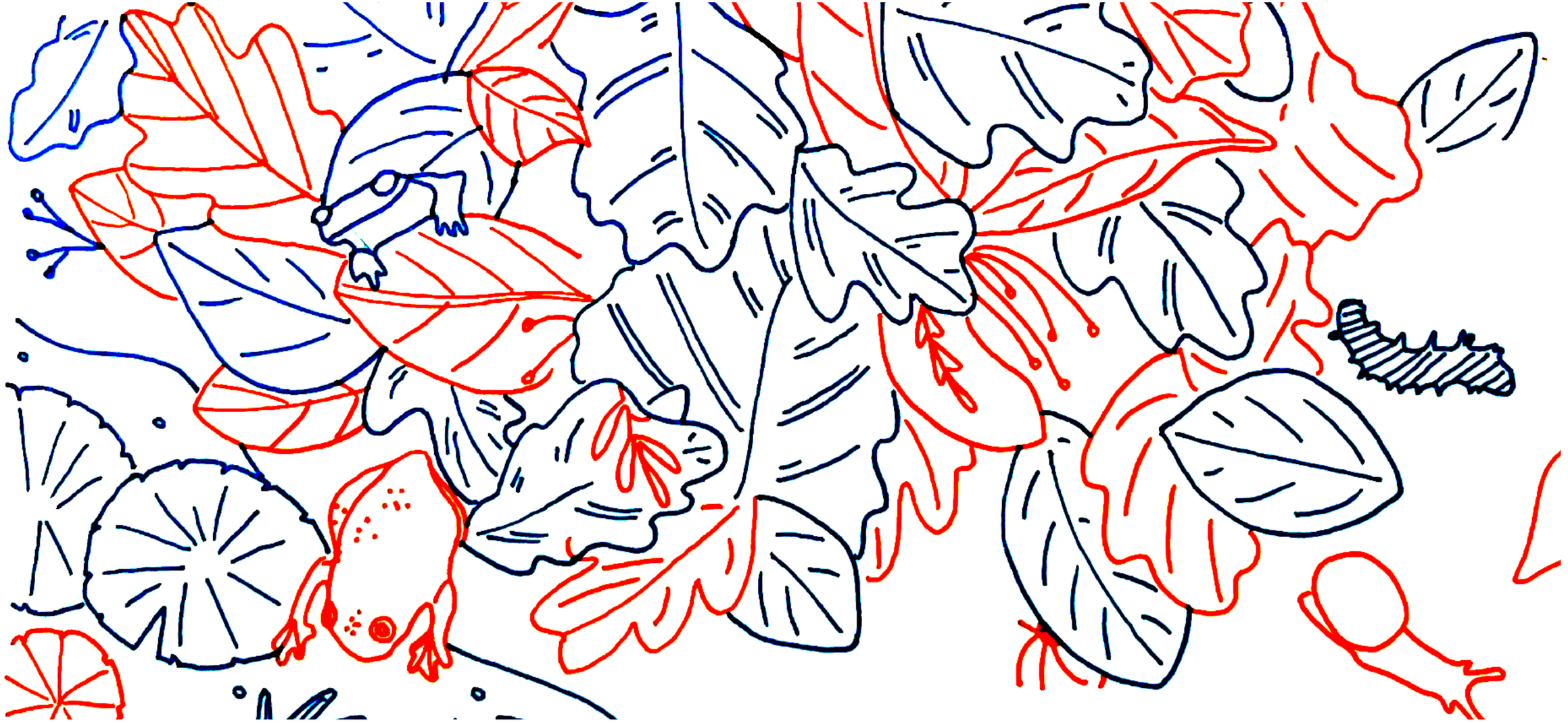


Figure 5.7:
Circulation map, highlights key bus routes and stops, & roads with heavy vehicle traffic
(Author, 2024)

Figure 5.8:
Site circulation map, highlights car and pedestrian traffic patterns. While exploring the visitor flow and entrance types
(Author, 2024)

Figure 5.9:
Edge map: Illustrating the edge conditions around the site
(Author, 2024)

Figure 5.10:
Edge Sections: Illustrating the edge conditions around the site
(Author, 2024)



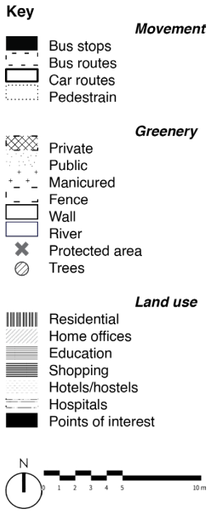
Animal Perspective

From the animal perspective, the mapping investigates conservation efforts in South Africa, particularly in relation to reintroducing animals into the wild. Additionally, the study examines the green spaces surrounding the zoo, the landscaping within the zoo itself, and the urban wildlife's use of these landscapes, using axonometric mapping techniques.

Provincial Conservation Areas

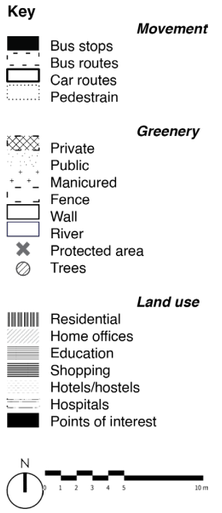
This map identifies protected areas in South Africa where wildlife can live without human threats, providing potential release sites for animals rehabilitated by the zoo. The results indicate that most conservation areas are located in Cape Town, with a few in Johannesburg.





Urban Greenery

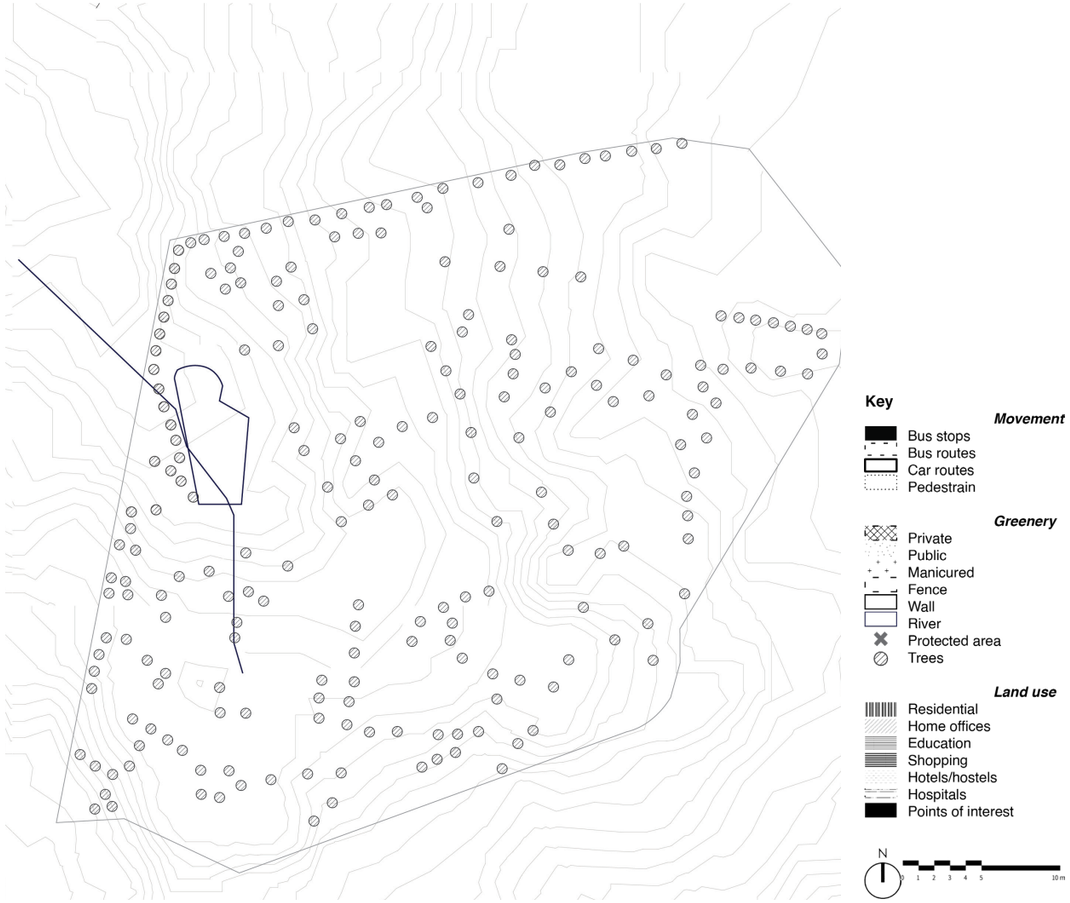
This mapping highlights green spaces around the site where urban wildlife can thrive, indicating areas designated for wildlife. These primarily include sectioned gardens and nature reserves.





Site Terrain

The terrain map of Johannesburg Zoo identifies site slopes, river lines, and tree placements. It shows that the site slopes downward toward Zoo Lake and is bordered by dense tree coverage.



Site Land Use

This analysis maps the zoo's landscapes and examines animal interactions with these environments. It highlights how versatile spaces, such as ponds, are used by various animals but also notes the limited provisions made to support specific wildlife needs, like bird feeders or squirrel habitats.

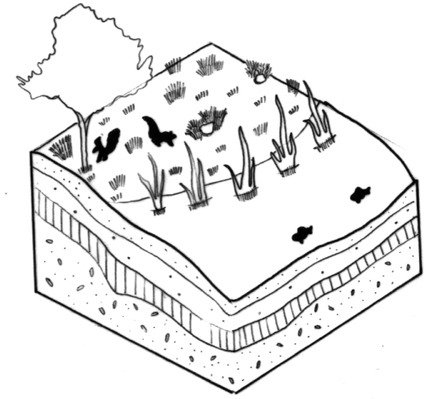


Figure 5.11:
Frog landscape
(Author, 2024; adapted from Dale-Scott, 2020)

Figure 5.12:
Conservation and protected areas for wildlife in South Africa, showing where animals can be released in a safe environment
(Author, 2024)

Figure 5.13:
Terrain, trees and waterline in the Joburg Zoo
(Author, 2024)

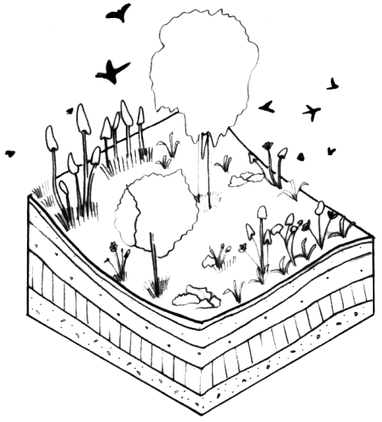


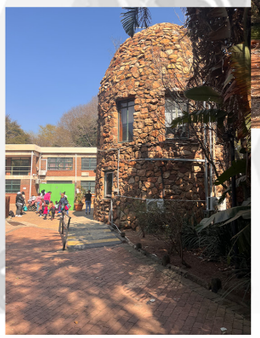
Figure 5.14:
Green areas around the site, that allow and make space for urban wildlife
(Author, 2024)

Figure 5.15:
Axonometric Diagram: illustrating how various urban wildlife interact with and navigate the landscape within the Johannesburg Zoo.
(Author, 2024)









Site Selection

Based on the site analysis, the proposed intervention is ideally located at the corner of Jan Smuts Avenue and Erlswold Street, directly opposite Zoo Lake, a site once connected to Johannesburg Zoo. This location is optimal due to its high visibility and accessibility, with significant foot traffic from public transport, cars, and pedestrians.

The project aims to redefine the traditional zoo model by positioning the intervention along the edge of the site, embodying the concept that "once you've reached the edge of the zoo, you've seen the world." By placing the project at this boundary, it seeks to inspire the development of a dynamic urban environment where humans and wildlife coexist harmoniously.

Building community



Figure 5.16:
Site Selection
(Author, 2024; adapted from "Johannesburg Zoo" n.d)

Figure 5.17:
Building Community
(Author, 2024)



Figure 5.18:
Site strategy diagrams
(Author, 2024)

Urban Strategy

The Public Edge: This area will prioritize fostering connections between the public and urban wildlife, offering spaces for interaction, relaxation, and shared activities. Designed as a multifunctional park, it will host events and activities that nurture the human-animal relationship, with public programs and landscaping enhancing the quality of life for local residents.

Living Grounds for Wildlife: This section will provide natural habitats for herbivorous species that cannot be released back into the wild. It will also house the existing animal hospital. Separated from visitor areas, these grounds will allow animals to live freely, without direct human interference, ensuring their well-being.

Existing Conference Halls and Military Museum: These existing facilities will remain as they are, continuing to serve the community.



Figure 5.19:
Healing Harmony theme
(Author, 2024)





Figure 5.20:
Site photos collage, from exterior
(Author, 2024)

Figure 5.21:
Site photos collage , from interior
(Author, 2024)

Design Strategy

The intervention will serve as a connector, linking the public to new zoo elements. By replacing traditional fences with planting corridors, the design integrates wildlife into the everyday experiences of city dwellers, creating a central hub that supports community engagement for both humans and wildlife.

The intervention focuses on integrating wildlife into urban life, using movement as a tool for exploration, learning, and interaction. The design will feature flexible spaces that blur the boundaries between indoors and outdoors, creating multifunctional environments that serve both humans and wildlife.

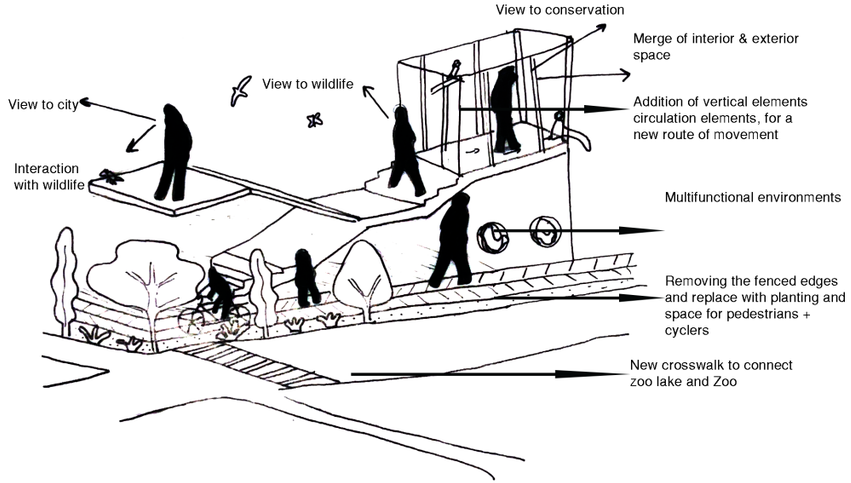
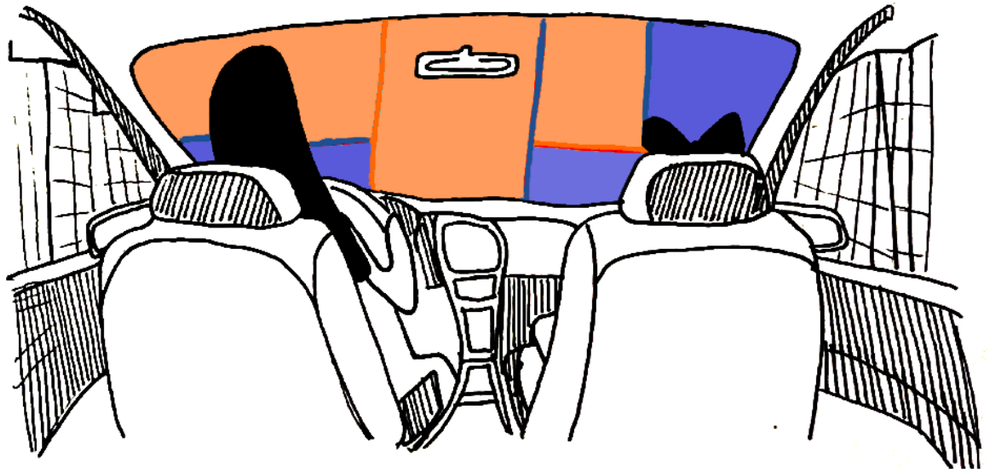


Figure 5.22:
Design and site strategy, indicating vertical level changes and planting boundaries
(Author, 2024)

6.
Programme



As they drove to get help, the mom said, "We're going to take the bird to the Johannesburg Zoo." The girl was worried. "No, Mom, they keep animals in cages there!" she cried. She couldn't bear the thought of the bird being locked up. Her mom smiled and said, "Not anymore. They help animals now."

Intentional Interaction

The programming of this research aims to design a public park focused on movement and views, with the goal of fostering stronger connections between humans and wildlife. The intention is to offer diverse experiences within the park while ensuring that strategic viewpoints link visitors to the urban landscape and surrounding conservation areas. This approach seeks to reduce the high number of daily zoo visitors, who primarily engage in passive viewing and entertainment, by shifting the focus from entertainment to education. Through this, the project integrates wildlife care with public education, creating seamless transitions between indoor and outdoor environments while prioritizing animal welfare over human needs.

According to the SABC, the Johannesburg Zoo receives approximately 500,000 visitors annually. (SABC, 2024).The new zoo model aims to reduce this number to 100,000 annual visitors, through multiple phases, allowing animals more freedom to live in a more organic environment.

The following breakdown outlines how the proposed model intervention will reduce visitor numbers

	Estimated Daily Visitors	Number Of Days Open Annually	Estimated Annual Visitors
Weekdays	100	250	25 000
Weekends	250	100	25 000
Special Events	500	5	2 500
			Phase 1: 52 500

This reduction in visitor numbers results from the shift in focus of the intervention, which prioritizes learning and rehabilitation over large enclosures for viewing and the stress they cause to both animals and visitors. The target audience is therefore more focused on nature enthusiasts, conservationists, and school groups, rather than tourists. Additionally, the model highlights urban wildlife, rather than large species that typically draw large crowds in traditional zoos. This model encourages shorter visits of 2-3 hours rather than a full-day experience, thereby aligning with the educational and rehabilitative mission while minimizing the stress of over-crowding on animals and visitors.

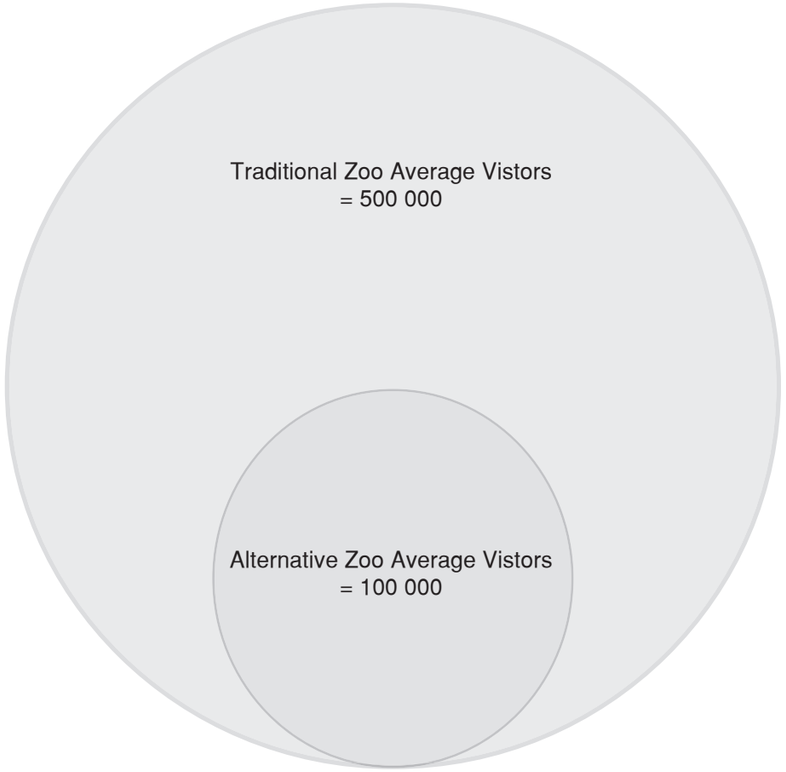
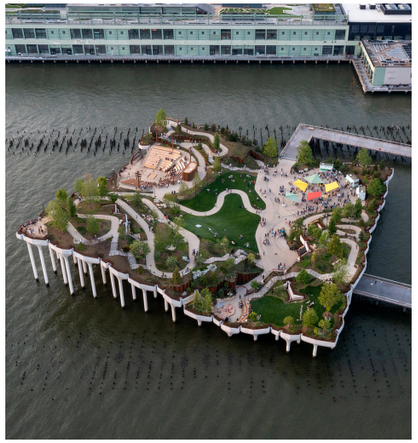


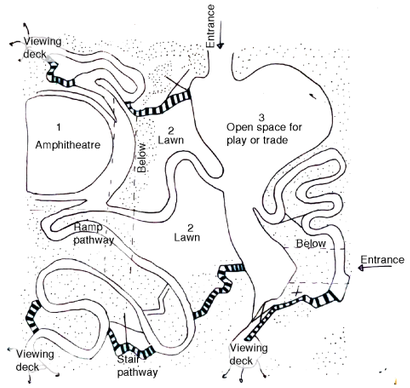
Figure 6.1:
Short story panel 05
(Drawing by Author, 2024; adapted from Desrosiers, n.d).

Figure 6.2:
Calculation Table illustrating average visitor numbers
(Author, 2024)

Figure 6.3:
Graphic illustrating decrease in average visitor numbers from a traditional zoo to an alternative zoo
(Author, 2024)

Public Park





Designing the public park focused on movement and views to build stronger connections between humans and wildlife. The aim was to offer varied experiences within the park while ensuring strategic views that link visitors to the urban landscape and nearby conservation areas.

To achieve this, the design was inspired by two key precedents. First, Thomas Heatherwick's Little Island Park in New York, which features elevated pathways and multiple levels supported by concrete columns in the Hudson River. This guided the development of diverse pathways that connect to performance programs and viewing decks. The use of underground services in Little Island Park provided insight into how to maximize space without obstructing views, accommodating both structured pathways and open exploration.
Second, the Platform for Humans and Birds designed by Studio Ossidiana, informed the park's programming by demonstrating how to create shared spaces for wildlife and humans, encouraging interaction and coexistence.

These precedents helped shape the park's design, particularly in defining event spaces and movement patterns.

Figure 6.4:
Little Island Park | Thomas Heatherwick | 2021
(Schenck, 2021)

Figure 6.5:
Little Island Park | Thomas Heatherwick | 2021

Little Island Park, floor plan, illustrating different pathways & programming
(Drawing by Author, 2024; adapted from Heatherwick, 2021)

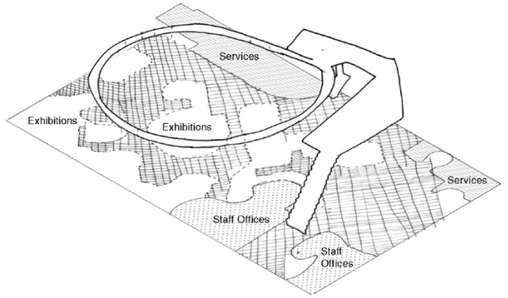
Figure 6.6:
Buzzhub | Wong Zee Leng | 2021
(Wong, 2021)

Figure 6.7:
Buzzhub | Wong Zee Leng | 2021

Journey created through the placement of exhibitions
(Drawing by Author, 2024; adapted from Wong, 2022)

Education





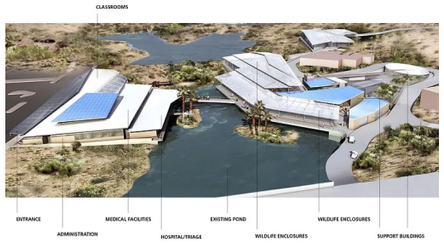
The project includes an educational exhibit designed to merge indoor and outdoor spaces, serving as an educational tool and a platform to foster new human-wildlife relationships.
This journey concept emphasizes learning through experience, enabling visitors to gain skills and insights that can be applied beyond the zoo environment. To design the educational exhibit,typical programs were reviewed, and precedents such as the Buzzhub were analyzed.

The Buzzhub exhibit by Wong Zee Leng served as a key reference for the educational design, featuring several insect displays arranged in a journey-like circulation. This layout guided the design of movement between exhibitions and shaped the narrative of the exhibit, creating a gradual, engaging learning experience. The precedent influenced the exhibition program for the center, focusing on interactive and dual-purpose spaces that could serve as both wildlife habitats and learning stations.

Rehabilitation

The project comprises of a wildlife rehabilitation center designed to integrate wildlife care with public education, merging indoor and outdoor environments to create fluid transitions between different areas. Typical programs were reviewed, and precedents, informed the size and placement of the rehabilitation facilities.

The Liberty Wildlife Campus by Roto Architects, served as a primary precedent for the rehabilitation center. The facility includes two buildings connected by a bridge over a pond. The first building, positioned near the city, houses classrooms and medical facilities, while the second, closer to the open landscape, contains raptor enclosures and visitor relaxation areas. The campus uses courtyard spaces to blur the lines between indoor and outdoor environments, allowing the public to observe animals in semi-open areas, enhancing engagement. This precedent provided insights into designing functional rehabilitation spaces that integrate with public areas.



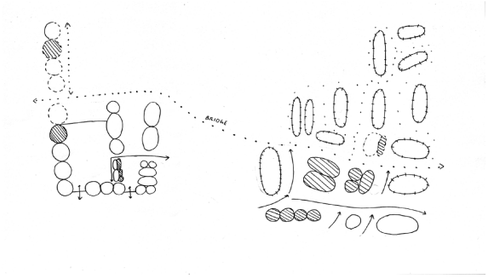


Figure 6.8:
Liberty wildlife campus | Roto Architects | 2017

Two wings of the building and the program
(Roto Architects, 2017)

Figure 6.9:
Liberty wildlife campus | Roto Architects | 2017

Programming bubble diagram to show services, public and private and circulation
(Drawing by Author, 2024; adapted from Roto Architects, 2017)

Figure 6.10:
Programming bubble diagram created from precedents
(Drawing by Author, 2024)

Program Development

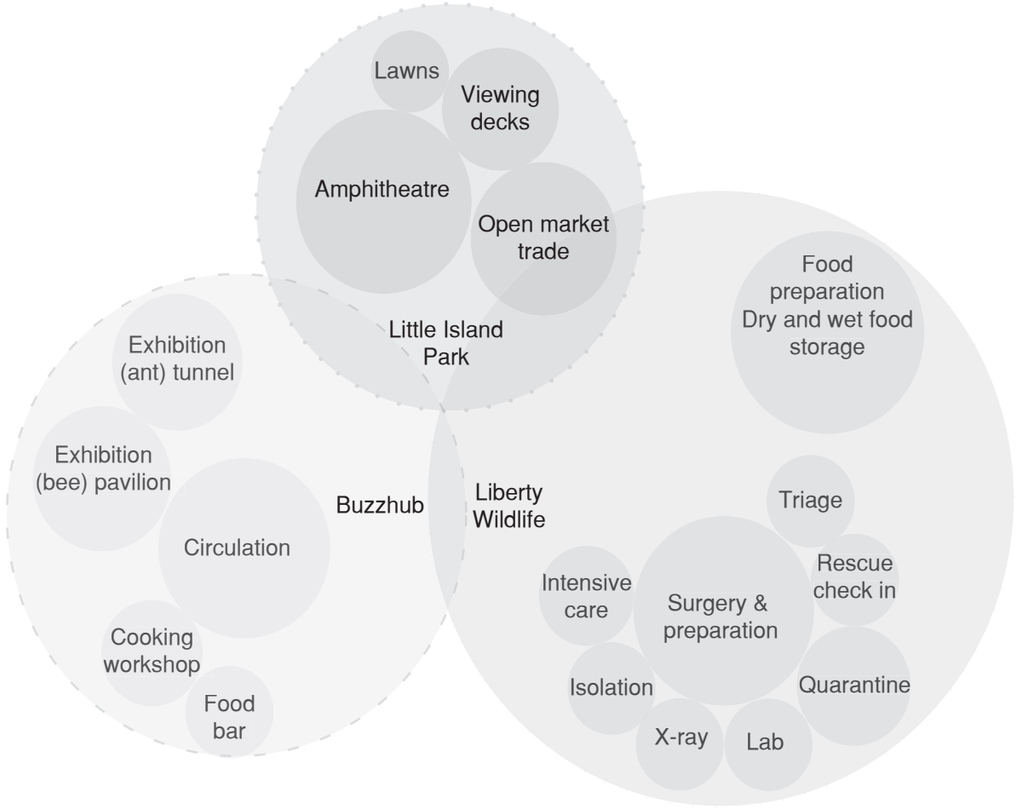




Figure 6.11:
Bird Relaxing
(Drawing by Author, 2024;adapted from "Greenorchid", n.d)

Wildlife Management

An interview with a zoo curator provided practical guidance on the layout and daily operational needs of the rehabilitation center, ensuring the design supported effective animal care, feeding, and treatment while promoting public engagement.

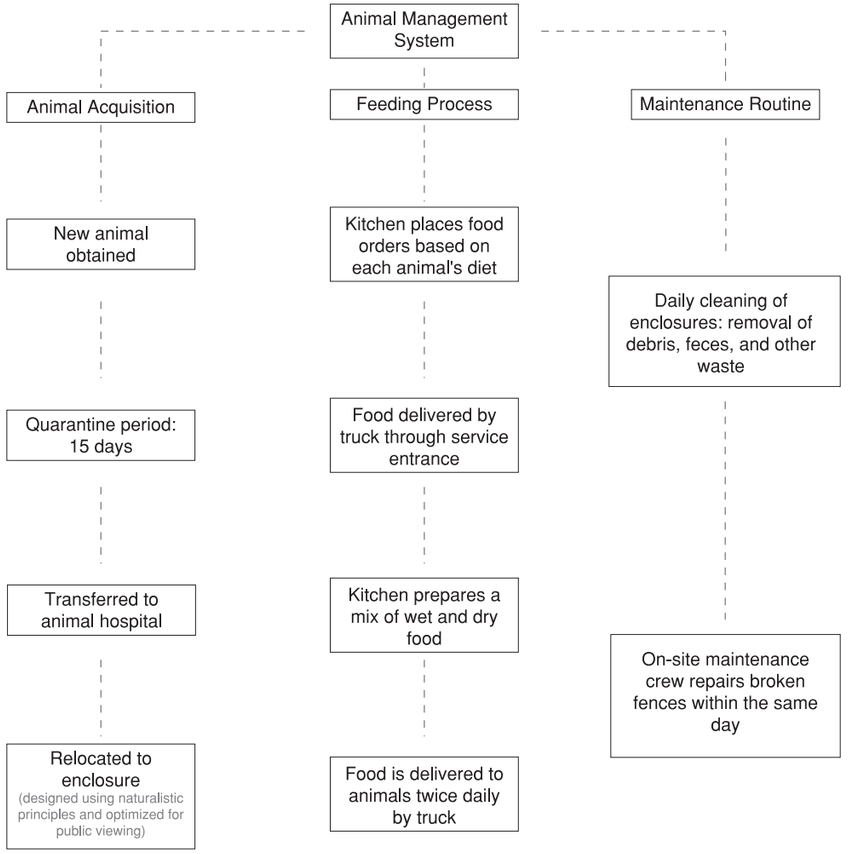


Figure 6.12:
Flow diagram of animal management in the Joburg Zoo
(Author, 2024)

Wildlife Behavior Patterns

A study of the surrounding urban wildlife revealed that these species share common activities and habitat structures. This understanding was crucial in identifying the types of spaces needed to support these animals effectively.

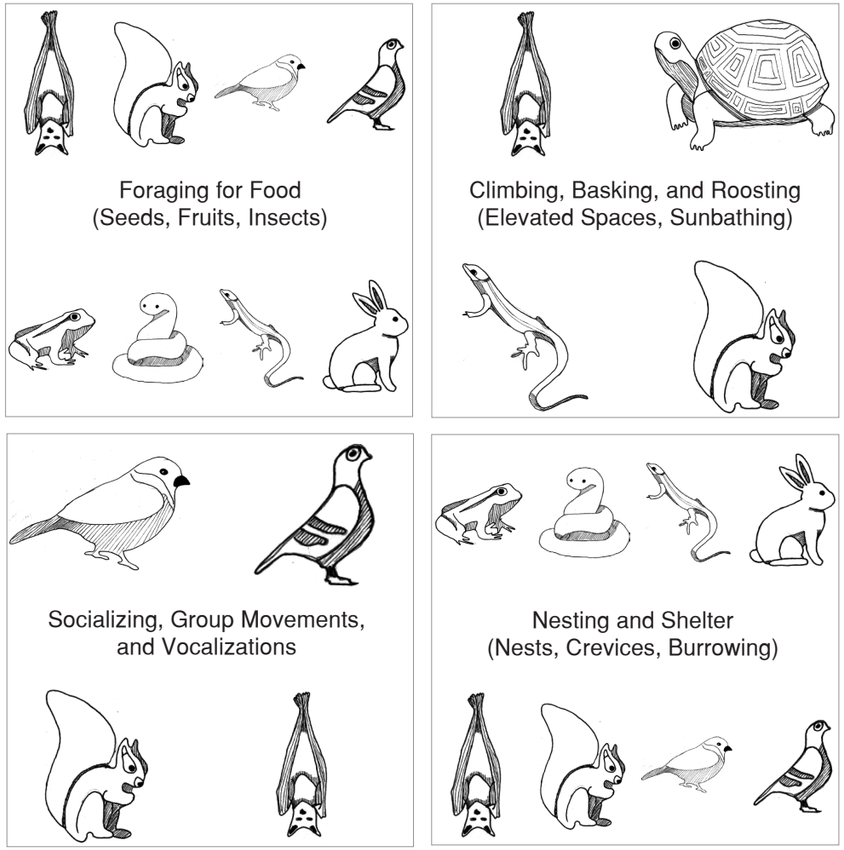
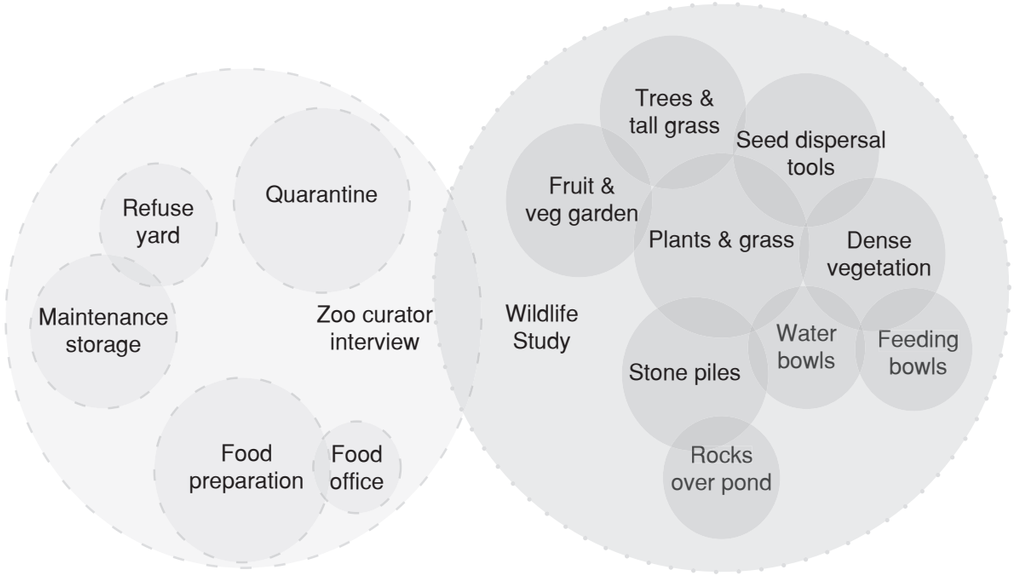


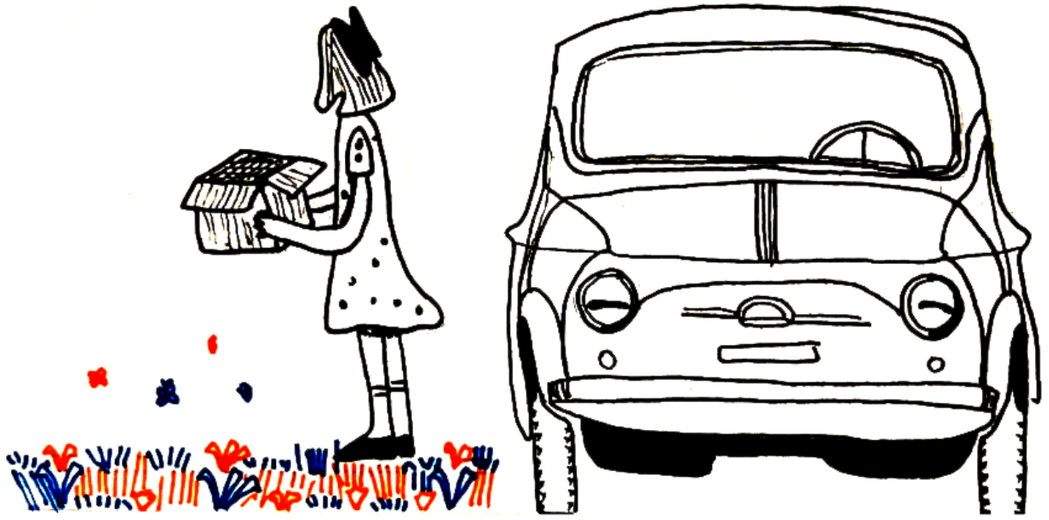
Figure 6.13:
Urban animal activity and spaces study
(Author, 2024)

Figure 6.14:
Programming bubble diagram created from interviews & study
(Drawing by Author, 2024)

Program Development



7.
Conceptual Approach

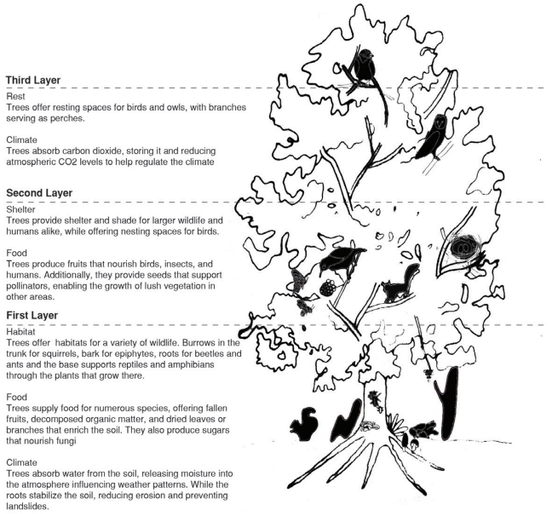


The girl felt slightly better but remained anxious as they arrived at the new zoo. Her uneasiness faded when she realized that the zoo looked different from what she had imagined.

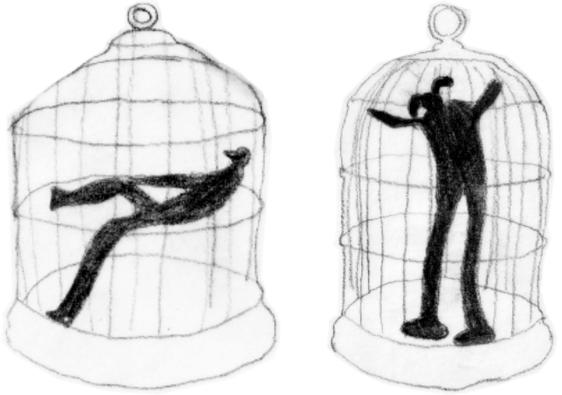
Deconstructing the cage

The conceptual explorations were guided by the theme of "Deconstructing the Cage," a concept derived from the research study and urban strategy. This theme reimagines the cage as a space for interaction and connection between humans and wildlife, rather than a tool of separation. This theme draws inspiration from the Mulberry tree, an indigenous species in Johannesburg, known for its layered structure that supports a diverse range of human and animal life.

Early explorations utilized pencil sketches to examine ideas of captivity and the nature of the cage. Illustrations depicted a large cage with distorted figures, symbolizing the zoo as a restrictive enclosure. These sketches portrayed visitors and wildlife in unnatural forms, reflecting the impact of observing animals in captivity and the unnatural conditions imposed on the animals themselves.
Subsequent sketches focused on a single cage, illustrating restrained movements and uncomfortable positions to directly reference animal enclosures. The final series explored the concept of opening the cage, depicting the liberation







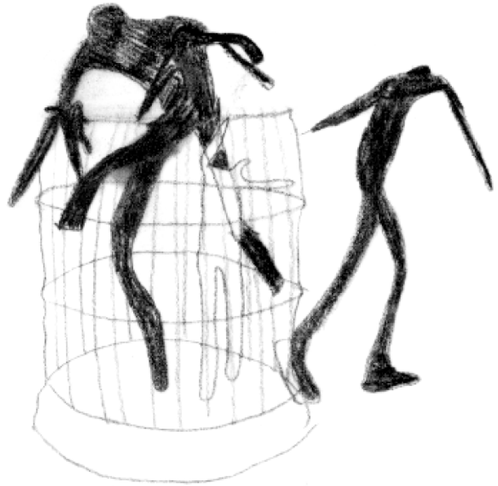


Figure 7.1:
Short story panel 05
(Drawing by Author, 2024; adapted from Desrosiers, n.d).

Figure 7.2:
Different layers of the tree and how it supports different species
(Author, 2022)

Figure 7.3:
Human & wildlife figures in the Zoo cage
(Author, 2024; adapted from Licha, 2018)

Figure 7.4:
Wildlife restrictive movements in the enclosure cage
(Author, 2024; adapted from Licha, 2018)

Figure 7.5:
Human and wildlife forms when cage is opened
(Author, 2024; adapted from Licha, 2018)



Through components

This exploration focused on deconstructing the cage into its individual parts or components, reimagining each as a tool for shared interaction between humans and animals, rather than as a means of separation. Inspired by the precedent Platform for Humans and Birds by Studio Ossidiana, which integrates public spaces for both birds and humans. The approach examined how a modular block could be used to provide programming that could support interactions between humans and wildlife. The insights gained were applied to the cage's components, envisioning how each part could be transformed into an architectural element that fosters meaningful engagement between people and animals.

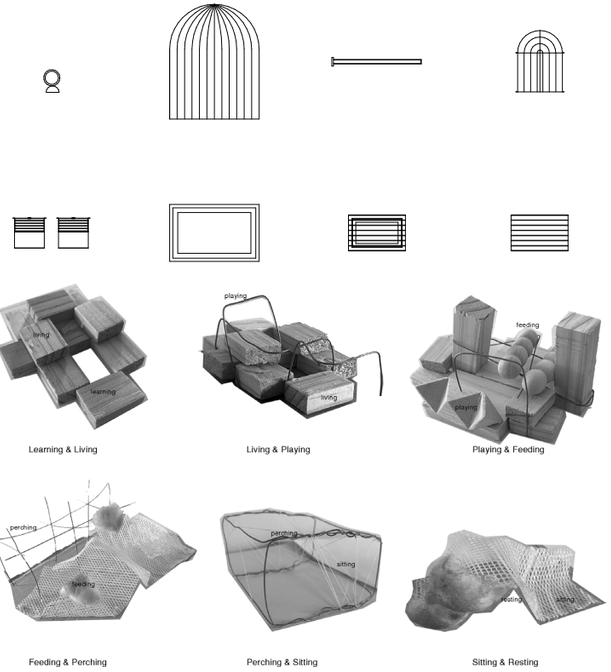




Figure 7.6:
Platform for humans and birds | Studio Ossidiana | 2021
(Studio Ossidiana, 2021)

Figure 7.7:
Platform for humans and birds | Studio Ossidiana | 2021

Platform for humans and birds, the different programs explored through a single modular element
(Drawing by Author, 2024; adapted from Studio Ossidiana, 2021)

Figure 7.8:
Cage broken down into individual components
(Author, 2024)

Figure 7.9:
Models exploring animal and human spaces
(Author, 2024)

Figure 7.10:
The cage redefined as a space for interaction between humans and various small wildlife, using tools from precedent and model elements to develop the concept
(Author, 2024)



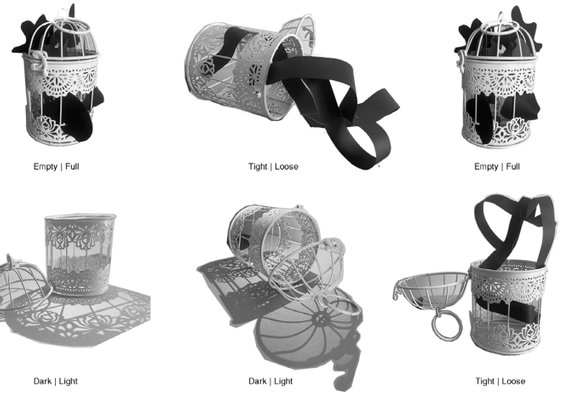
Through words

This approach involved deconstructing the cage into words commonly associated with it, then overlaying them with contrasting words to challenge its perception and transform it within the context of the new zoo model. This was inspired by the precedent Live Together by Ziting Wang, which features a multispecies pod system that supports insects, algae, plants, and birds, extending from the ground level to the facade and roof. The precedent illustrates how the concept of a cage can be redefined by merging different spatial elements- floor, wall, and roof- into a fluid form that enlarges enclosures, allowing wildlife to move freely and creating safe spaces for human-animal interaction.









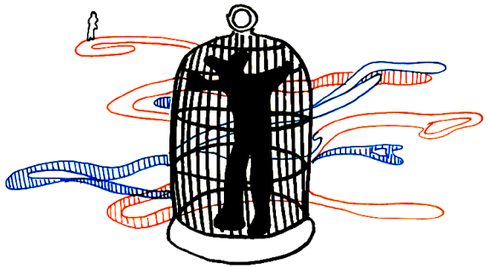


Figure 7.11:
Live together | Ziting Wang | 2022
(Wang, 2022)

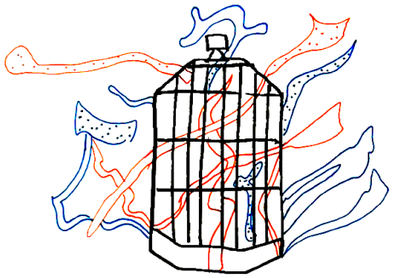


Figure 7.12:
Live together | Ziting Wang | 2022

Figure 7.13:
Words associated and contrasted with a cage
(Author, 2024)

Pod system
(Drawing by Author, 2024; adapted from Wang, 2022)

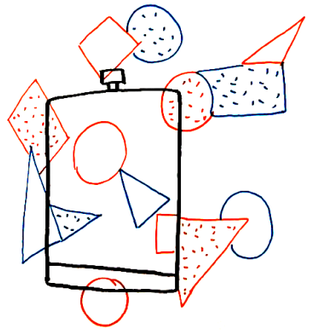


Figure 7.14:
Models exploring the contrasting words
(Author, 2024)

Figure 7.15:
The cage redefined through colour, shape and movement, using tools from precedent and model elements to develop the concept
(Author, 2024)

8.
Formal Approach



They handed the box to a kind lady at the zoo, who looked at the bird with gentle eyes. "We'll take good care of the bird," she promised. "You can come back in a few weeks and try to spot him." The girl felt a sense of relief mixed with hope.

Comfort and Interaction

Within this phase of the project, more solid and concrete ideas and forms were able to take place, by working through sketches, colleges, models and cad drawings. The project was able to take its initial ideas explored through research and concepts and develop them further.

Public

The project operates on initially on the urban scale to connect people and animals to the broader city context. By engaging with the existing movement networks identified in the site analysis, the design taps into existing activity hotspots to strategically place entrances, retail spaces, and seating along the most active edges. The centre of the site remains largely open, incorporating landscaped elements like seating, and adaptable open spaces that can be used by the public for various events, as identified in the site analysis.

The project recognizes the need for sufficient lighting in the night for safety however this can be disruptive for nocturnal animals and other way finding animals. It therefore proposes low intensity or motion sensor lights to ensure comfort of both animals and humans.

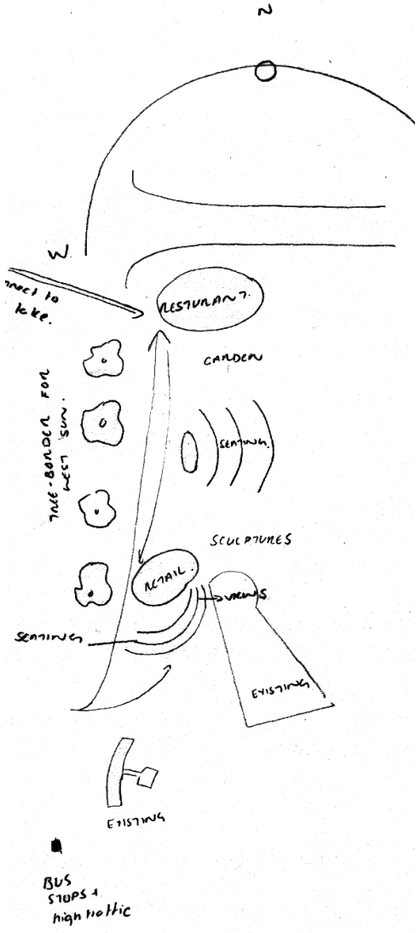
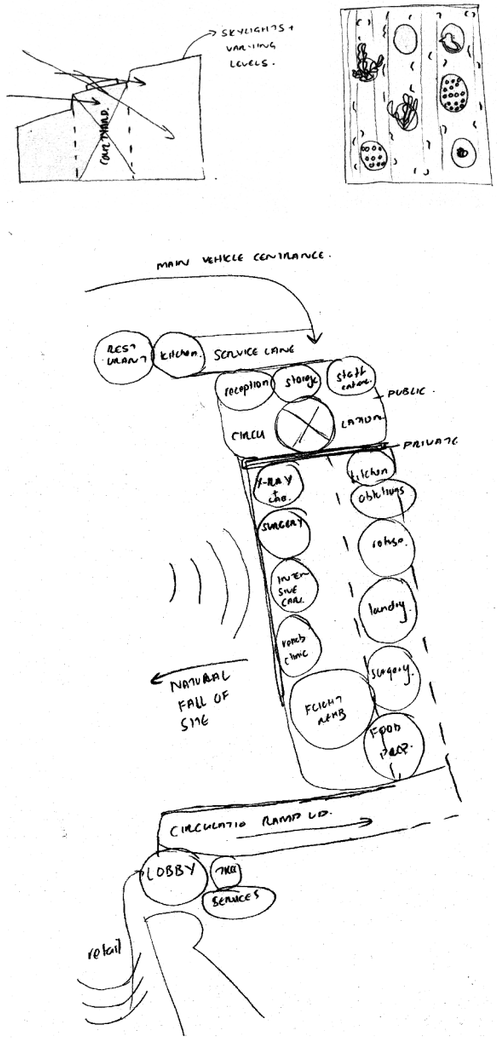


Figure 8.1:
Short story panel 08
(Author, 2024)

Figure 8.2:
Conceptual planning of public areas, like retail and seating
(Author, 2024)

Figure 8.3:
Conceptual ideas of sections, facades and programming
(Drawing by Author, 2024)



The Built Form

The project then integrates human and animal spaces to foster a sustainable coexistence. Using strategies like natural daylighting, varying ceiling heights, and open courtyards, to reduce artificial lighting enhancing comfort for both human and animal. It also centres the programming around a courtyard that functions as both a circulation hub and a space for human-animal engagement on all levels. Facades are designed as living walls, offering nesting and feeding spaces for birds while maintaining thermal comfort within the building for the humans.

Landscaping

The incorporation of a fruit and vegetable garden serves multiple purposes: it supplies the on-site restaurant, offers food for birds and urban wildlife, and becomes an educational tool for visitors. center. Elements like perching ledges, sunbathing spots, and stepped seating encourage rest and leisure for animals, while humans can enjoy the space for events or relaxation.

Services

The project considers the operational needs of the rehabilitation centre, positioning it along the quieter Erlswold Road, allowing for discreet service access for animal care, storage, and medical supplies. This ensures minimal disruption to both animals and the user.

Visual & Interactive Education

Research indicates that humans feel more connected to animals when they can observe or participate in their care. The project therefore intends to link the rehabilitation centre to the education centre through design elements, such as mezzanine views, double-volume spaces, and observation balconies, allowing visitors to witness animal care without intrusion.

Research also revealed that students learn more effectively when live animals are present, which significantly influenced the design approach. The focus shifted towards urban animals which people encounter daily within the city. By emphasizing urban wildlife, the design encourages people to learn how to care for these animals in practical, everyday contexts, equipping them with the knowledge and skills they can later apply at home or in other urban settings.

This insight also shaped the educational component of the project, steering it away from traditional exhibition styles and toward a more interactive, workshop-based experience. The introduction of interactive workshops and tactile exhibitions can be used as a tool to directly engage with conservation efforts fostering a deeper understanding of animals.

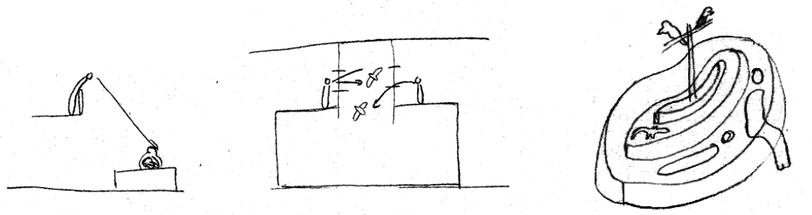
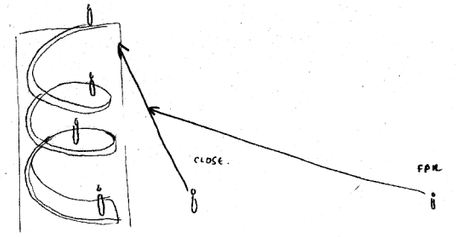


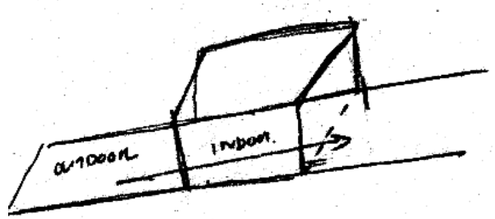
Figure 8.4:
Conceptual drawings of views in sections and landscaping
(Author, 2024)

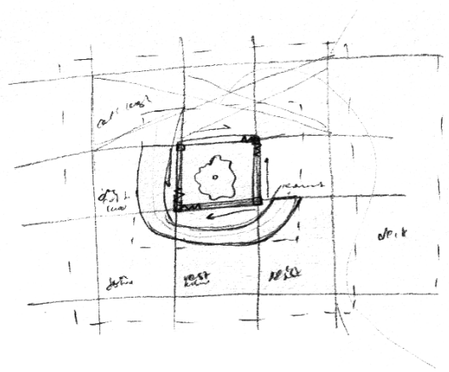
Figure 8.5:
Conceptual drawings of movement and the spaces
(Author, 2024)

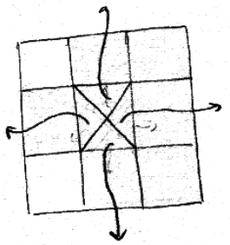
Movement & Tactility

Traditional zoos typically feature horizontal movement patterns, the project introduces a new vertical element, that connects visitors with the city, animals, and the surrounding landscape. This verticality not only enhances educational opportunities but also redefines the visitor s gaze, fostering a deeper connection with the animals.
Suspended walkways and ramps merge indoor and outdoor spaces, offering varied perspectives and also varied tactility. That enhances the sensory experience for both human and animals. This encourages visitors to view themselves as part of the larger ecosystem.







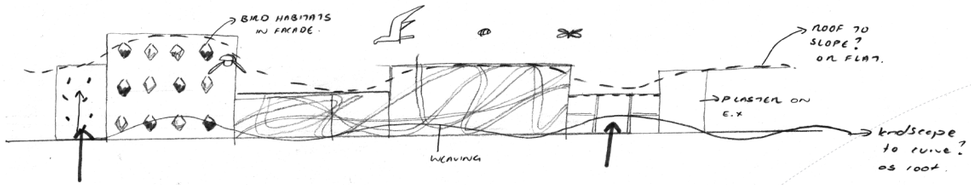


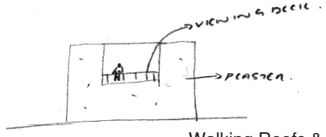
First Iterations



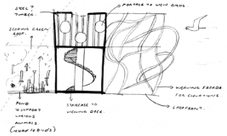
Journey Walkway

Figure 8.6:
Collage exploring human and animal spaces with walkable roofs
(Author, 2024)





Walking Roofs & Bird Nest Facade



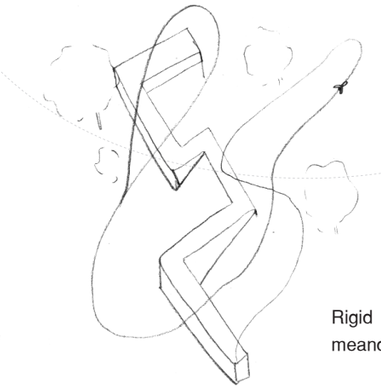


Figure 8.7:
Initial 3D concept sketch
(Author, 2024)

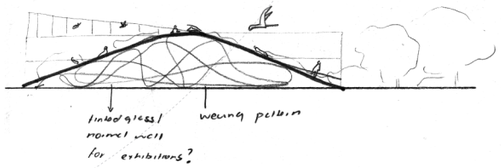




Figure 8.8:
Sections and elevations exploring volume, views and material
(Author, 2024)

Rigid building with overlapping meandering walkways

Figure 8.9:
Cad drawing derived from sketches
(Author, 2024)



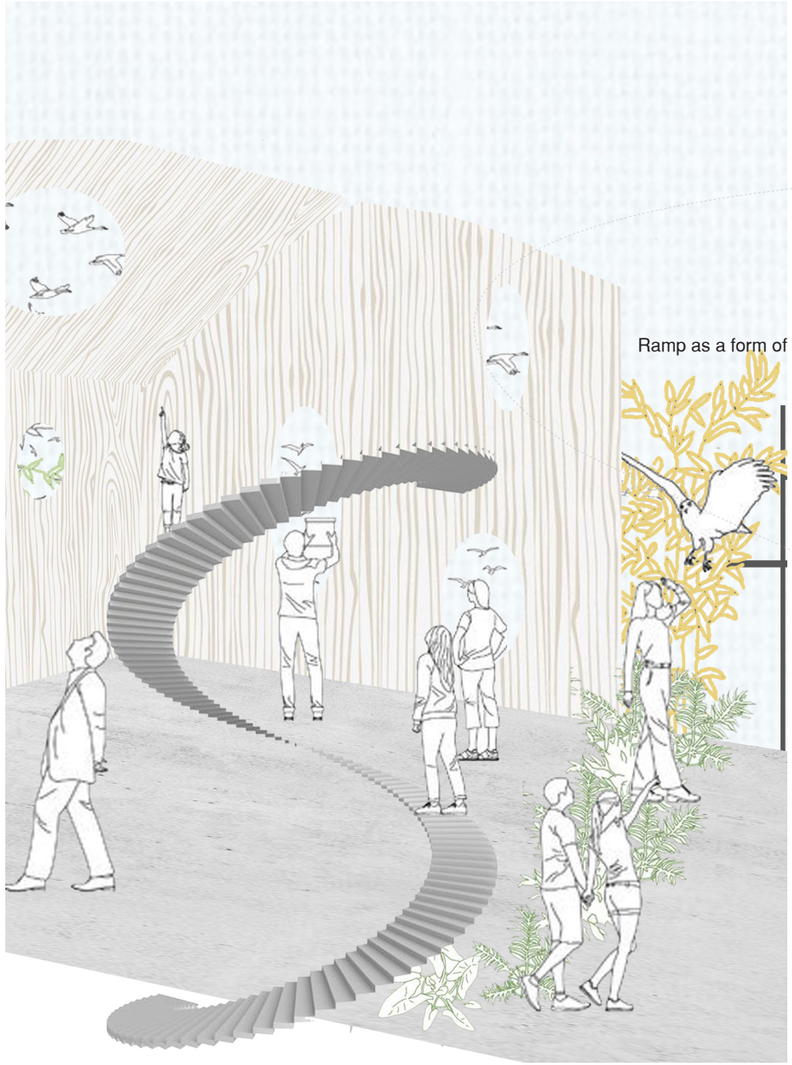
Journey Walkway

Figure 8.10:
Model formed from plans and sections
(Author, 2024)

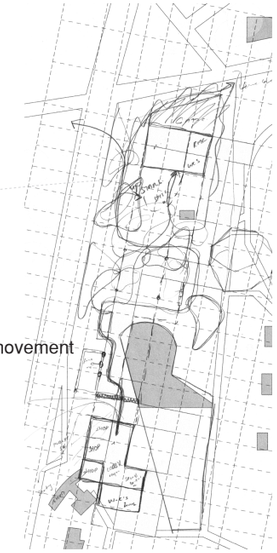


1.

Explored a long, single-story building that functioned as both a structure and an elevated walkway, integrating outdoor exhibitions. However, this design posed challenges with appropriately sizing the rooms and programs, resulting in an elongated structure that lacked dynamic endpoints.

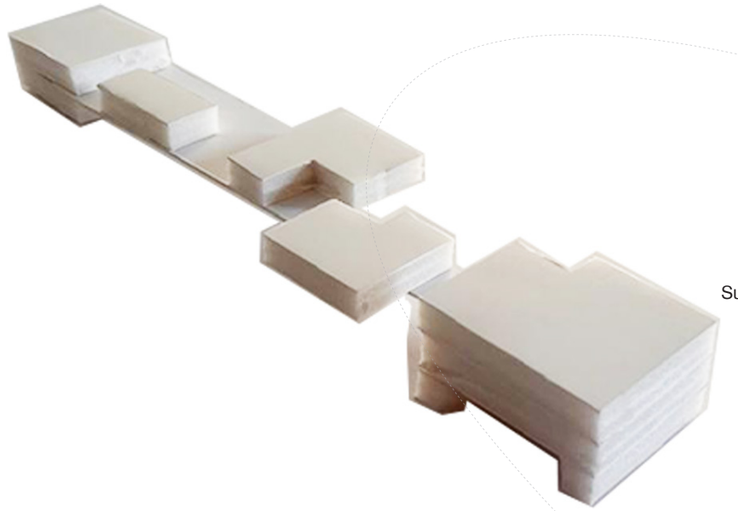


Ramp as a form of movement

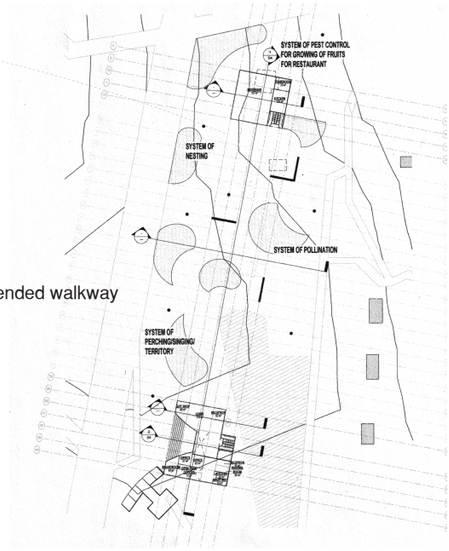


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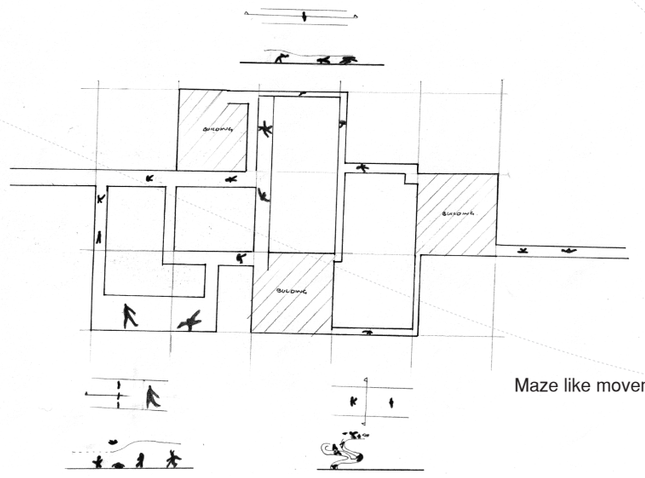
Breaking the building into smaller, interconnected elements linked by an elevated walkway.
This iteration was more successful, as it created public space below and provided shade while maintaining private or semi-private exhibitions above. It also established a journey-like movement through the addition of separate buildings and connecting pathways.



Suspended walkway



Human and animal spaces



Maze like movement

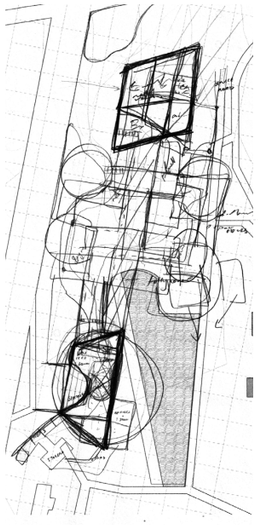
Figure 8.11:
Sketches over previous plans for new model
(Author, 2024)

Figure 8.12:
Collage introducing ramp, with human and animal spaces
(Author, 2024)

Figure 8.13:
Maze movement sketches
(Author, 2024)

Figure 8.14:
Model created from plans
(Author, 2024)

Figure 8.15:
Cad plan drawing
(Author, 2024)



Shapes Walkways Stairs Viewing Portals

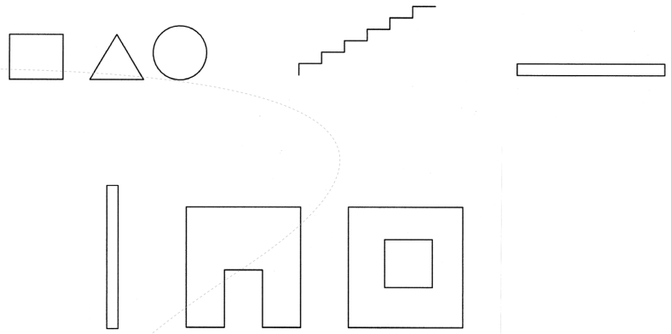


Figure 8.16:
Sketches over previous plans for new model
(Author, 2024)

Figure 8.17:
Kit of parts, shapes, stairs, walkways and viewing portals
(Author, 2024)

Figure 8.18:
Collage introducing ramp as a tool for education, with human and animal spaces
(Author, 2024)

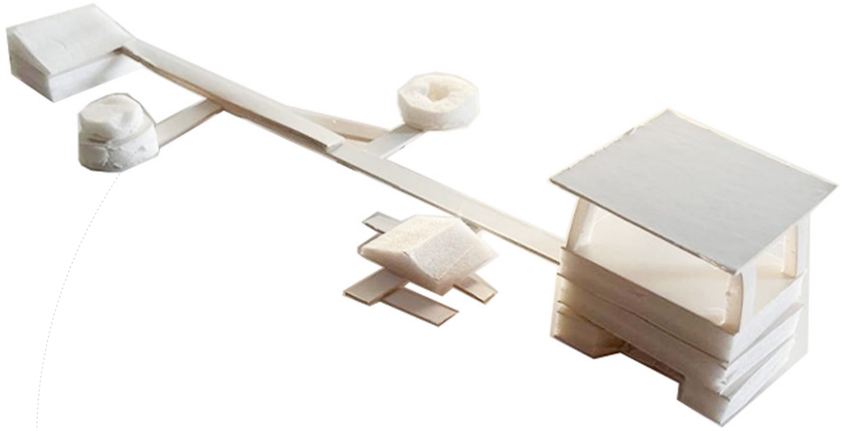
Figure 8.19:
Models created from kit of parts
(Author, 2024)

Ramp as an education tool

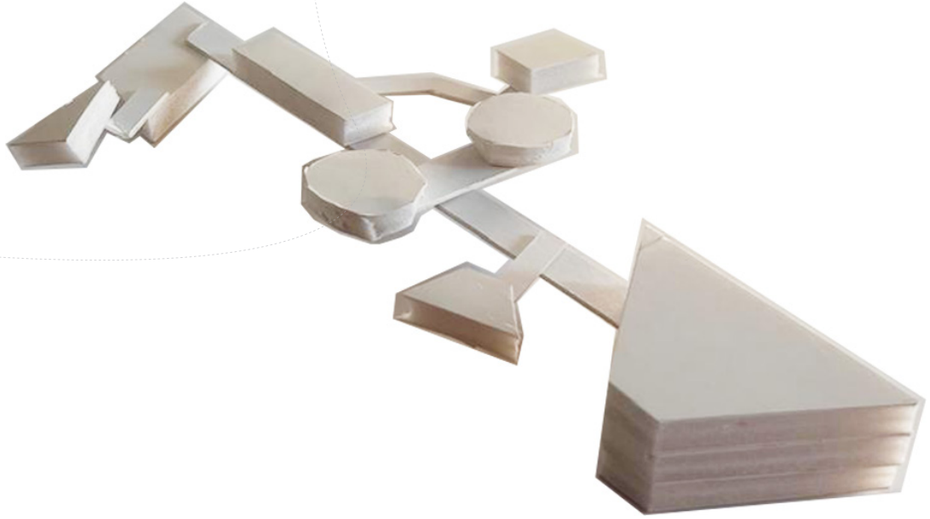


3.

Further developed the walkway concept by experimenting with new shapes suspended from the walkway. However, these forms appeared awkward and lacked functionality, reducing the walkway to an ineffective bridge without purpose.



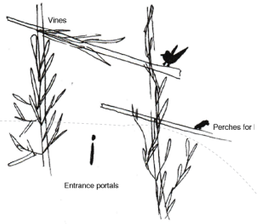
Odd forms generated from Kit of Parts



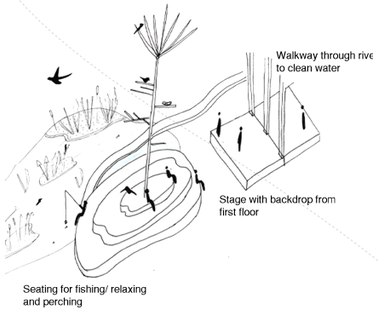


4.

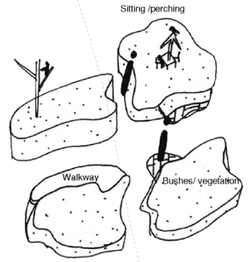
This iteration explores the project in mainly 3 components, the urban square where one can interact with the animals, the viewing tower, louver cladded and the exhibitions spaces, which is modelled after birdhouses. It also explores various landscaping tools for interaction and community use.



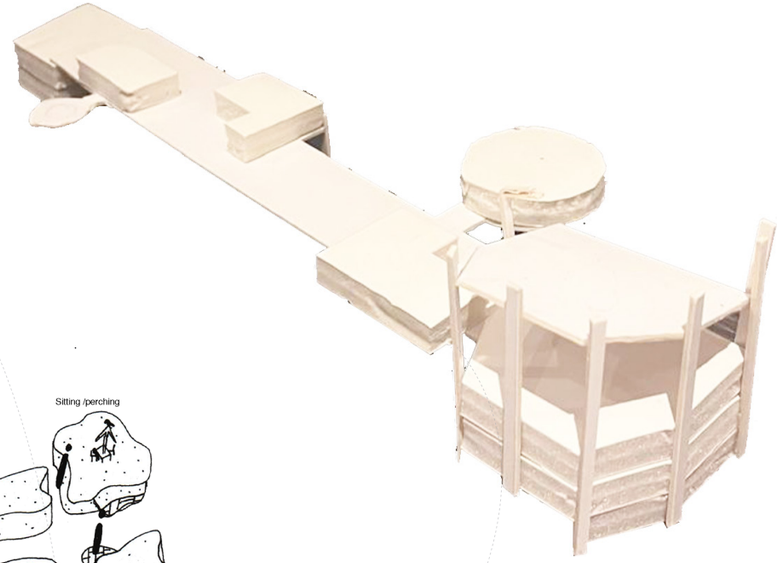
Perching & Entrance portals

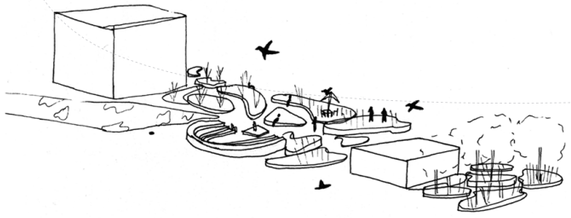


Performance & Seating

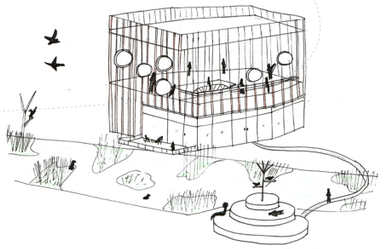


Seating & Perching

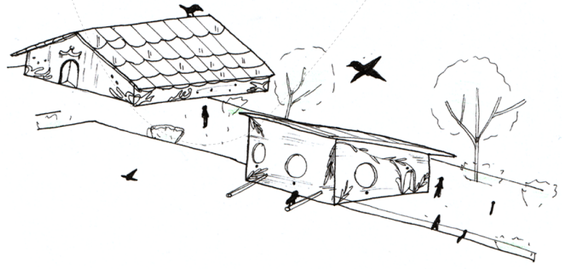




Urban square



Viewing tower



Walkway & Exhibition pods

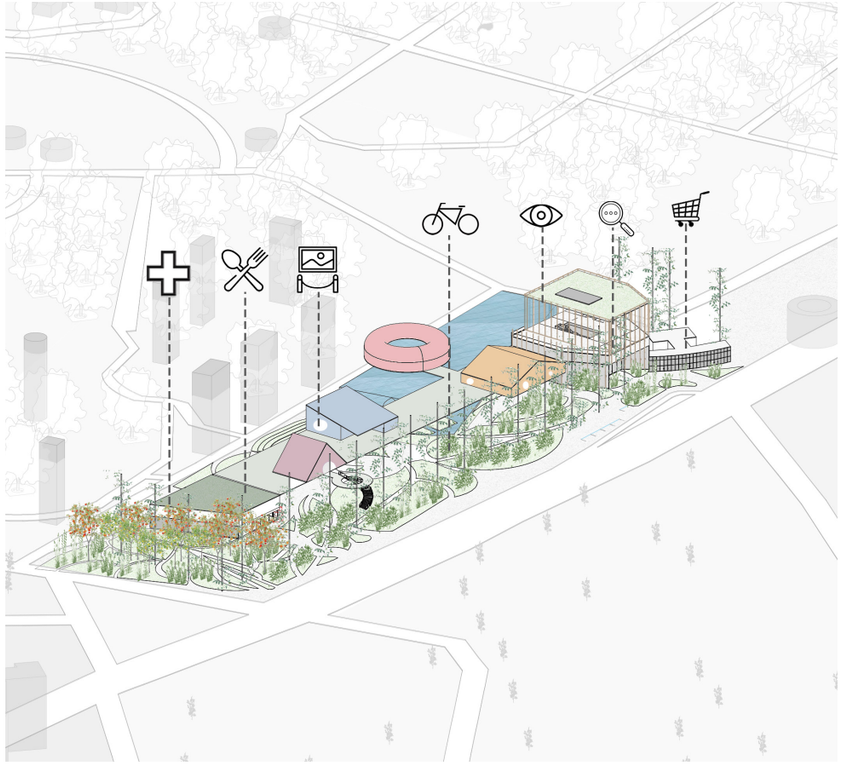
Figure 8.20:
Collage showing programing for human and animal space
(Author, 2024)

Figure 8.21:
Drawings showing various building and landscaping elements for human and animal interaction
(Author, 2024)

Figure 8.22:
Model showing heights, form and walkways
(Author, 2024)

The 3D shows the projects, location and the length of building indicating the idea of movement and journey to become aware and educated in the urban wildlife species to better care and adapt spaces for them.

The ground floor shows the separated building portions with the walkway overhead allowing a flow through the space instead of the closed off zoo, it also shows the maze-like element within the landscape to replicate the idea of journey and movement while including seating and event spaces. The mezzanine floor and the first floor holding programs of multipurpose rooms, wildlife animal clinic and exhibition spaces.



PROGRAM
- Animal Clinic
- Exhibition
- Food Court
- Recreation
- Retail
- Research
- Vegetable Garden

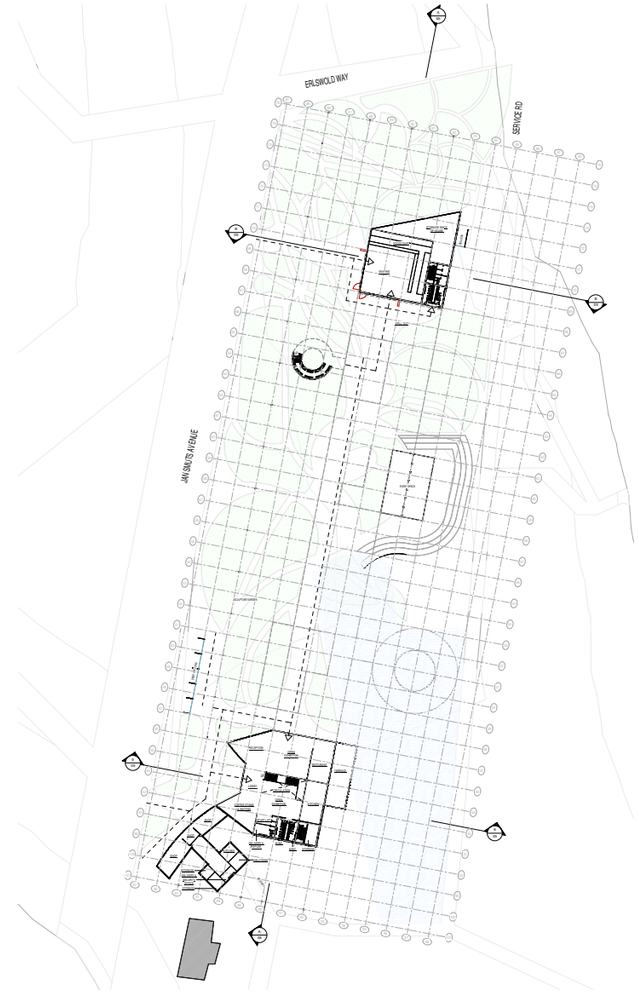
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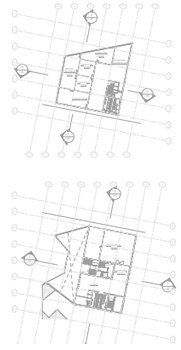
Figure 8.23:
Perspectives showing the buildings form and programming
(Author, 2024)

Figure 8.24:
Plans showing the buildings form, programming and landscaping features
(Author, 2024)

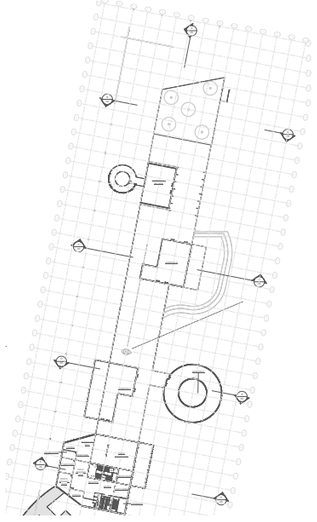
Plans



Ground Floor



Mezzanine Floor



First Floor

The sections and elevations explores the ideas of vertical steel elements resembling he cage but broken up with vines growing on them, to function as entrance portal or perches for birds. The space below the walkway is examined as a tool for the public such as screening systems or cover for the seating elements, that serves both human and bird.
The drawings also explore, the heights of various elements like the viewing tower, the walkway and the exhibitions. While exploring materiality of louvers, and decorative elements

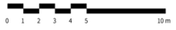
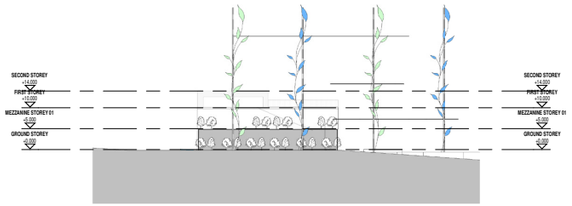
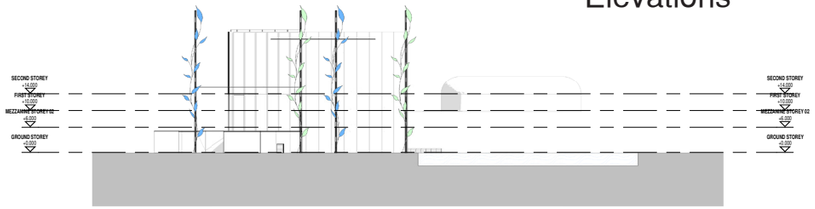


Figure 8.25:
Elevations showing the buildings form, programming and landscaping features
(Author, 2024)

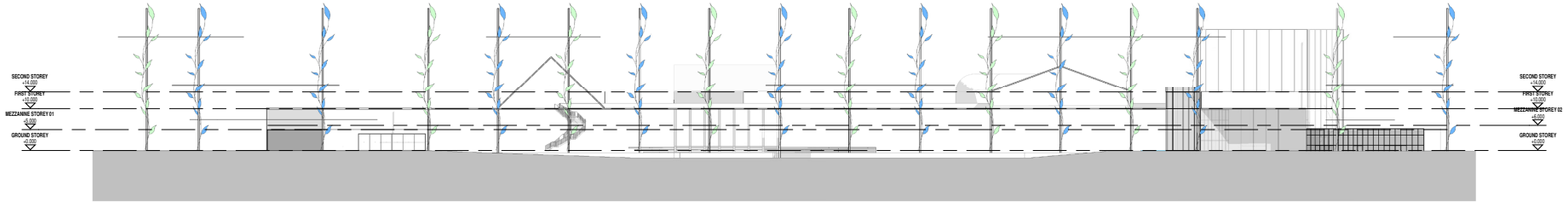
Figure 8.26:
Sections showing the buildings form, programming and landscaping features
(Author, 2024)

Elevations

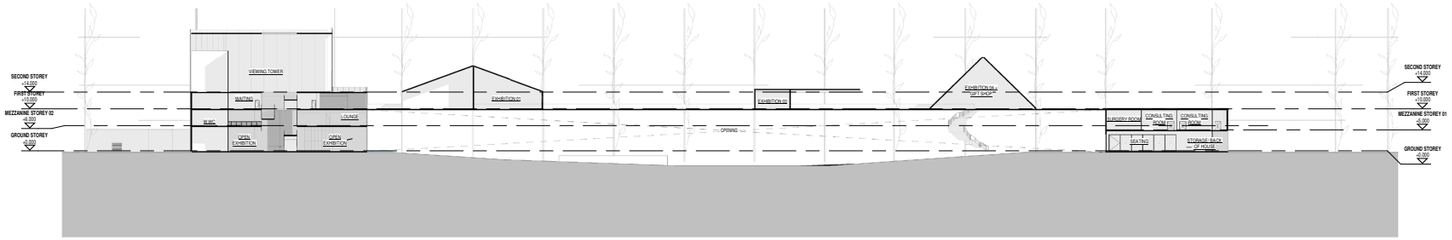




South Elevation



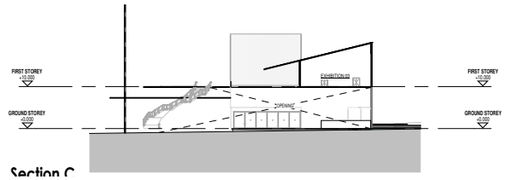
West Elevation



Section A



Section E



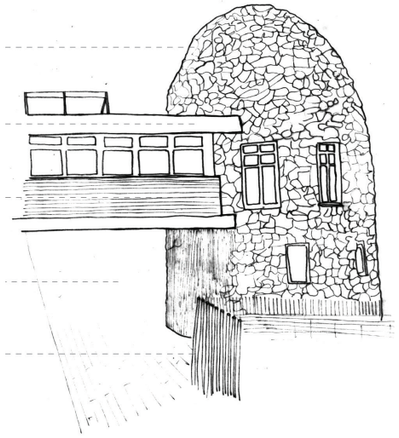
Section C

Material Study

The project's technical systems are informed by the study of three key precedents. The research guides the incorporation of materials that are beneficial for both humans and wildlife, creating habitats for animals while minimizing environmental impact. Additionally, the project seeks to incorporate the existing context, particularly the main entrance at Joburg Zoo.

Existing Material

Main Entrance Building | Jan Smuts Avenue
The main entrance features a double-storey, stone-clad dome housing offices, connected to a standard face-brick building by a bridge. The structure includes exposed concrete slabs and green-coloured window frames.



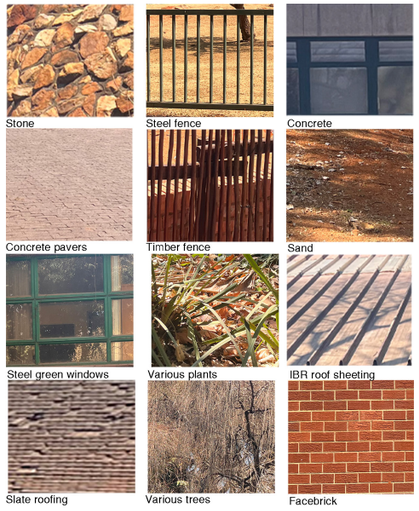


Figure 8.27:
Existing Entrance Building at Joburg Zoo showing materiality
(Author, 2024)

Figure 8.28:
Materials most commonly found at Joburg Zoo
(Author, 2024)

Figure 8.29:
Loosely a House | Martin Hitch and Claire Leffler | 2023

Rammed earth walls to support small mammals
(Marcus, 2023)

Figure 8.30:
Loosely a House | Martin Hitch and Claire Leffler | 2023

Rammed Earth columns at ground level to support small mammals with perching or crevices
(Author, 2024 adapted from Marcus, 2023)

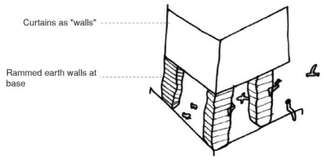
Figure 8.31:
Research material
(Batlleiroig, 2017;"June Gardening Advice", n.d; RISE Design Studio, 2019; Terreform ONE, 2024)



Researched Material

The project explored materials that would support animal habitats and avoid toxicity or harm to wildlife. A key precedent in this approach is "Loosely a House" by Martin Hitch and Claire Leffler, which innovatively combines sustainable materials with digital technology, similar to Neri Oxman's exploration of biological material and digital aid in the Silk Pavilion. This project uses rammed earth to create a structure that caters to both humans, birds, and insects, integrating digitally fabricated components to enhance the overall design.

The building acts as a corridor, elevated at ground level with curtains as primary wall elements, allowing natural movement of people, birds, and insects throughout the space. This precedent is particularly relevant to the design as it emphasizes materials that prioritize both human and animal needs, ensuring no one is displaced and natural movement remains uninterrupted when new structures are introduced.



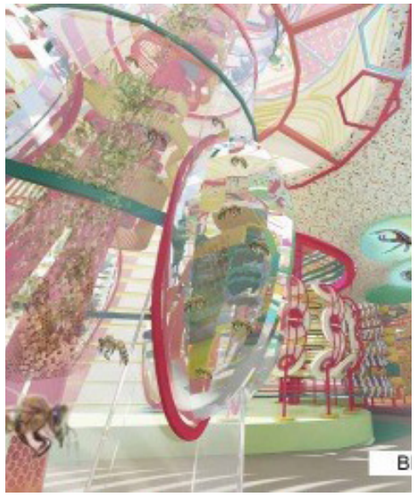


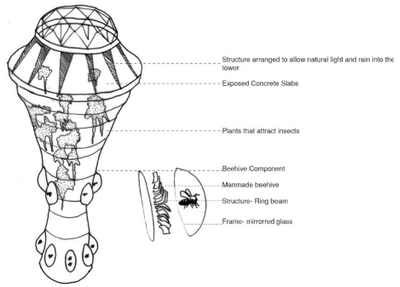






Systems Study





One of the project's primary goals was to seamlessly merge indoor and outdoor environments. This was envisioned through the use of courtyards and integrating animal habitats directly within or on the building structure. A key precedent that informed this approach is Buzzhub by Wong Zee Leng.

Buzzhub features an innovative insect exhibit with a tower element that spans two floors, opening at the roof level. The tower is designed with integrated plants and artificial beehive structures that support various pollinators, including bees. Open slits at the top provide access for insects, while natural light and rainwater sustain the vegetation inside. The mirrored glass cladding allows visitors to observe the insects at different levels while they move freely within the space.

This tower system functions similarly to a courtyard enclosed on the sides but open at the top, allowing natural elements and insects to enter the building. This concept inspired the design, leading to an initial idea, illustrated in Figure X, of a central tree structure with an open roof and operable doors at various floor levels, enhancing the connection between indoor spaces and the surrounding environment.

Figure 8.32:
Buzz Hub | Wong Zee Leng | 2021

Bee Paradise Exhibition
(Wong, 2021)

Figure 8.33:
Buzz Hub | Wong Zee Leng | 2021

Bee tower structure
fit for comfortable bee
habitation
(Author, 2024 adapted from Wong, 2021)

Figure 8.34:
Rough Sketches of
technical systems,
tree through building,
floatation devices, ramp
and materiality
(Author, 2024)

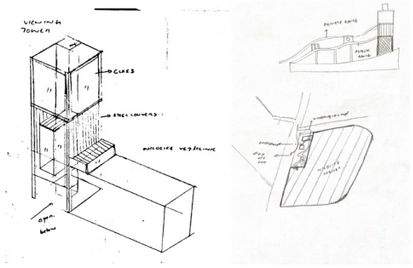
Design Integration

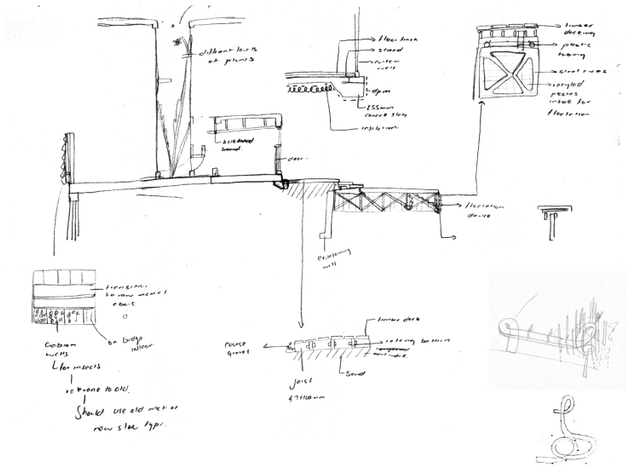
Form

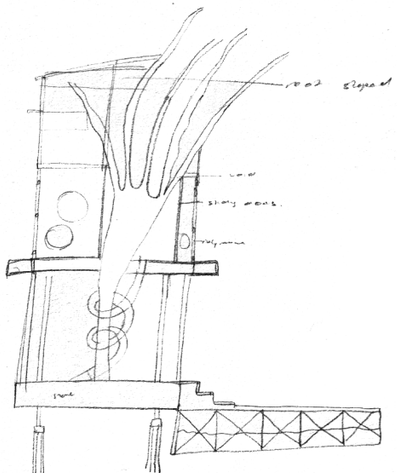
The building is elevated off the ground, allowing wildlife to move freely beneath while providing seating and relaxation areas for humans. It also features a central tower that houses various plants and includes an open roof system for insect filtration.

Material

The building incorporates stone from the existing entrance building, redesigned to serve as a habitat for insects at its base. As the structure ascends, the stone transitions into a translucent polycarbonate material that enhances the connection between the interior and exterior spaces.







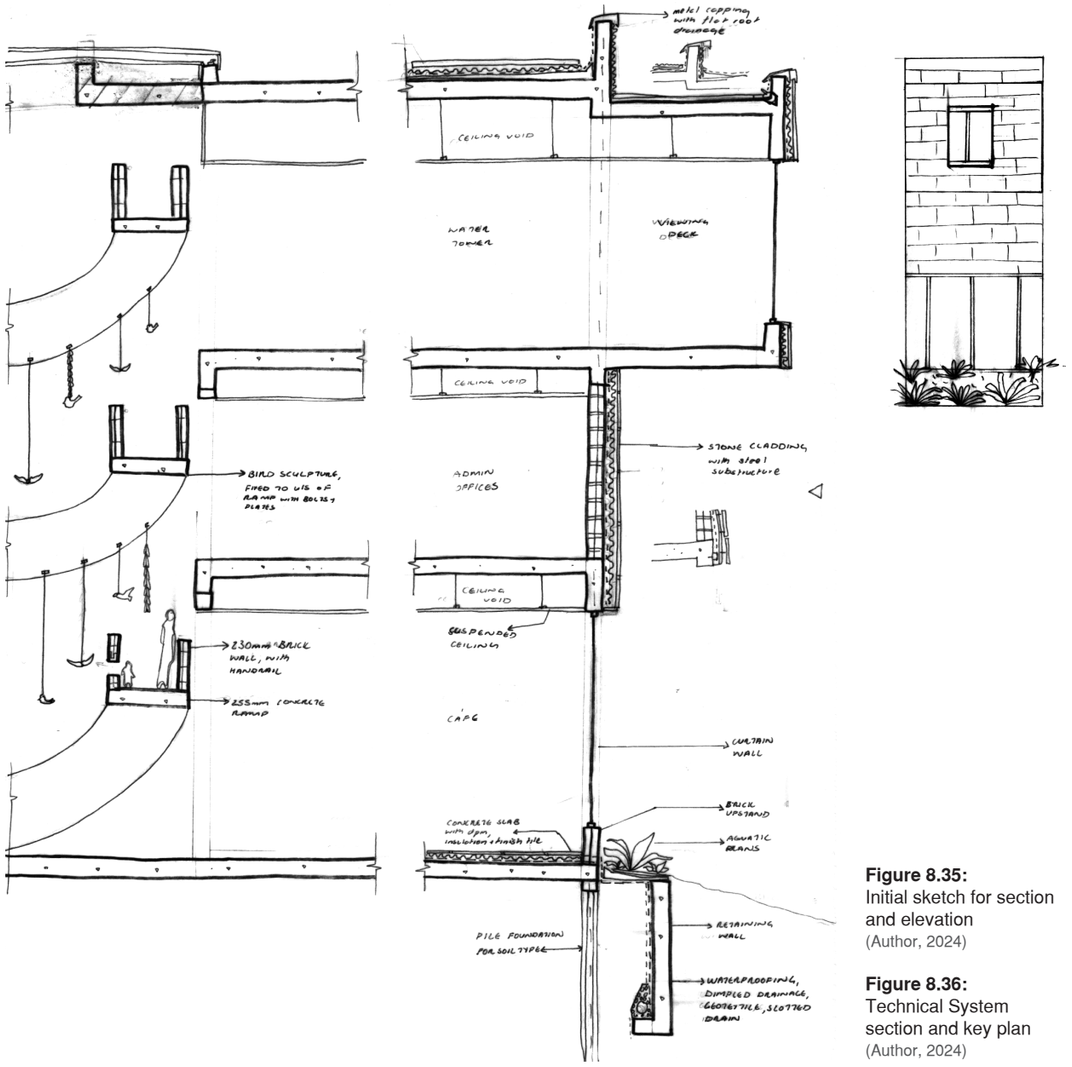


Figure 8.35:
Initial sketch for section and elevation
(Author, 2024)

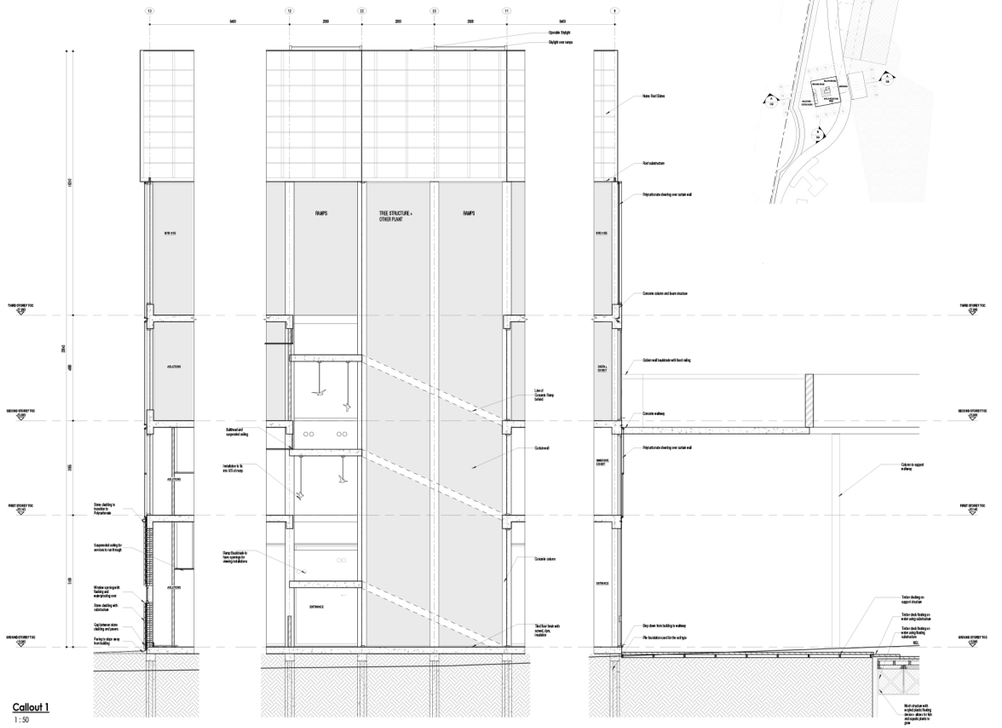
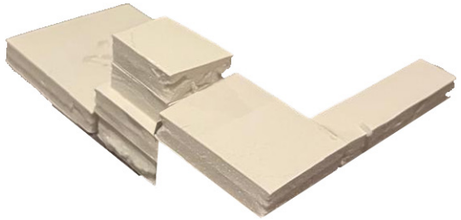


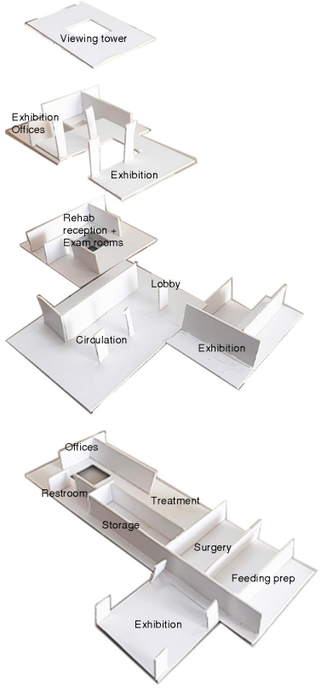
Figure 8.36:
Technical System section and key plan
(Author, 2024)

Refined Iterations

A new design approach was adopted, incorporating elements of towers, walkways, experiences, and terracing, with the latter responding directly to the site's natural contours











First Model
Returned to square structures to refine the stepping of the building and better align the size of programs. This iteration successfully connected the educational exhibit and rehabilitation centre but failed to meet the specific requirements and services needed for the rehabilitation centre.

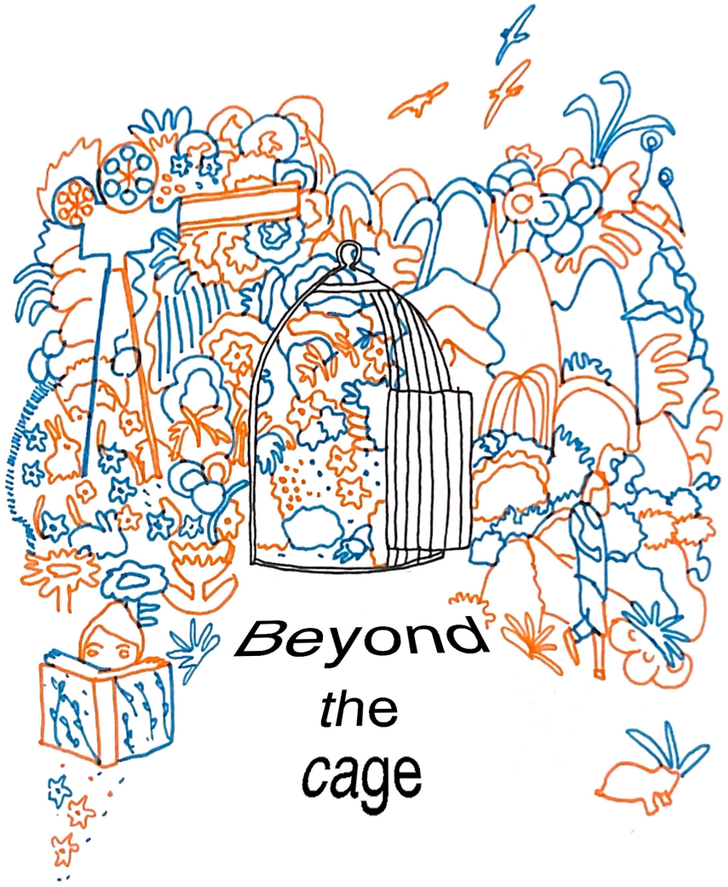
Second Model
Explored semi-basements and varying levels. The program was re-imagined on-site, with the tower and educational exhibit consolidated into one building, and the restaurant, shops, and rehabilitation centre grouped into another. The rehabilitation centre extended one level below ground and two above, accommodating the program. Public spaces featured an amphitheatre and lawn, with wildlife structures integrated throughout the site.

Third Model
A sectional model further refined the use of semi-basements, relocating the rehabilitation centre's program below ground while developing more defined spaces for humans and wildlife. Courtyards were introduced to enhance light and connection between species. This design condensed the building into a unified form, with roof elements serving as walkways linked to outdoor exhibits. The tower was repositioned to a central location as part of the exhibition route, and parking and service roads were also integrated.

Resting Spaces
This model explores resting elements designed to support both wildlife and human needs. It includes bird perches, pollen sources for insects, and shaded areas provided by leaves for humans. Perching structures double as water bowls for wildlife and seating poles for visitors, creating multi-functional spaces that blur the lines between human and animal uses.

Play and Feeding Areas
This model focuses on play and nourishment, integrating water and land elements to create playful environments for both humans and animals. It features shaded play areas near water, seating spaces for the restaurant that combine plant life with seating, and interactive landscape games. Additionally, a vegetable and fruit garden serves as a food source accessible to both humans and wildlife, offering fresh fruits, seeds, and vegetables for birds, insects, and visitors alike.

Figure 8.37:
Models exploring new themes of site, landscaping
(Author, 2024)



A few weeks later, the girl and her mom returned to the zoo, this time for a special event. It was the day the bird she rescued would be released back into the wild. Excitement bubbled inside her as they joined a small crowd gathered in the open area.

9.
Final Design

Welcome

Beyond the Cage, is a reimagined model of what was previously known as the Johannesburg Zoo. After years of feedback concerning animal welfare, and in response to shifting global perspectives on zoos, the institution made a transformative choice: to release all animals capable of surviving in the wild and, only privately housing wildlife unable to survive on their own.

Beyond the Cage redefines human interaction with wildlife and the urban landscape, weaving nature into everyday life and encouraging people to reflect on their impact within the ecosystem. At the heart of this experience, is an elevated walkway that guides visitors through interactive exhibitions aligned with the stages of healing: awareness, processing, growth, and transformation. As they journey along this elevated path, visitors experience moments of connection, observing animals and gaining a deeper understanding of humanity's role in maintaining ecological balance.

Beyond the Cage also includes an urban wildlife rehabilitation center and a shared public park. Here, visitors witness the rehabilitation and release of local animals, fostering a sense of responsibility and care. The public park further demonstrates a harmonious design that respects both human and animal needs, serving as a model of coexistence.

In creating a shared world where humans and animals can thrive together, Beyond the Cage offers a vision of a compassionate and sustainable future where both species live in harmony.

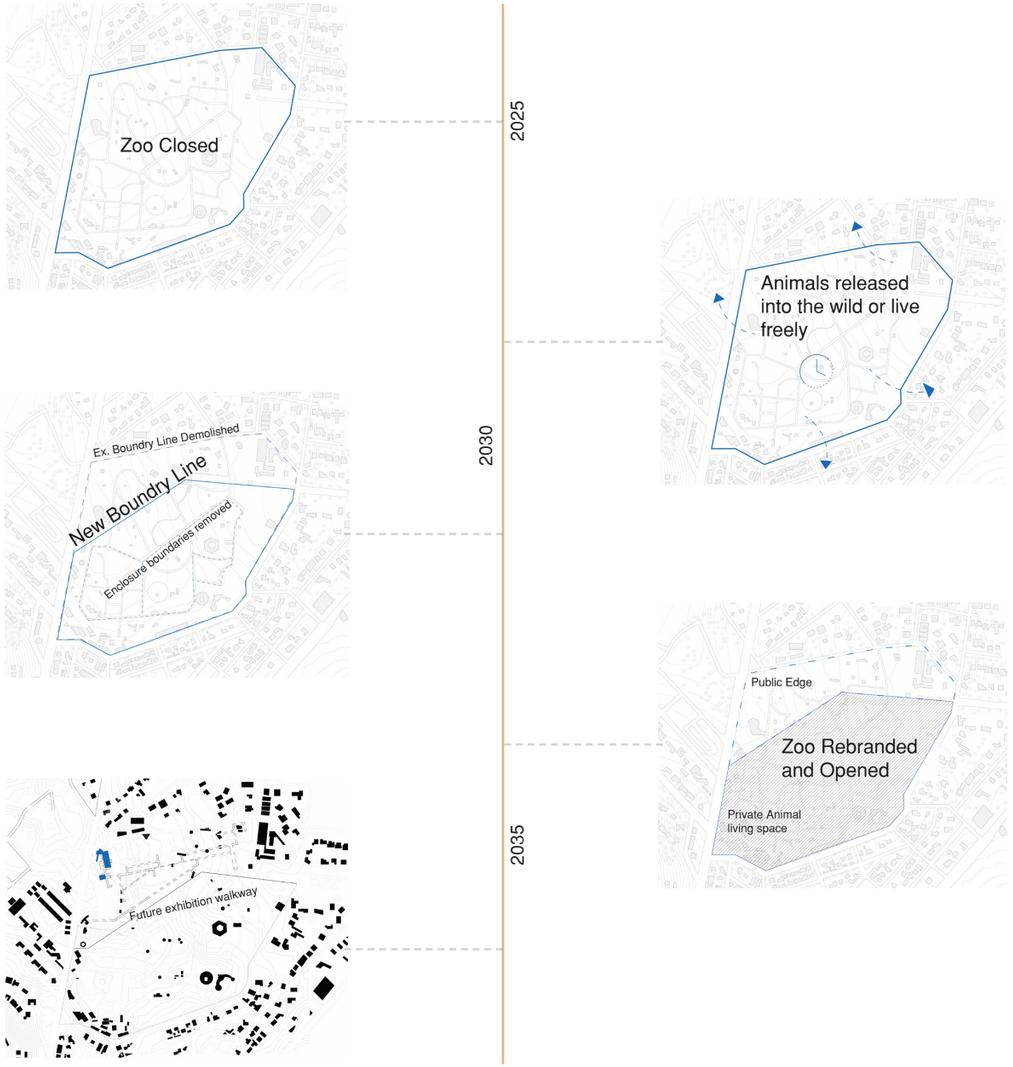
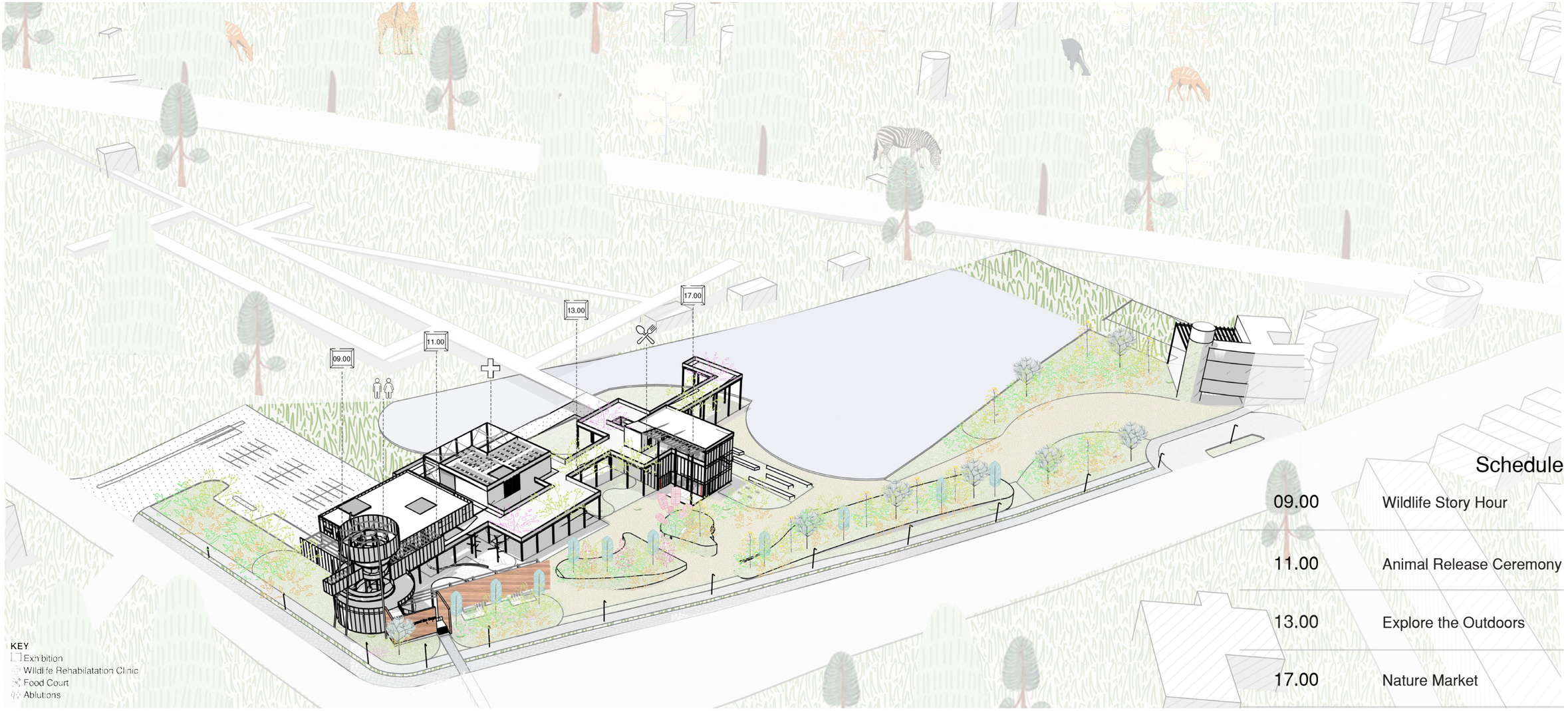


Figure 9.1:
Short story panel 09
(Author, 2024)

Figure 9.2:
Projects timeline of development
(Author, 2024)

Figure 9.3:
Axonometric view and schedule for event
(Author, 2024)



Schedule

09.00	Wildlife Story Hour
11.00	Animal Release Ceremony
13.00	Explore the Outdoors
17.00	Nature Market

Arrival & Entry

Visitors can access the site through two primary entrances. The vehicle entrance is located on Erlswold Road, while pedestrian access and public transport drop-off points are situated along Jan Smuts Road, at the existing entryway.

Once on-site, visitors can proceed to the main building to purchase tickets and begin their journey through the exhibition.

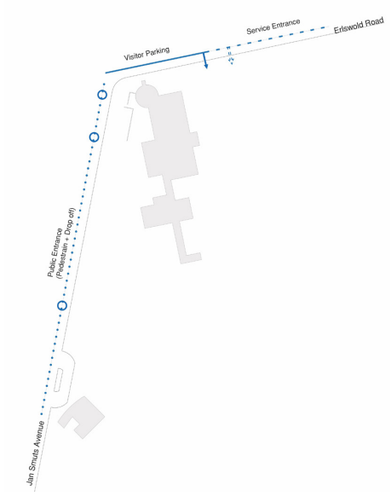






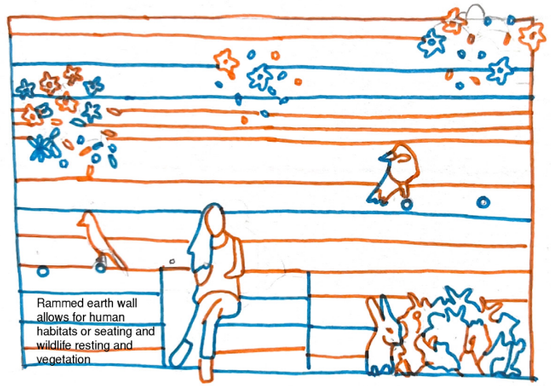
Figure 9.4:
Approach from Zoo Lake
(Author, 2024)

Figure 9.5:
Circulation Diagram
(Author, 2024)

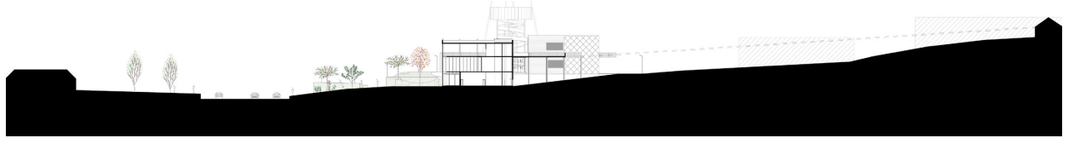
Figure 9.6:
Roof Plan
(Author, 2024)

Figure 9.7:
Sketches of rammed earth wall and landscaping mounds for multispecies
(Author, 2024)

Figure 9.8:
Site Section AA
(Author, 2024)









Key

Visitor movement

Vehicle

Pedestrian

0 5 10 20 50 Metr

GRAPHIC SCALE 1:1000

N

Figure 9.9:
Ground storey plan
(Author, 2024)

Figure 9.10:
Diagram showing ground storey position
(Author, 2024)

Figure 9.11:
North Elevation
(Author, 2024)

Figure 9.12:
Visitor Circulation Diagram
(Author, 2024)

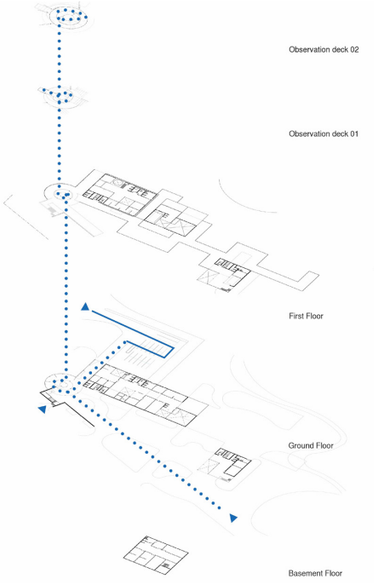
Wildlife Story Hour

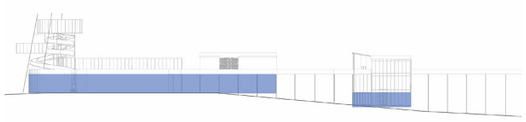
09.00

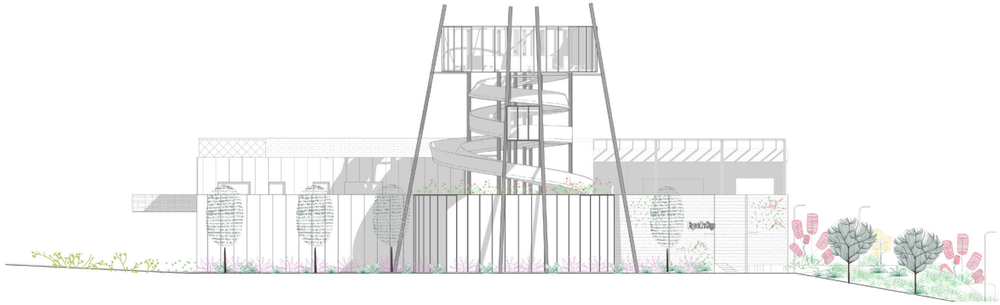
Upon arrival, visitors are greeted at reception and information desks located at each entrance, offering guidance on either the exhibition or directions for those bringing in injured animals.

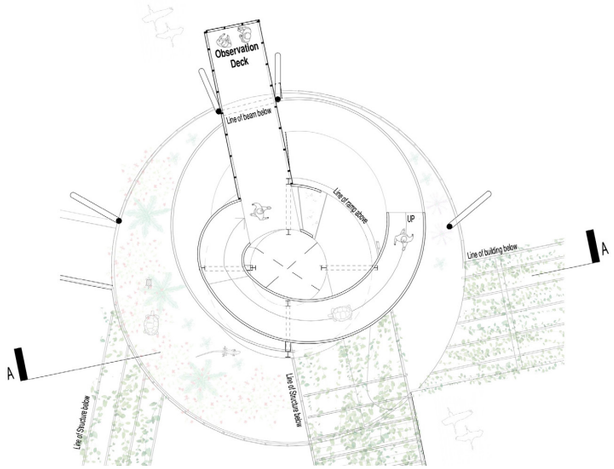
From the reception, visitors will pass through a rammed earth wall, marking the start of their journey up the ramp to the highest level, the Observation Deck 02, where they can enjoy a moment of reflection and the reading.

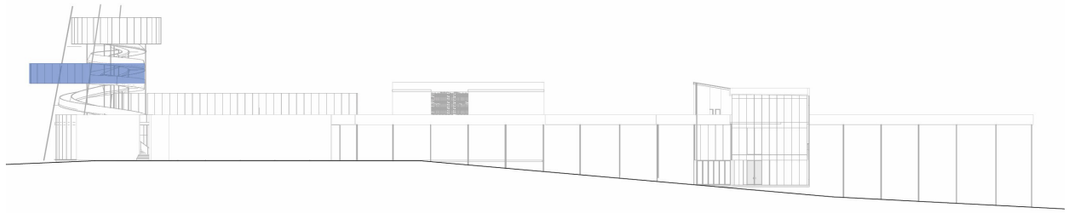
Along the way, visitors can stop for a coffee on the ground floor, enjoy the garden on the first floor, or take in a different perspective from Observation Deck 01.











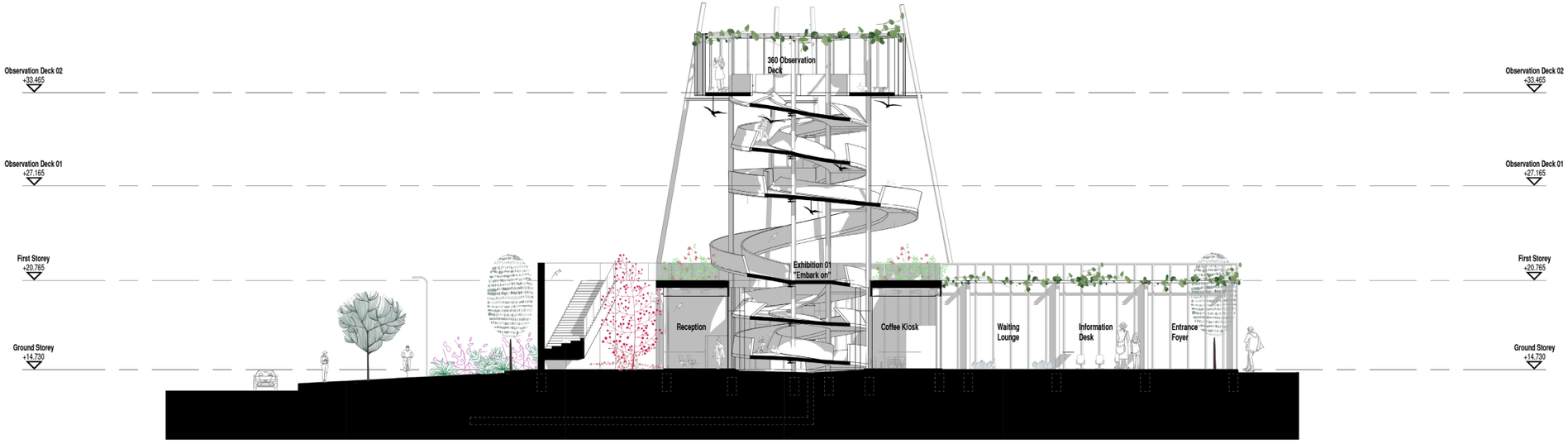
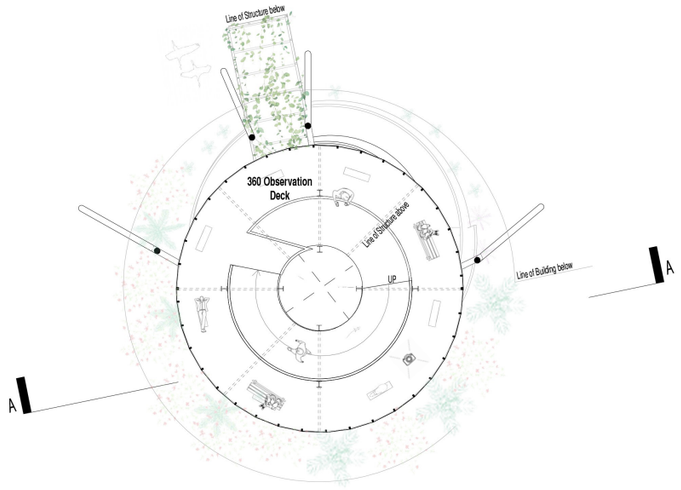


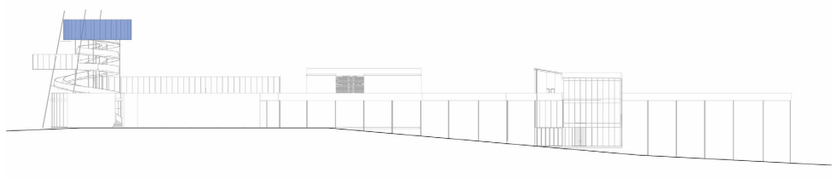
Figure 9.13:
Observation Deck 01 Plan
(Author, 2024)

Figure 9.14:
Diagram showing observation deck 01 position
(Author, 2024)

Figure 9.15:
Section A
(Author, 2024)







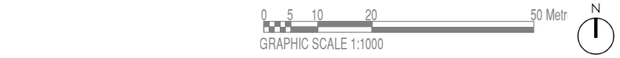


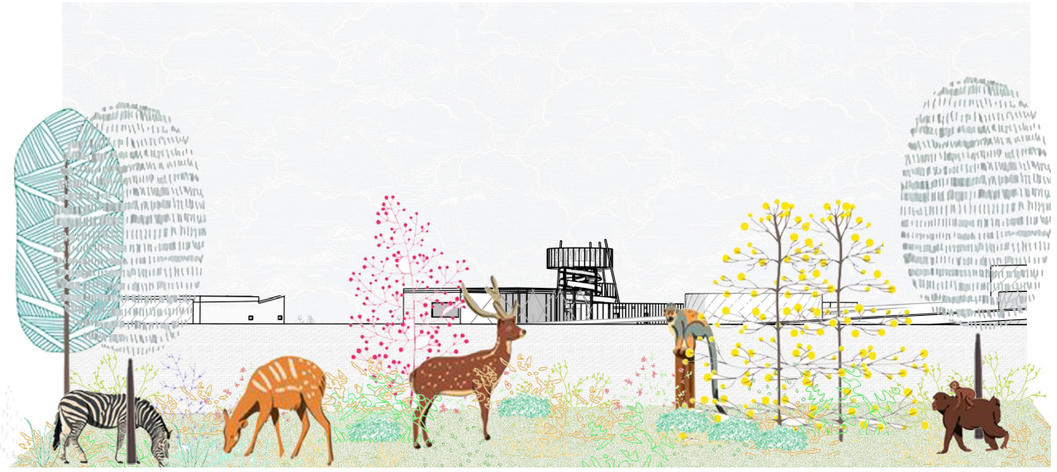
Figure 9.16:
Observation Deck 02 Plan
(Author, 2024)

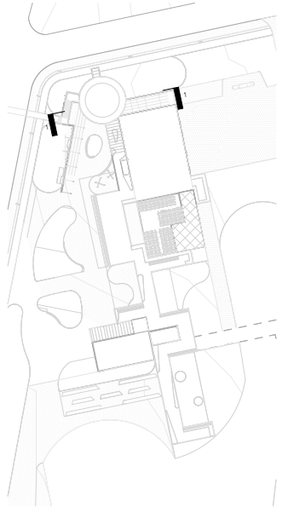
Figure 9.17:
Diagram showing Observation Deck 02 position
(Author, 2024)

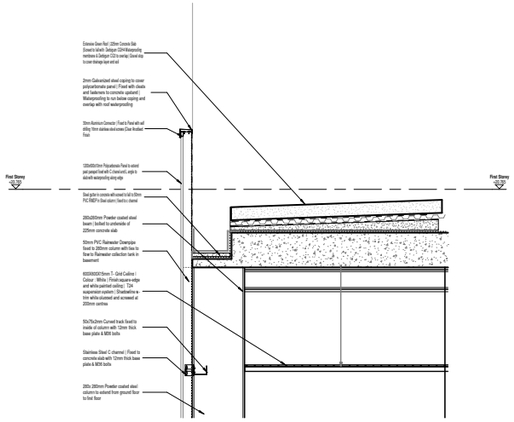
Figure 9.18:
Humans in cage Interior Render of Observation deck 02
(Author, 2024)

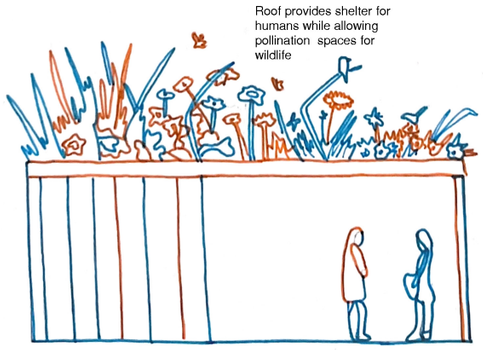
Figure 9.19:
Wildlife view of cage. Exterior render of observation deck 02, from wildlife perspective
(Author, 2024)











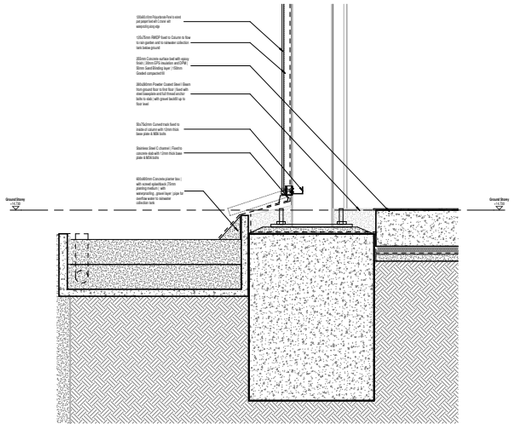


Figure 9.20:
Key Map for detail sections
(Author, 2024)

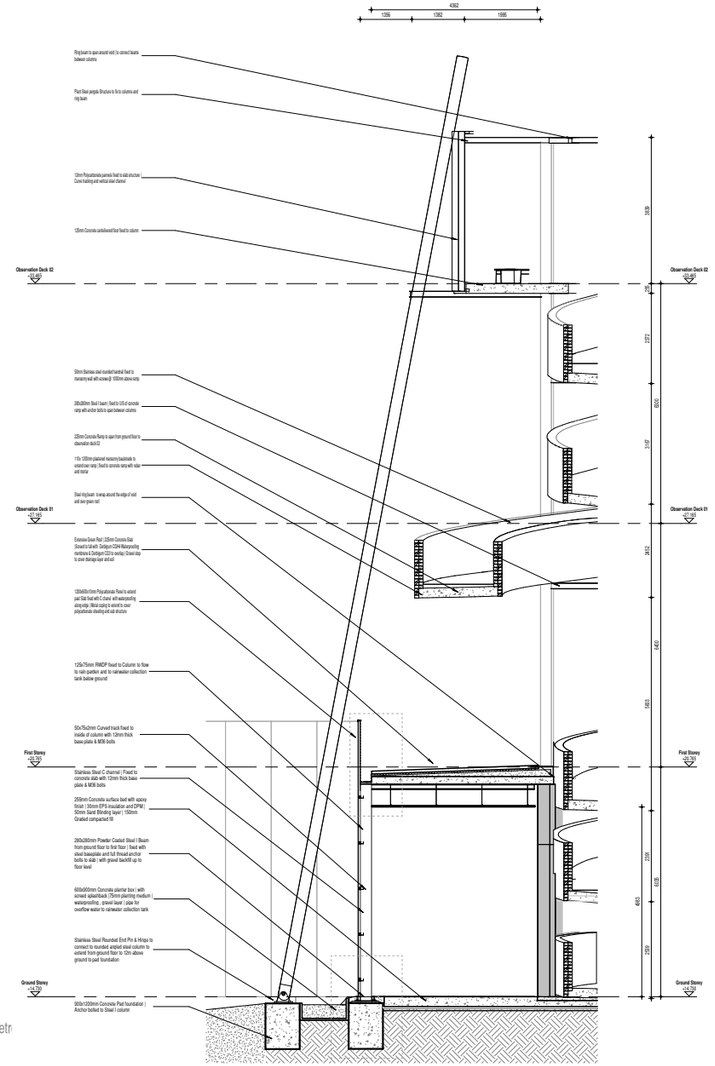
Figure 9.21:
Sketch of roof design for multispecies
(Author, 2024)

Figure 9.22:
Details of roof
(Author, 2024)

Figure 9.23:
Details of base
(Author, 2024)

Figure 9.24:
Detail Section of Main Building with ramp
(Author, 2024)



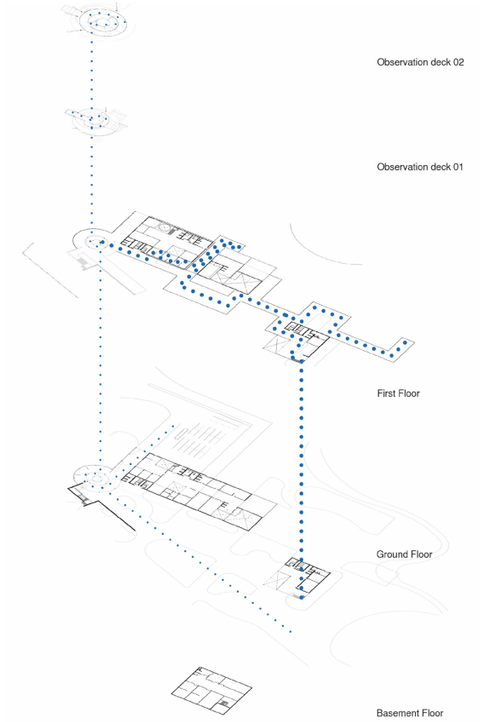


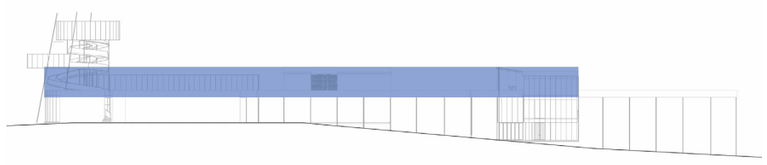
Animal Release Ceremony

11.00

After completing their reading on Observation Deck 02, visitors can descend the ramp to the first floor, where they can explore the second exhibition in the Rehabilitation Building. Here, they can observe wildlife undergoing treatment and engage with dioramas and artwork that highlight the impact of human actions on wildlife. Staff offices are also located on this floor.

Continuing their journey, visitors can walk through a series of gardens along the pathway, each offering a unique perspective. They can also participate in an informative talk before witnessing the release ceremony, where the rehabilitated animals are returned to the wild.







Key

Visitor movement

Vehicle

Pedestrian

N

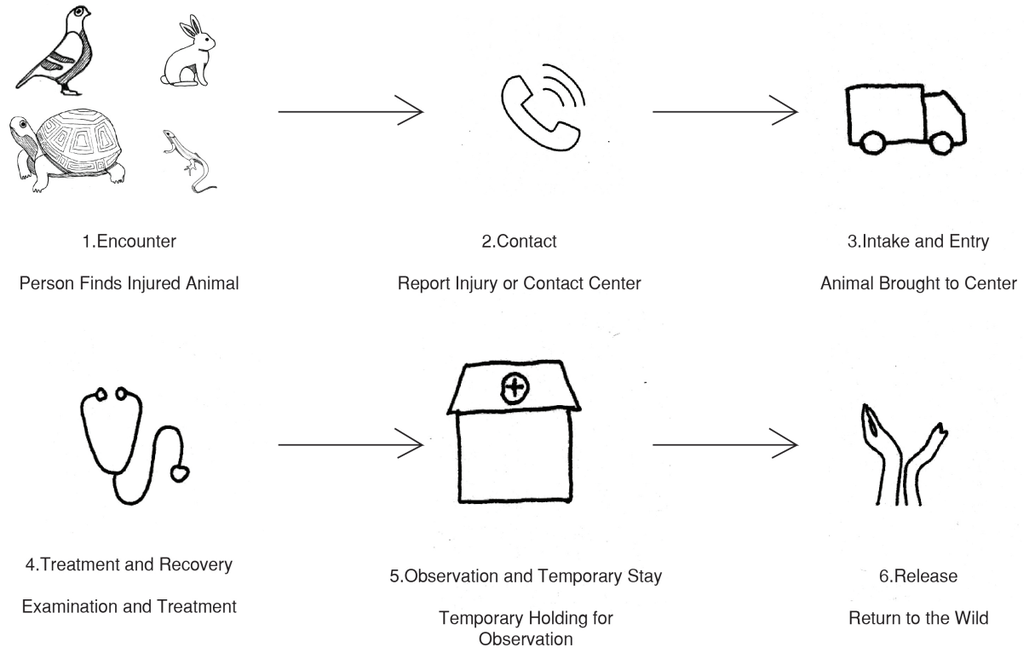
0 5 10 20 50 Metr

GRAPHIC SCALE 1:1000

Figure 9.25:
Visitors Circulation diagram continued
(Author, 2024)

Figure 9.26:
First storey position
(Author, 2024)

Figure 9.27:
First Storey Plan
(Author, 2024)



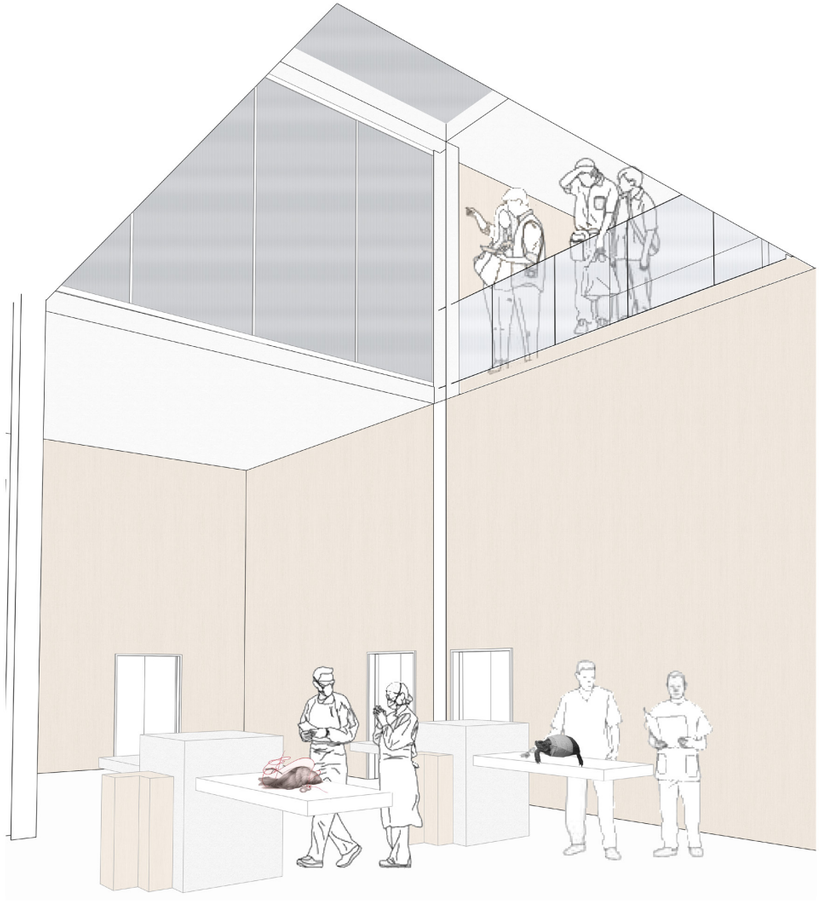


Figure 9.28:
Rehabilitation clinic process and wildlife treated
(Author, 2024)

Figure 9.29:
Treatment exhibition render
(Author, 2024)

The building's services are primarily located along the east facade in the basement. Deliveries are accessed from the ground floor and transported down to storage areas, alongside the rainwater tanks and solar panel batteries.

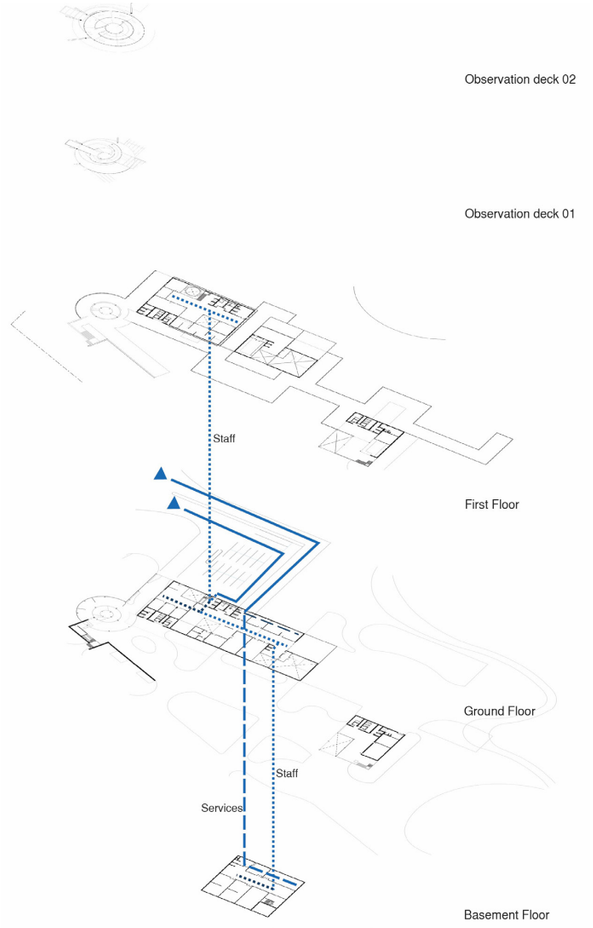


Figure 9.30:
Staff & Services Circulation diagram
(Author, 2024)



Figure 9.31:
View from parking entrance
(Author, 2024)

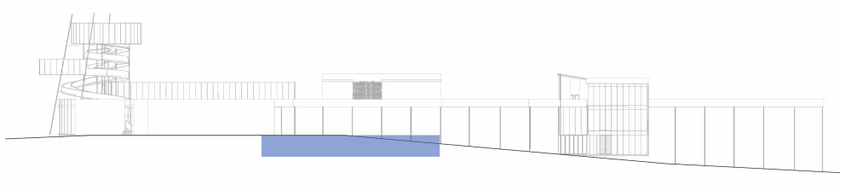


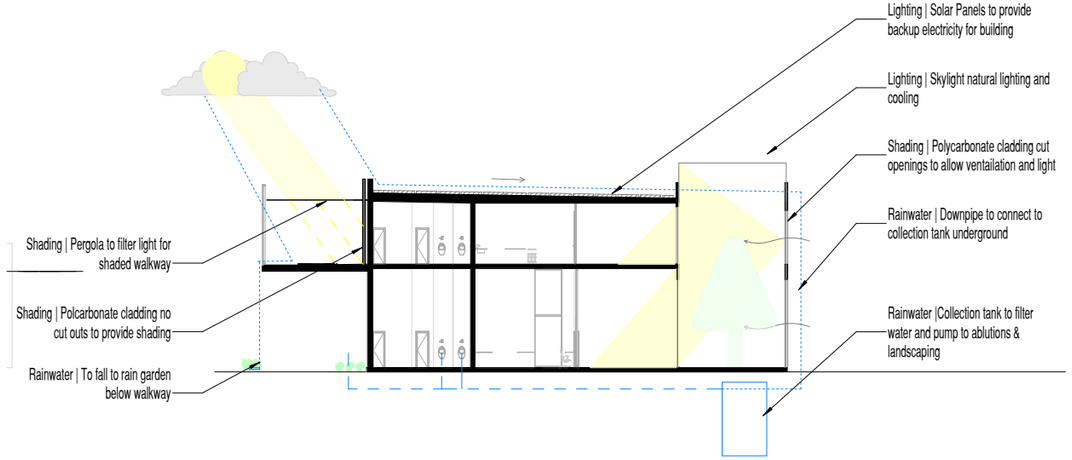


Figure 9.32: Basement Storey position
(Author, 2024)

Figure 9.33: Basement storey
(Author, 2024)

Figure 9.34: Technical system diagram
(Author, 2024)

In addition to these sustainable systems, the building employs several passive design strategies to enhance its environmental performance. Polycarbonate cladding, featuring strategically placed cutouts, controls sunlight entry, while skylights bring in natural light and ventilation. Natural shading, along with pergola structures, further help to prevent overheating. The rainwater collected on-site is used for toilets and landscaping, reinforcing the building's commitment to sustainability.





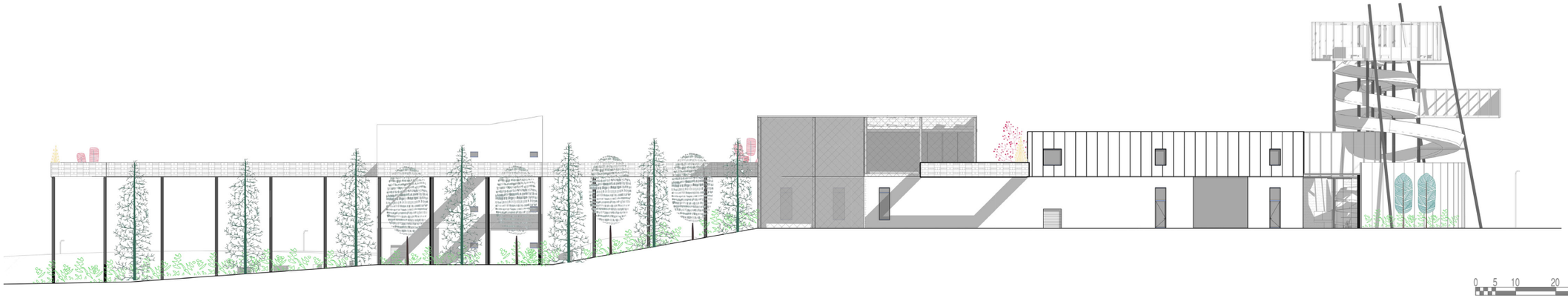




Figure 9.35
Section B
(Author, 2024)

Figure 9.36:
East Elevation
(Author, 2024)

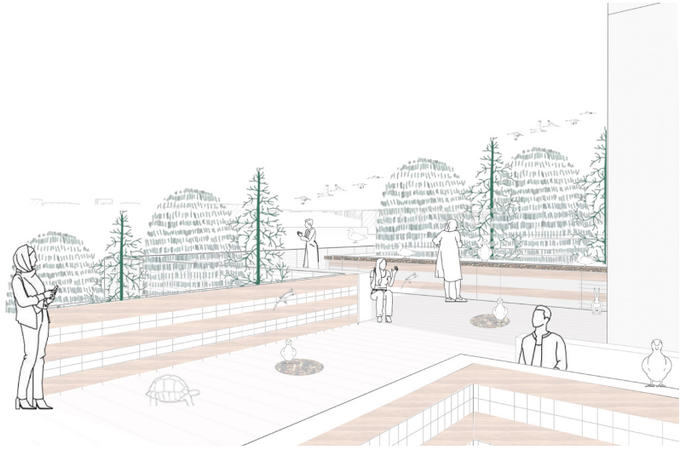
Explore the Outdoors

13.00

After witnessing the release ceremony along the walkway, visitors can continue further up to take photos and enjoy the view before making their way to the bar, where complimentary drinks are offered. Here, they can admire the unique planter sculpture, which merges materials in an artistic display.

Following this, visitors can descend to the mezzanine, where they can indulge in cakes and refreshments at the coffee shop, or head to the ground floor restaurant for a full meal.







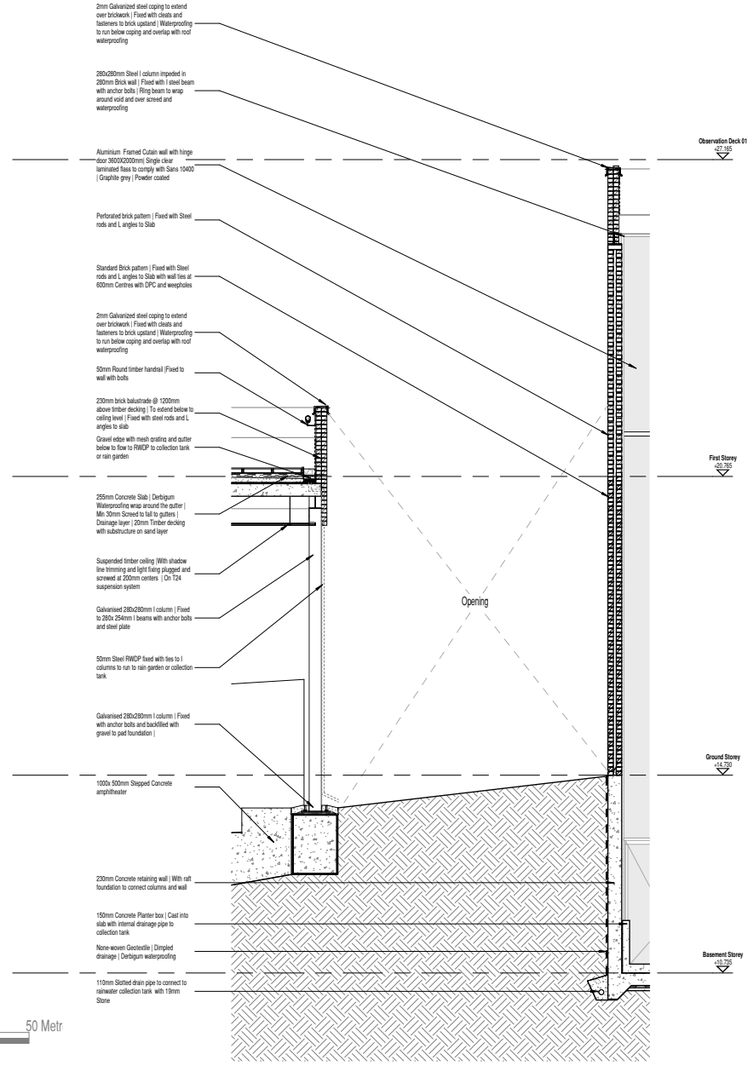
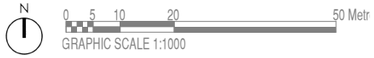
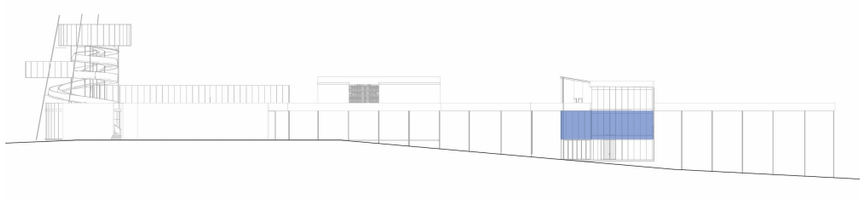


Figure 9.37:
Release and Feeding exhibition render
(Author, 2024)

Figure 9.38:
Sketch of balustrade for multispecies
(Author, 2024)

Figure 9.39:
Detail Section of walkway and Brickwork
(Author, 2024)





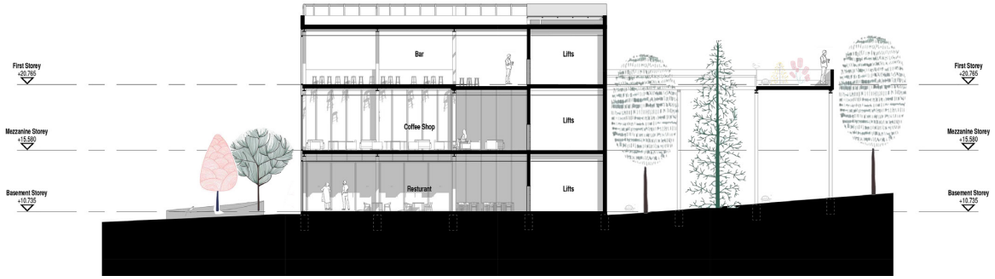


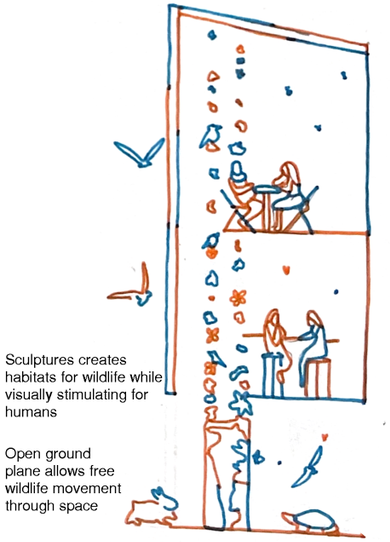


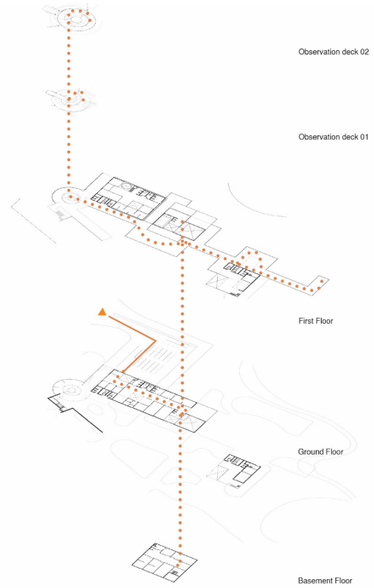
Figure 9.40:
Mezzanine storey position
(Author, 2024)

Figure 9.41:
Section C
(Author, 2024)

Figure 9.42:
Mezzanine storey plan
(Author, 2024)







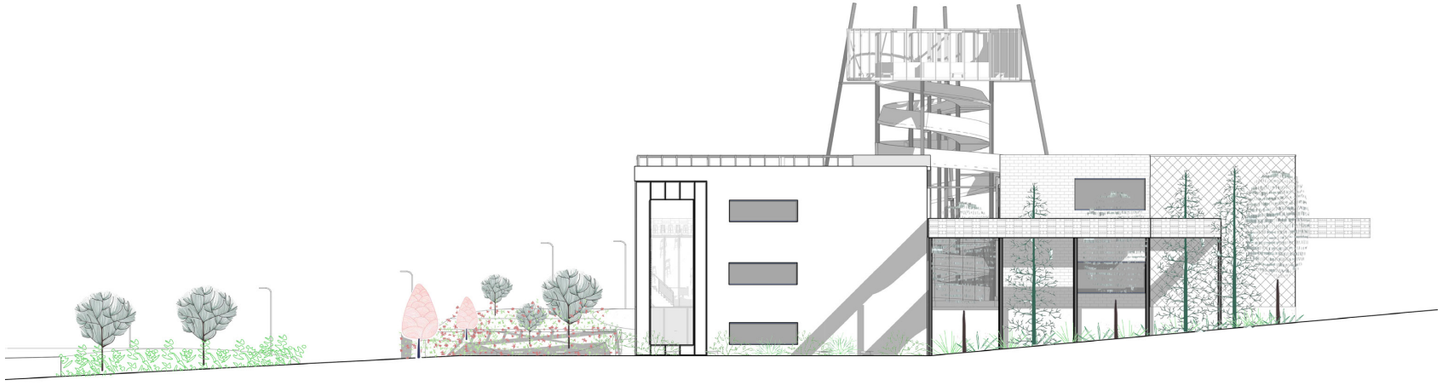




Figure 9.43:
Sketch of sculptures and an open ground floor design for multispecies
(Author, 2024)

Figure 9.44:
Wildlife circulation
(Author, 2024)

Figure 9.45:
South Elevation
(Author, 2024)



Nature Market

17.00

After enjoying a meal, visitors can take a leisurely stroll through the eco-market, which extends toward Zoo Lake. The market showcases goods and resources focused on sustainable living and urban biodiversity, providing visitors with opportunities to engage in responsible consumerism and learn more about conservation efforts.

While the polycarbonate cladding will feature videos and graphics that can be seen from Zoo lake, showcasing various conservation efforts around the world.

This final stop offers a chance for visitors to reflect on the broader impact of sustainability and wildlife preservation.



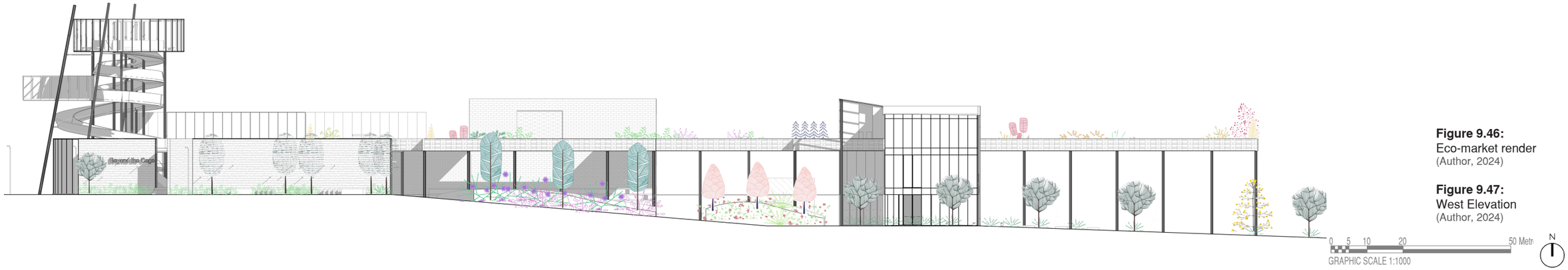


Figure 9.46:
Eco-market render
(Author, 2024)

Figure 9.47:
West Elevation
(Author, 2024)

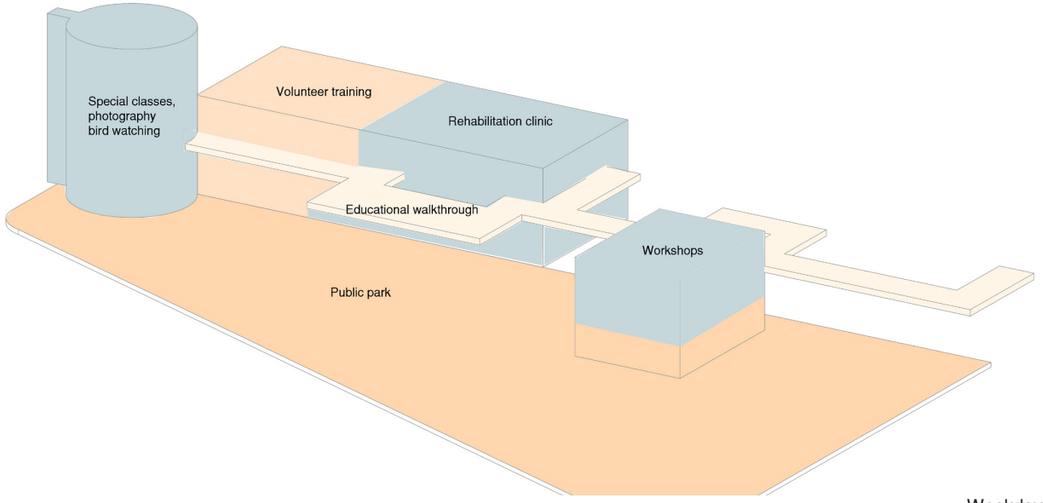
Community & Conservation

Beyond the Cage functions not only as an event venue but as a everyday community hub with open boundaries that invite interaction beyond scheduled events.

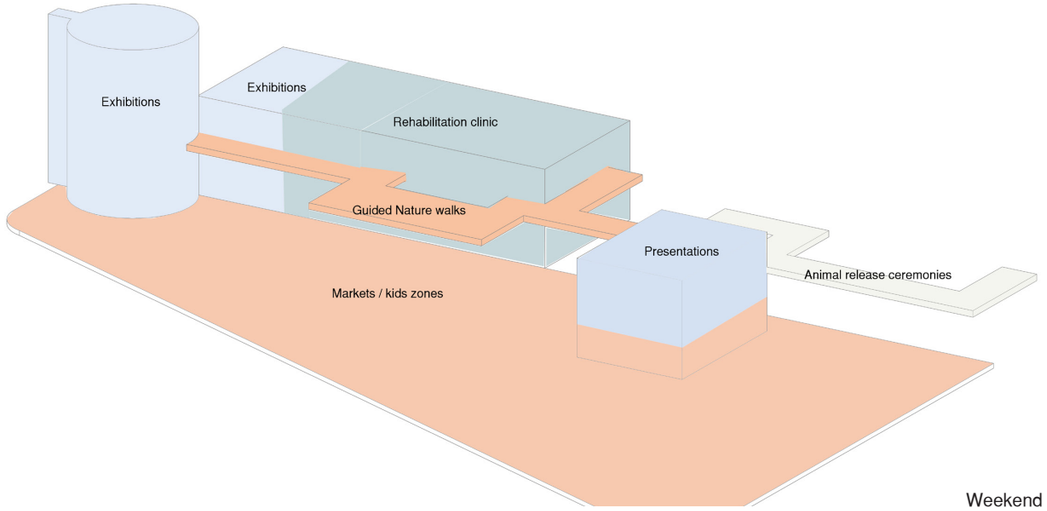
The adaptable tower structure, while serving as the starting point for exhibitions, can also host bird-watching or photography classes. The elevated walkway, typically used for immersive exhibitions, easily transforms into an educational nature trail for visiting school groups. Meanwhile, the rehabilitation center serves as a volunteer training hub during the week, providing ongoing care for injured animals and engaging community members in conservation efforts.

The open design encourages spontaneous daily visits, making the restaurant and coffee spaces ideal for community gatherings, casual meetings, or workshops that extend into the public park.

With its rectangular form and flat roofs, the building allows for flexible adaptations over time, ensuring it evolves with the community's needs and the growing vision for urban wildlife coexistence.



Weekday



Weekend

Figure 9.48:
Programming for a weekday and a weekend
(Author, 2024)

Figure 9.49:
Future envisioning of project
(Author, 2024)



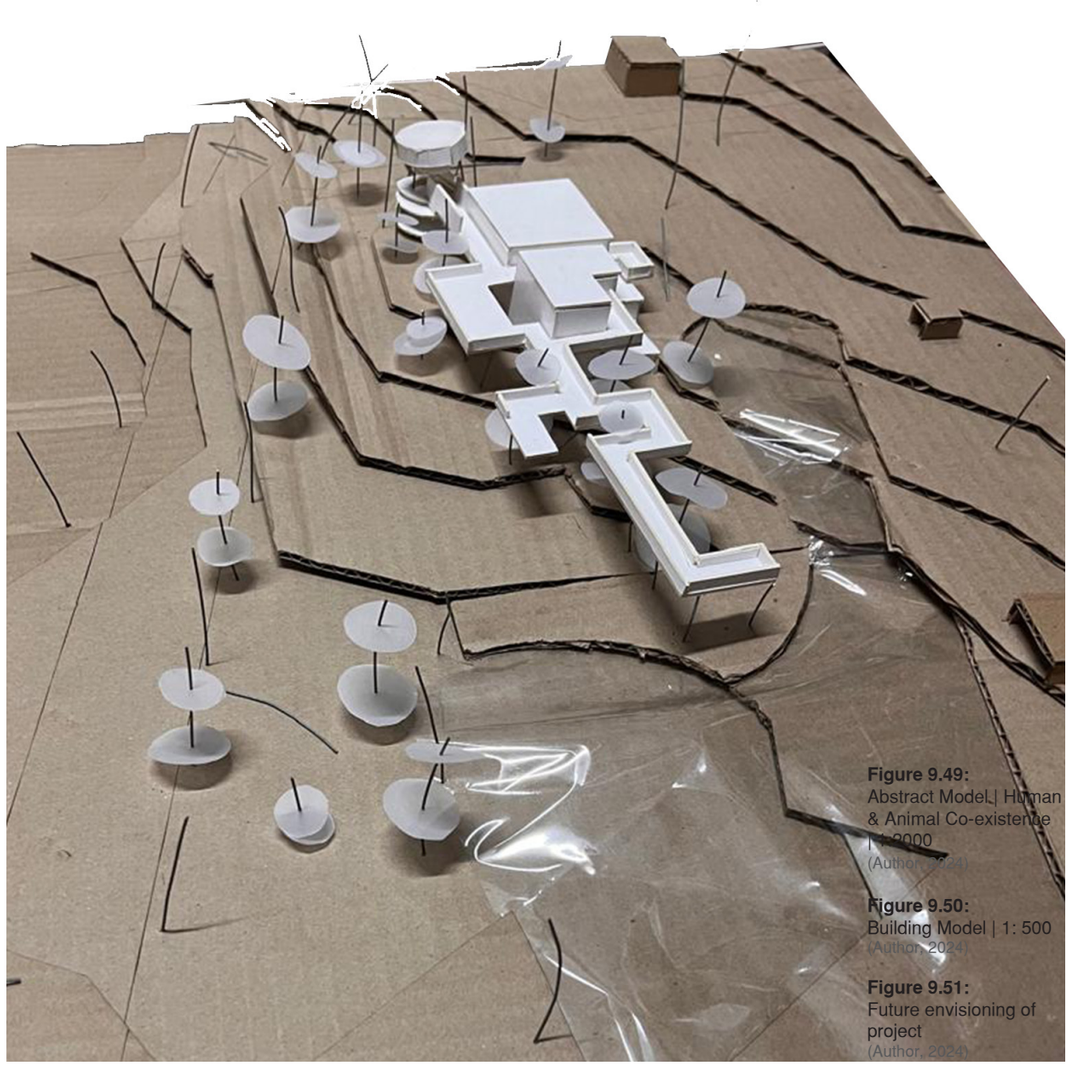


Figure 9.49:
Abstract Model | Human & Animal Co-existence | 1: 2000
(Author, 2024)

Figure 9.50:
Building Model | 1: 500
(Author, 2024)

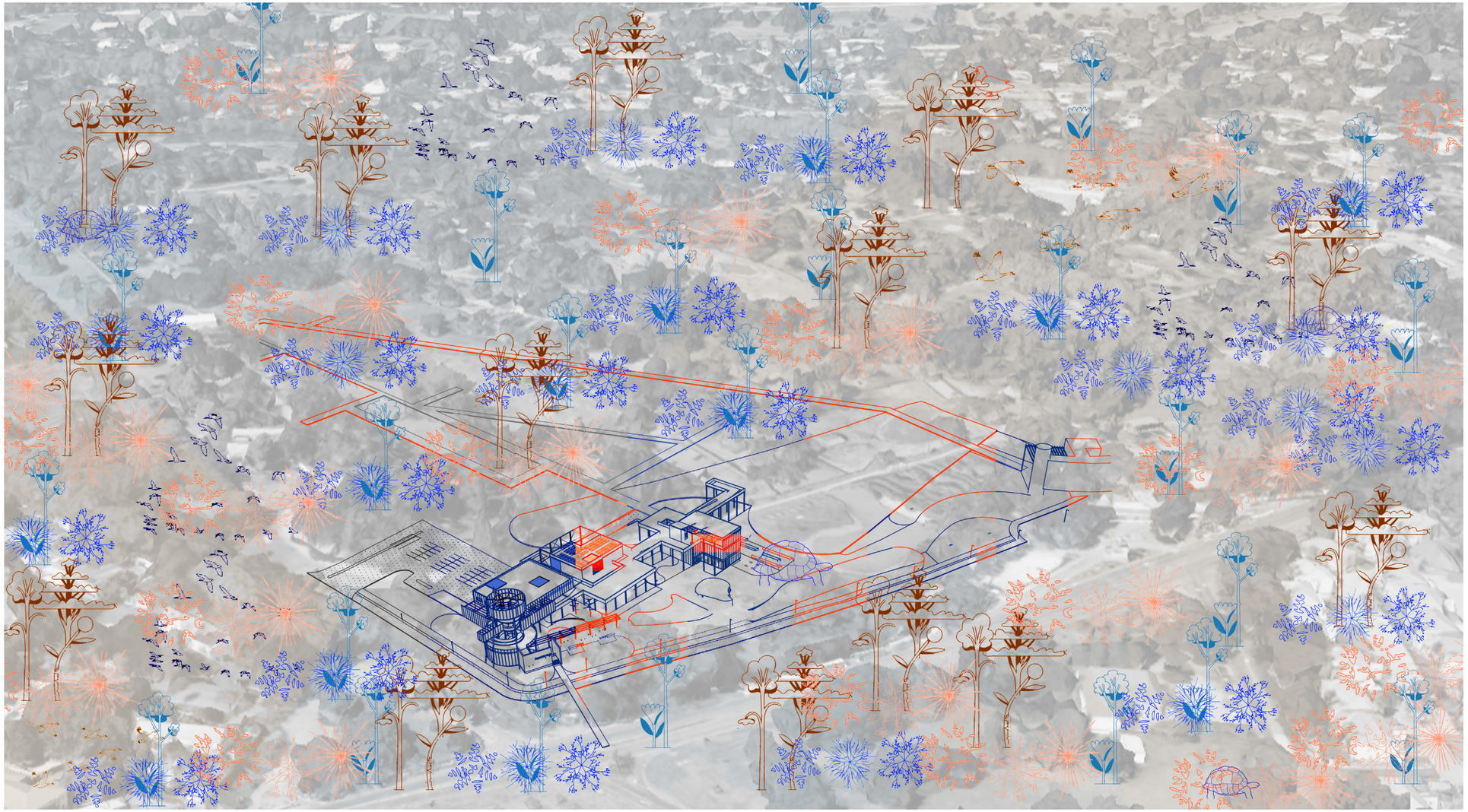
Figure 9.51:
Future envisioning of project
(Author, 2024)

Looking Ahead

Beyond the Cage envisions itself as a catalyst for a new model of human-wildlife coexistence, paving the way for urban spaces that support both ecological health and community engagement. By collaborating with city planners, it could help establish green corridors and wildlife-friendly zones throughout Johannesburg, linking parks and gardens to create safe pathways for wildlife and enrich urban biodiversity.

As a center for education and research, Beyond the Cage could partner with universities and conservation organizations, advancing studies in urban ecology and sustainable design. Over time, it could serve as a global model for urban conservation, harmonizing community, culture, and sustainability.

Ultimately, Beyond the Cage aims to make Johannesburg a model of urban coexistence, where wildlife and people thrive side-by-side, inspiring other cities to embrace this vision of a sustainable, shared future.



10.
End Notes



As they left the event, she felt a sense of pride and joy, knowing she had been a part of his journey back to freedom. The moment stayed with her—a reminder of the impact small acts of kindness can have on the world.



Figure 10.1:
Short story panel 10
(Author, 2024)

Figure 10.2:
Flower Food
(Author, 2024)

Reflection on the Project's Impact & Limitations

The proposed alternative zoo model aimed to integrate wild species into urban environments and introduce new considerations for the inclusion of other species in the planning of human habitats. This approach sought to reduce human-animal conflict, which often arises when animals enter areas that are not designed or suitable for their needs. Achieving this shift requires the establishment of new socio-ecological balances, focusing on designs that mimic and function like natural ecosystems. The goal was to create spaces where ecosystems seamlessly blend into human environments, ensuring they are valued and respected, rather than overlooked or dismissed.

The proposed project was an intervention that reimagines the human-animal relationship, offering an alternative model for education, rehabilitation, and wildlife engagement. It served as a starting point in addressing broader environmental and societal issues, but its impact will require significant support from government policies. These policy changes should address habitat destruction, improve road safety for animals, reduce human-wildlife conflict, and facilitate the development of other architectural interventions such as wildlife corridors, urban wildlife rehabilitation and education centres, and land and wetland sanctuaries. Additionally, the closure of traditional zoos and their transformation into more sustainable wildlife centres should be prioritized.

Furthermore, the intervention recognizes that a single project cannot reach everyone. Therefore, it calls for complementary public awareness campaigns and sustained funding to support these initiatives over time. These efforts will help shift public perception, promote long-term change, and ensure that wildlife protection and urban planning move toward a more harmonious coexistence.

Acknowledgments

I would like to express my heartfelt gratitude to everyone who has contributed to the development and completion of this thesis, it is your support, guidance, and encouragement that has truly brought this work to life.

I am deeply thankful to God for granting me strength and guidance throughout my years of study.

To my family,
Mom, Dad, Alicia, Shaelen, and Mylo, thank you for everything. From driving me to countless destinations, to running errands and assisting with my research in ways beyond measure, your unwavering support, love, and understanding have been invaluable. Your belief in me has been a constant source of strength and motivation throughout this journey.

To my friends and fellow classmates,
Thank you for the laughter, the snacks, the chocolate pick-me-ups, and the shared experiences during those challenging crit sessions and breakdowns. Weve made it to the other side!

To my supervisor, Jabu,
Thank you for your endless guidance, support, and most importantly, your faith in me when I had none. I'm deeply grateful for your patience in helping me through my weekly breakdowns and reassuring me every step of the way. I couldn't have done it without you.



Appendix

Appendix A: Viability Report

Executive Summary

Project Introduction & Proposal

The project explores wildlife welfare within the zoo landscape. It questions the treatment and captivity of wildlife for human entertainment and poses an alternative zoo architecture and landscape.

The proposed project is located within the Johannesburg Zoo. The zoo has a long history spanning over 100 years, however, in recent years the Zoo has failed to represent the advancements in species and society. This has led to disinterest among visitors and the Zoo receiving vast criticisms of poor living conditions, neglect, abusive treatment, and the depression of kept wildlife. This is fuelled by zoo infrastructure and technology not progressing at the same level as the urban environment, it remains stagnant, preventing insufficient education and awareness around wildlife adding to the conflict between humans and animals thereby hindering animal well-being.

The project, therefore, seeks to address this problem by creating an edge-condition building, that acts as a safe haven for the animals who can remain in the city, through suitable habitat design, while creating a place of education and relaxation that supports the current functionality of the zoo model yet eradicates its current boundaries. This will create a deeper understanding of animals and the ecosystem ensuring long-term wildlife population persistence, social legitimacy, and a desired level of kinship rooted in wildlife welfare The new model aims to ensure long-term wildlife population persistence, social legitimacy, and a desired level of kinship rooted in wildlife welfare that maintains resources for the future.

Figure 1:
Flowers & Insects
(Author, 2024; adapted fro m "Hallmark", n.d)

Funders	Contribution(%)	Contribution (R)
JCPZ	60	960 000 000
AAZ/WAZ	20	320 000 000
SEGA	20	320 000 000
Total cost		**1 600 000 000**

Figure 2:
Table illustrating funders and funding contribution
(Author, 2024)

Client

Client

Johannesburg City Parks and Zoo Non-Profit Company

The Johannesburg City Parks and Zoo is a non-profit legal entity owned by the City of Johannesburg Metropolitan Municipality. The company's duties include developing, maintaining, and conserving green open spaces, cemeteries, and zoos. Over the last ten years, the Johannesburg Zoo has received several complaints & petitions about poor wildlife welfare within the zoo. After reviewing this, the stagnant nature of the zoo in the current digital era, and the growing environmental crisis, JCPZ has decided to seek an alternate zoo design that responds to the above concerns.

Organisational Structure

The JCPZ organisational structure of the company is through several executive managers and an overall managing director. Therefore, the managing director would be the authorised representative able to sign off on design decisions, while the company secretary would be used as a liaison to coordinate information received from the Zoo management teams and present this to the managing director for the design.

Financial: Funding mechanisms

The project will seek capital funding through three organisations:

1.Johannesburg city parks and zoo- serves as the main client and will be required to provide substantial capital to complete the project. According to JCPZ BUSINESS PLAN for the year 2021-2022, the expected capital expenditure is R80.0m for open space development and nature conservation development. Therefore, this capital would cover a large portion of the building.

2.African Association of Zoos and Aquaria & the World Association of Zoos and Aquaria- this organisation sets out various animal welfare laws and monitors zoos and aquariums in relation to these laws. They will be approached to provide funding for the landscaping and animal habitats to be provided. As they are a large company, associated with a large group of zoos, a steady capital source is assumed.

3.SEGA- is a video game company, that recently collaborated with BBC to create a digital zoo experience in Japan. They will be approached to develop a similar program within the project. It is assumed, as they are a large company with several international branches, and a steady income from sales and other projects, the company would be able to provide adequate capital for the project.

The Project

Brief

The project seeks to create an alternative zoo landscape model, that addresses poor wildlife welfare in zoos and in the city. It proposes several urban wildlife habitats and innovative digital and analog educational exhibitions to foster interspecies co-existence.

The Site

The Urban Scale: Saxonwold

The Exhibition Centre is based in the Johannesburg Zoo in Saxonwold which is primarily a residential area. The project will seek to relate to the needs of the surrounding area through program and landscaping.

The Building Scale: Joburg Zoo

The site chosen within the Zoo is located on the corner of Jan Smuts Avenue and Erlswold Way, a high-trafficked area, and is currently an Eland and Waterbuck enclosure. The project will seek to create an edge building, that responds to the area's needs, and proposes an alternate Exhibition.

Rights And Other Constraints

Address:	Jan Smuts Ave / Upper Park Drive, Forest Town
Stand Number(S):	Portion Of 37/53, Portion 86/53 Farm Braamfontein
Zoo Area:	572 532 m2
Site Area:	40 134 m2
Zoning:	Public Open Space
Height:	2 Storeys
Coverage:	50%
Far:	2.1

Land Cost

In 1903, 200 acres of land was offered as a public park to the city by the firm H Eckstein & Co. The land is currently owned by the Johannesburg City Council and continues to function as a zoo and park.
Since the project appoints the JCPZ as the client, JCPZ is managed by Council, and the project builds on this land no land would need to be bought.

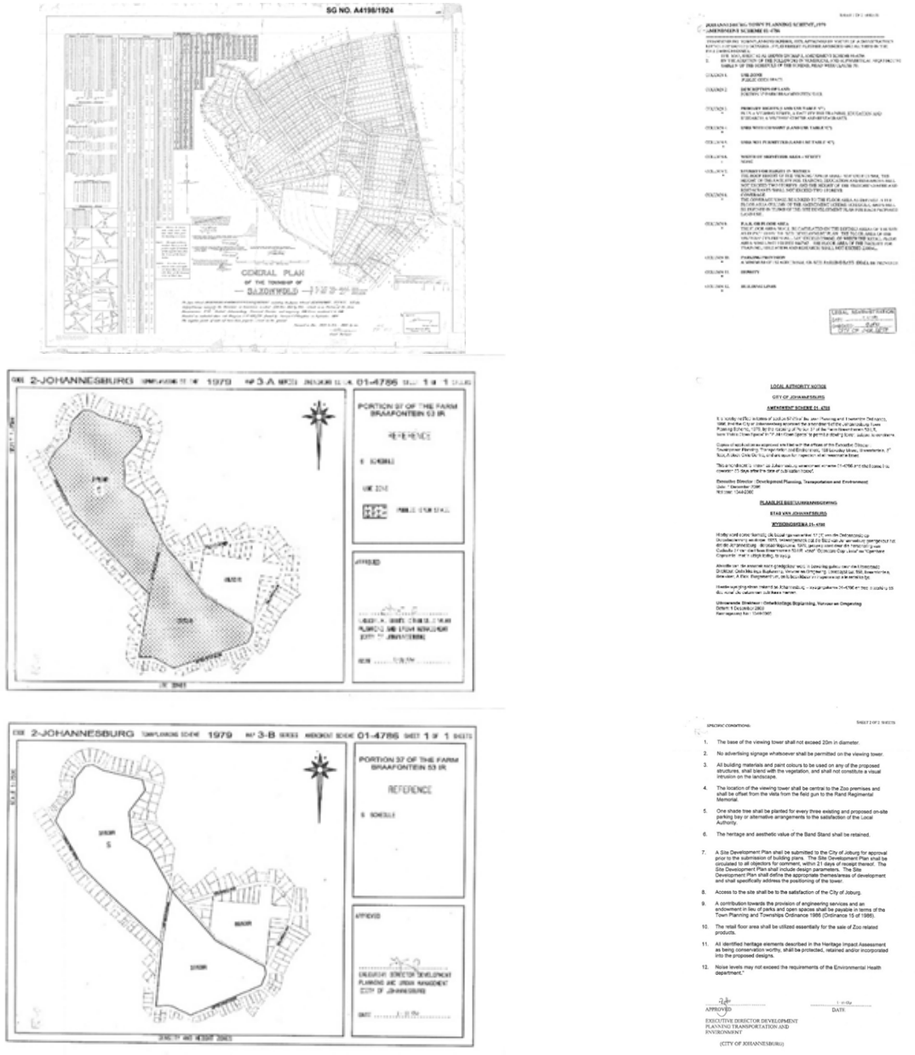


Figure 3:
SG Diagram of site & Amendment notices
(Author, 2024)

Description	Total Area (M²)	Cost (R/M)	Vat (15%)	Total Cost (R)
Public				
Forecourt				
Retail	100	12 000	13 800	1 380 000
Storage	50	9 100	10 465	523 250
Coffee shop	100	12 000	13 800	1 380 000
Restaurant (inside)	180	12 000	13 800	2 484 000
Restaurant (outside)	125	16 000	18 400	2 300 000
Kitchen and Service Area	100	9 100	10 465	1 046 500
Public toilets	50	9 100	10 465	523 250
Landscaping	100	850	978	97 800
				9 734 800
Semi-Public				
Reception				
Entrance foyer	50	17 800	20 470	2 149 350
Reception/ticket sales	10			
Information stand	10			
Gift shop/ book shop	35			
Security office	15	11 500	13 225	925 750
Volunteer office	15			
Cashiers office	15			
Management/ public relations office	25			
				3 075 100
Exhibition				
4d theatre experience	300	23 000	26 450	7 935 000
Podium exhibition	150	16 000	18 400	2 760 000
Outdoor exhibition	500	10 500	12 075	6 037 500
Interactive screen game	200	23 000	26 450	5 290 000
Animatronic exhibition	450	16 000	18 400	8 280 000
Workshops	100	9 800	11 270	1 127 000
				31 429 500
Wildlife Rehabilitation Centre				
Exam room	150	31 300	35 995	21 597 000
Quarantine room	120			
X ray	50			
Laboratory	60			
Operative room	100			
Intensive care room	60			
Necropsy Room	60			
Indoor enclosure	300	11 800	839 500	13 570
Outdoor enclosure	400			
Reception & Waiting Room	75	11 500	13 225	2 777 250
Staff Offices	75			
Meeting Room	40			
Volunteer staff Lounge	20			
				646 528 850
				681 033 450
Private				
Administration				
Reception desk & Waiting area	25	11 500	13 225	5 290 000
Open plan office	75			
curator	20			
administration staff	60			
marketing staff	30			
exhibition staff	30			
researchers offices	30			
Meeting room	40			
Boardroom	40			
Kitchenette	20			
Staff toilets	30			
				5 290 000
Service Areas				
Electrical	351	(1300 + 1300 + 825) 3425	3939	1 382 589
Electronic	351	(600 + 880 + 1 100) 2580	2967	1 041 417
Fire protection	351	(460)	529	185 679
Air-conditioning	351	(570 + 1 750 + 1850) 4170	4796	1 683 221
				4 292 906
Total cost(inc. VAT)				**700 351 156**

Feasibility

Technology, Sustainability, and Materiality

The project will employ several passive and active design methods to decrease service expenditure such as using solar panels to supply exterior lighting, using solar shading to prevent overheating in the building, and several courtyards for natural cooling. The project will primarily use brick and concrete as a building material. As it is readily available and low maintenance.

Viability

The project explores a mixed-used program consisting of retail, education, and administrative spaces through a public, semi-public and private interface.

The costing is determined through program areas and uses AECOM 2022-2023 as a guide, as seen below.

	Architect
Value Of Works	R 700 351 156
Primary Fee	R 60 593 982,10
Secondary Fee	(R 700 351 156– R 520 000 001,00) x 10.98% =R 6 480 351 155x 10.98% =R 711 542 556.80
Professional Fee	R 60 593 982,10 + 711 542 556.80 =R 772 136 538.90
Vat (15%)	115 820 480.80
Total cost	**887 957 019.70**

Construction cost	**700 351 156**
Architect Professional fee	**887 957 019.70**
Estimated cost of project	**1 588 308 176**

Figure 4:
Table showing the total cost of the project, based on the program's total area and the cost per m2
(Author, 2024)

Figure 5:
Table showing Fee Calculations
(Author, 2024)

Figure 6:
Table showing Estimated Project Cost
(Author, 2024)

Figure 7:
Table showing estimated yearly income and expenses and the gross profit
(Author, 2024)

Income

The project has several active and passive income sources. Active income sources include retail, coffee shop and a restaurant while passive income includes exhibitions ticket entry and workshops.

Active income sources:

1.Retail- positioned along the street to interact with pedestrians moving across and through the site.
2.Coffee shop/ restaurant- positioned along the street to interact with bus travellers/ students and visitors.
3.Exhibition entry- positioned inside the building, these would be used by visitors entering the exhibition.
4.Workshops- positioned inside the building, these would be used by schools or large visitor groups.

Passive income sources:

1.Donations/ sponsors- subsidy received from sole shareholder, the City of Johannesburg Metropolitan Council
2.Interest received- from various projects and accounts.

Expenses

The project estimates several expenses, these include:

1.Salaries and wages- expenses for administrative staff and exhibition staff
2.Repairs and maintenance- for the digital exhibitions and landscaping
3. Services- for electrical, data, water, etc.
4.General expenses- for daily cash flow and functioning of the building.
5.Depreciation-to cover digital equipment.

As seen from the table below, the projects income sources are able to cover the expenses and results in a profit/ surplus of funds. To be used for community events or further design extension.

Income sources	Yearly cost
Active	1 065 629
Passive	2 793 967
Total	3 859 596
Expenses	**Yearly cost**
Salaries & Wages	2 079 541
Repairs & Maintenance	120 717
Services	296 408
General expenses	922 129
Depreciation Bad	70 825
Total	(3 489 620)
Gross profit total	369 976

The Professional Team

Several professional teams are required to complete the project including the pre-design team, the design team and the construction team.

The Legal Team

Attorney
Appointed to assist with contract negotiations and site related concerns or issues.

The Planning Team

Land surveyor
Appointed to conduct a surveyor of the site within the Joburg Zoo. Providing detailed contour and water levels, vegetation and municipality connections.

The Design Team

Architect
Appointed to design the building with SANS compliance.

Landscape architect
Appointed to assist in designing the public space and the wildlife habitats.

Engineers

Structural engineer
To provide insight into the structural components of the building.

Civil engineer
To assist with stormwater runoff in the public space, as the project incorporates a large public forecourt.

Mechanical engineer and electrical engineer
To assist with adequate ventilation and electrical requirements for the digital technology exhibitions.

Quantity surveyor

Appointed to prepare bill of quantities for the project costing.

Consultants

Fire consultants
Appointed to advise on fire related specifications i.e., fire rated door in regard to the digital exhibitions and the open habitats fire safety.

Contractor

Contractor
Appointed to build the project as stipulated in the drawings.
Sub-contractor
Appointed to acquire digital technology required for the exhibitions and/or specific planting required for the wildlife habitats.

Implementation

Procurement & Contracting methods

An assumed selective tender will be implemented, as this is a government-funded project.
Three contracts will be used within the project:
SAIA: Client Architect Agreement
PROCSA: Client Consultant Agreement
JBCC Principal Building Agreement: Client Contractor Principle Agent Agreement.

Construction methods

All drawings from the design team will be required to be completed in compliance with SANS, prior to handover of site to the contractor.
As the site is located inside the Johannesburg Zoo and alongside a main road , the contractor will need to prepare the site to avoid disruption to the daily activities of the users and employees. The contractor will need to hire labourers, equipment and plan positioning of site offices in relation to the current landscaping and river adjacent to the site.

Conclusion

The project seeks to redefine animal welfare within the zoo landscape through alternative exhibitions and education. The project proves viable gaining investors from affiliated fields and incorporating various active revenue sources to allow the project to operate yearly. The surplus income allows for community animal welfare outreach projects or further expansion for the design/ animal habitats in the future.

Figure 8:
Turtles
(Author, 2024; adapted from Kim, n.d)

Appendix B: Ethics Clearance

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG | SCHOOL OF ARCHITECTURE PLANNING

31 July 2024

Jacob Anneline

1901368

TO WHOM IT MAY CONCERN

RESEARCH ETHICS APPROVAL

A Conservationist Menagerie: Redefining The Johannesburg Zoo Through A Multi-Species Educational Facility

This letter serves to confirm that the Ethics application for the above titled study has been approved. The researcher has been granted clearance to proceed with the research study or project.

Protocol/clearance number is: **SOAP011/03/2024**

Yours sincerely

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References

List of Figures

0.1.

Author. (2024) *A conservationist menagerie*. [Collage]. Adapted from Anjjaemi (2023), AntiquePrintMarket (n.d), *Bird in flight drawing* (n.d.), Demuro (2014), Jiang (n.d), Ledesma (2019), Majewski (2021), Molly (2022), Sudowoodo (n.d).

Anjjaemi. (2023). *Hands Animals and more Animal Tutorials.* [Drawing]. Available at: https://www.designstack.co/2023/04/hands-animals-and-more-animal-tutorials.html (Accessed 24 August 2024).

AntiquePrintMarket. (n.d). *1834 Rare Antique Lizard Iguana Bearded Dragon Reptile Original Print Engraving Hand Colored Comte de Lacepede L'Histoire Naturelle.* [Image]. Available at: https://www.etsy.com/uk/listing/231111028/1834-rare-antique-lizard-iguana-bearded?show_sold_out_detail=1&ref=nla_listing_details (Accessed 24 August 2024).

Bird in flight drawing. (n.d.). [Drawing]. Available at: https://clipart-library.com/clipart/rinrbjrbT.htm (Accessed 24 August 2024).

Demuro, T. (2014). *Earth 178 (Ecuador).* [Illustration]. Available at: https://tonidemuro.blogspot.com/2014/11/earth-178-ecuador.html (Accessed 24 August 2024).

Jiang, N. (n.d). *Eyeball clipart PNG.* [Illustration]. Available at: https://pngtree.com/freepng/simple-black-vector-cartoon-big-eyes-material-eyes-clipart-anime-eyes_5546219.html?sol=downref&id=bef (Accessed 24 August 2024).

Ledesma, I. (2019). *Injured*. [Drawing]. Available at: https://www.il-art.studio/traditional-art.html (Accessed 24 August 2024).

Majewski, M. (2021). *Botanical- Does Earth Feel?* [Illustration]. Available at: https://www.dutchuncle.co.uk/marcmajewski?itemId=jq1jv9z7q88lrcqmt1vwdu5kcqy40c (Accessed 24 August 2024).

Molly. (2022). *Free Printable Googly Eyes*. [Illustration]. Available at: https://www.mommymadethat.com/printable-googly-eyes/ (Accessed 24 August 2024).

Sudowoodo. (n.d). *Cartoon snake drawing stock illustration.* [Illustration]. Available at: https://www.istockphoto.com/vector/cartoon-snake-drawing-gm1264842330-370559217 (Accessed 24 August 2024).

0.2.

Author. (2024) *A conservationist menagerie*. [Drawing]. Adapted from Anjjaemi (2023), AntiquePrintMarket (n.d), *Bird in flight drawing* (n.d.), Demuro (2014), Jiang (n.d), Ledesma (2019), Majewski (2021), Molly (2022), Sudowoodo (n.d).

Anjjaemi. (2023). *Hands Animals and more Animal Tutorials*. [Drawing]. Available at: https://www.designstack.co/2023/04/hands-animals-and-more-animal-tutorials.html (Accessed 24 August 2024).

AntiquePrintMarket. (n.d). *1834 Rare Antique Lizard Iguana Bearded Dragon Reptile Original Print Engraving Hand Colored Comte de Lacepede L'Histoire Naturelle*. [Image]. Available at: https://www.etsy.com/uk/listing/231111028/1834-rare-antique-lizard-iguana-bearded?show_sold_out_detail=1&ref=nla_listing_details (Accessed 24 August 2024).

Bird in flight drawing. (n.d.). [Drawing]. Available at: https://clipart-library.com/clipart/rinrbjrbT.htm (Accessed 24 August 2024).

Demuro, T. (2014). *Earth 178 (Ecuador).* [Illustration]. Available at: https://tonidemuro.blogspot.com/2014/11/earth-178-ecuador.html (Accessed 24 August 2024).

Jiang, N. (n.d). *Eyeball clipart PNG.* [Illustration]. Available at: https://pngtree.com/freepng/simple-black-vector-cartoon-big-eyes-material-eyes-clipart-anime-eyes_5546219.html?sol=downref&id=bef (Accessed 24 August 2024).

Ledesma, I. (2019). *Injured*. [Drawing]. Available at: https://www.il-art.studio/traditional-art.html (Accessed 24 August 2024).

Majewski, M. (2021). *Botanical- Does Earth Feel?* [Illustration]. Available at: https://www.dutchuncle.co.uk/marcmajewski?itemId=jq1jv9z7q88lrcqmt1vwdu5kcqy40c (Accessed 24 August 2024).

Molly. (2022). *Free Printable Googly Eyes.* [Illustration]. Available at: https://www.mommymadethat.com/printable-googly-eyes/ (Accessed 24 August 2024).

Sudowoodo. (n.d). *Cartoon snake drawing stock illustration.* [Illustration]. Available at: https://www.istockphoto.com/vector/cartoon-snake-drawing-gm1264842330-370559217 (Accessed 24 August 2024).

0.3.

Author. (2024) The newfound excitement and freedom in fostering a deeper relationship between humans and animals. [Drawing]. Adapted from Cairns (2018), *Cattails in Pond 1352G* (n.d.), Cisco (n.d), Duarte (2022), *Flying Birds Free Background Sheets Swallows Bluebirds Robins Starlings Blue Jay.* (2014.

Cairns, A. (2018). *Bug Hike.* [Illustration]. Available at: https://www.behance.net/gallery/69434941/Bug-Hike (Accessed 24 August 2024).

Cattails in Pond 1352G. (n.d.). [Drawing]. Available at: https://www.beeswaxrubberstamps.com/products/cattails-in-pond-1352g?variant=38743911694&utm_source=pinterest&utm_medium=social (Accessed 24 August 2024).

Cisco, W. (n.d). *Gold Fish.* [Drawing]. Available at: https://i.pinimg.com/originals/66/62/5e/66625e93a3f022a2c1e8a22806115495.jpg (Accessed 24 August 2024).

Duarte, O. (2022). *Dancing.* [Illustration]. Available at: https://www.behance.net/gallery/146179597/Dancing (Accessed 24 August 2024).

Flying Birds Free Background Sheets Swallows Bluebirds Robins Starlings Blue Jay. (2014). [Image]. Available at: https://blogger.googleusercontent.com/img/b/R29vZ2xl/AVvXsEgwtV_I_G5S9uTc1U-JOwK6vk6Jo73_mIzYqFTdahCPJAJRCCIgQ1rGNJyvTCjuMdggvFVQ0X6w5YbUYEf7vsDn2S-BX2zg6jShj-KcA6k68sK6X4Rxh2sVMb3kpPr-VrKt_KB-Qjp0060zY/s1600/BirdBookPlateLFD2014.jpg (Accessed 24 August 2024).

0.4.

Author. (2024). Rabbit in feild. [Drawing]. Adapted from Binney (2023)

Binney, K. (2023) Kendra's Dreamy Portfolio. [Illustration]. Available at: https://lillarogers.com/artists/kendra-binney/ (Accessed 06 September 2024).

Chapter 1

1.1.

Author. (2024). *Short story panel 01*.[Drawing].Adapted from Aksol (2019), Asmakar (2020),Royan (2013)

Aksol. (2019). *Set of flying birds.* [Drawing]. Available at: https://www.shutterstock.com/image-vector/set-flying-birds-titmouse-sketch-outrline-1587498940 (Accessed 24 August 2024).

Asmakar. (2020). *Sketch of lonely townsman sitting in outdoor caffe in wait stock.* [Illustration]. Available at: https://www.istockphoto.com/vector/sketch-of-lonely-townsman-sitting-in-outdoor-caffe-in-wait-gm1200498440-343892929 (Accessed 24 August 2024).

Royan, J. (2013). *Aix, Rue de la Masse.* [Drawing]. Available at: https://sketchesjr.blogspot.com/2013_11_01_archive.html (Accessed 24 August 2024).

1.2.

Author. (2024). *Location of Johannesburg Zoo, in relation to major cities*. [Map Illustration].

Chapter 2

2.1.

Author. (2024). *Short story panel 02*.[Drawing].Adapted from Aksol (2019)

Aksol. (2019). *Set of flying birds.* [Drawing]. Available at: https://www.shutterstock.com/image-vector/set-flying-birds-titmouse-sketch-outrline-1587498940 (Accessed 24 August 2024).

2.2.

Author. (2024). *The human perspective of power over animals*. [Drawing]. Adapted from How Does Language Make Humans Different?(n.d).

How Does Language Make Humans Different?. (n.d) [Image]. Available at: https://www.pinterest.com/pin/717620521908857147/ (Accessed 24 August 2024).

2.3.

Wood, R. (2016). *Destroying nature is destroying life*. [Illustration]. Available at: https://www.behance.net/gallery/34853303/Destroying-nature-is-destroying-life (Accessed 08 August 2024)

2.4.

Drawing by Author, 2024 adapted from , *Colosseum of Fools* (n.d), Gancharuk (n.d), Trusova (2019), Sahlins (2021).

Colosseum of Fools. (n.d).[Drawing] .Available at: https://www.etsy.com/ca/listing/956927608/hollow-knight-a5a4-print-colosseum-of?epik=dj0yJnU9ZlVyVGR3OTNmRUliNnJpRUI1Rm9IUzVGZm-JGazhMT24mcD0wJm49dk1kbmsyUlQya1NkVXl2QUQ3YmpkZyZ0PUFBQUFBR2JNUVlr(Accessed 24 August 2024)

Trusova, I. (2019). *Cows for Hutten Beef*. [Illustration]. Available at: https://sketchesjr.blogspot.com/2013_11_01_archive.html (Accessed 24 August 2024).

Sahlins, P. (2021). *Absolute Animals: The Royal Menagerie and the Royal Labyrinth at Versailles*. [Photograph]. Available at: https://ageofrevolutions.com/2021/07/19/absolute-animals-the-royal-menagerie-and-the-royal-labyrinth-at-versailles/ (Accessed 08 August 2024)

2.5.

Drawing by Author, 2024 adapted from Angerer (1898),), Gancharuk (n.d)

Angerer, V. (1898). *Tiergarten sch nbrunn affenk fig 1898.* [Photograph]. Available at: https://commons.wikimedia.org/wiki/Tiergarten_Sch%C3%B6nbrunn#/media/File:Tiergarten_sch%C3%B6nbrunn_affenk%C3%A4fig_1898.jpg (Accessed 08 August 2024)

Gancharuk, M. (n.d) *10 of the World's Most Magical Zoos*. [Photograph]. Available at: https://ageofrevolutions.com/2021/07/19/absolute-animals-the-royal-menagerie-and-the-royal-labyrinth-at-versailles/ (Accessed 08 August 2024)

2.6.

Koning, S. (2018). *Humane Society International (H5I) calls for Lammie to be moved to a rewilding sanctuary*.[Photograph]. Available at: Johannesburg Heritage Foundation.

2.7.

Edwardes, R. (2014).*Protest at Joburg Zoo*. [Photograph]. Available at:Johannesburg Heritage Foundation

2.8.

Mackenzie, A. (2020). *Joburg Zoo under social media fire*. [Photograph]. Available at: Johannesburg Heritage Foundation

2.9.

Author. (2024). *Comparison of the London Zoo Penguin exhibit in 1936 & 2011*.[Illustration]. Adapted from

Xu, Z. (n.d). *Visitors feed the penguins at Berthold Lubetkin's pool, London Zoo, 1936*.[Photograph]. Available at:https://interioreducators.co.uk/uploads/submitted-files/123.W_.CSb_.2021.pdf (Accessed 24 August 2024)

Xu, Z. (n.d). *Zoomed in view showing the beach and the lakes* .[Photograph]. Available at: https://interioreducators.co.uk/uploads/submitted-files/123.W_.CSb_.2021.pdf (Accessed 24 August 2024)

2.10.

Author. (2024). Animal placed in captivity, with reduced space. [Drawing] Adapted from Gupta (2023)

Gupta, A. (2023). *The intense trauma of the process that makes an elephant rideable leaves long-lasting scars on the animal even after it is rescued*.[Illustration]. Available at:https://wildlifesos.org/chronological-news/behavioural-trauma-in-rescued-animals/ (Accessed 06 September 2024)

2.11.

Author. (2024). Results of reduced space in captivity prevents biological functioning, first principle of welfare. [Drawing] Adapted from Gupta (2023)

Gupta, A. (2023). *The impact of an elephant's traumatic past manifests in its physical and psychological scars.* .[Illustration]. Available at:https://wildlifesos.org/chronological-news/behavioural-trauma-in-rescued-animals/ (Accessed 06 September 2024)

2.12.

Author. (2024*). Owl enclosure at Joburg Zoo, showing direct views into the enclosures and a comparison of the owl wingspan to the enclosure size*. [Drawing].

2.13.

Author. (2024). *Animals in natures fear response to natural sound, temporary stop in feeding* .[Drawing]. Adapted from Levy (n.d)

Levy, S.(n.d). *Neurogenesis, or the formation of new connections between brain cells, is crucial to an animal s ability to forget and move on after a scare. Intense fear especially when accompanied by physical trauma suppresses neurogenesis and can lead to persistent memories that keep animals in a permanent state of fear that prevents them from feeding freely. This, in turn, can mean fewer offspring.*[Illustration]. Available at:https://www.smithsonianmag.com/science-nature/do-wild-animals-get-ptsd-180978448/ (Accessed 06 September 2024)

2.14.

Author. (2024). *Animals in captivitys fear response to human sound, lasting stop in feeding* .[Drawing]. Adapted from Levy (n.d)

Levy, S.(n.d). *Neurogenesis, or the formation of new connections between brain cells, is crucial to an animal s ability to forget and move on after a scare. Intense fear especially when accompanied by physical trauma suppresses neurogenesis and can lead to persistent memories that keep animals in a permanent state of fear that prevents them from feeding freely. This, in turn, can mean fewer offspring.*[Illustration]. Available at:https://www.smithsonianmag.com/science-nature/do-wild-animals-get-ptsd-180978448/ (Accessed 06 September 2024)

2.15.

Author. (2024). *Fox enclosure at Joburg Zoo, showing direct views into and all sides enclosed in a naturalistic enclosure*. [Drawing].Mota-Rojas, D; Ghezzi, M; Dom nguez-Oliva, A and Vega, L (2022)

2.16.

Author. (2024). *Animals brain response when facing a stress in captivity. Releasing chemicals that result in aggressive or depressed behaviour* .[Drawing]. Adapted from Mota-Rojas, D; Ghezzi, M; Dom nguez-Oliva, A and Vega, L. (2022).

Mota-Rojas, D; Ghezzi, M; Dom nguez-Oliva, A and Vega, L. (2022). *Neurobiology of stress and stereotypies in circus animals. Environmental, psychological, and physiological stressors are factors recognized by brain structures that activate the SAM and HPA, responsible for behavioral, neuroendocrinal, and*

Mota-Rojas, D; Ghezzi, M; Dom nguez-Oliva, A and Vega, L. (2022). *Neurobiology of stress and stereotypies in circus animals. Environmental, psychological, and physiological stressors are factors recognized by brain structures that activate the SAM and HPA, responsible for behavioral, neuroendocrinal, and immunological changes. Short-term responses are mediated by the SAM, which releases adrenaline to trigger the fight-flight response. Long-term responses are initiated by the HPA, beginning with the secretion of CRH and its subsequent action on the pituitary and adrenal glands for the secretion of glucocorticoids (cortisol) and mineralocorticoids. The development of stereotypies is also associated with the action of HPA, cortisol, a predominant sympathetic tone, and the presence of endogenous opioids (-endorphin), since they modulate responses through the arcuate nucleus-VTA-nucleus accumbens pathway. This system can be activated either by the action of CRH or independently. CRH: corticotropin-releasing hormone; HPA: hypothalamic-pituitary-adrenal axis; SAM: sympathetic-adrenal-medullary axis; VTA: ventral tegmental area. SAM: sympathetic adrenal medullary axis; SNS: the sympathetic nervous system; HPA: hypothalamic-pituitary-adrenal axis; PaNS: parasympathetic nervous system.*[Illustration]. Available at:https://www.researchgate.net/figure/Neurobiology-of-stress-and-stereotypies-in-circus-animals-Environmental-psychological_fig3_360334947 (Accessed 06 September 2024)

2.17..

Author. (2024). *Lemur enclosure at Joburg Zoo, showing two opposite window views into enclosure blocked by naturalistic elements*. [Drawing].

2.18.

Fridolin, S. (2016). *weaving elephant-bull.*[Photograph]. Available at:https://en.upali.ch/stereotypic-behaviour/ (Accessed 06 September 2024)

2.19.

Author. (2024). *Squirrel in trees foraging.*[Drawing} Adapted from Dale-Scott (2017)

Dale- Scott, L. (2017). *Leaves Autumn Pop-Up Book.* [Illustration]. Available at: https://www.frankieandclaude.com/products/leaves-pop-up-book (Accessed 06 September 2024)

2.20.

Silverman, D. (2020) .*Kruger National Park considers new technology rules to protect visitors and animals.*[Image]. Available at: https://edition.cnn.com/travel/article/kruger-national-park-photos-scli-intl/index.html (Accessed 08 August 2024).

2.21.

"The Elephant Sanctuary in Tennessee". (2020). [Photograph]. Available at: https://www.elephants.com/elecam/ (Accessed 08 August 2024).

2.22.

Author. (2024*). The layout of the elephant sanctuary plot*. [Illustration] Adapted from The Elephant Sanctuary in Tennessee (2020).

"The Elephant Sanctuary in Tennessee". (2020). [Photograph]. Available at: https://www.elephants.com/elecam/ (Accessed 08 August 2024).

2.23.

Author. (2024*). Satellite technology and tracking to aid in conservation efforts*. [Illustration] Adapted from Wang, D; Quanqin, S and Yue, H. (2019)

Wang, D; Quanqin, S and Yue, H. (2019). *Photographs of representative UASs: (**a**) Gatewing 100™, a fuel-powered fixed-wing UAS.* Available at: https://www.elephants.com/elecam/ (Accessed 06 September 2024).

Wang, D; Quanqin, S and Yue, H. (2019). UAS imagery of wild animals: (**a**) Elephants in the Nazinga Game Ranch in the south of Burkina Faso. Available at: https://www.elephants.com/elecam/ (Accessed 06 September 2024).

2.24.

Jeremijenko, N. (2003). *Robotic Geese.* [Photograph]. Available at: https://www.fondation-langlois.org/html/e/page.php?NumPage=1830 (Accessed 08 August 2024).

Chapter 3

3.1.

Author. (2024).*Short story panel 03*. [Collage]. Adapted from SeemaLotion (n.d)

SeemaLotion (n.d). *bird line art fall down. silhouette isolated. illustration vector. feather line art. bird die from sky. tattoo design. minimal style.*[Illustration]. Available at: https://stock.adobe.com/za/images/bird-line-art-fall-down-silhouette-isolated-illustration-vector-feather-line-art-bird-die-from-sky-tattoo-design-minimal-style/213334756 (Accessed 08 August 2024).

3.2.

Author. (2024) The current dominant zoo gaze, and the alternative zoo gaze of rehabilitation and witnessing. [Collage].

3.3.

Author. (2024). *Eco-centric human perspective of power over animals*. [Drawing]. Adapted from How Does Language Make Humans Different?(n.d).

How Does Language Make Humans Different?. (n.d) [Image]. Available at: https://www.pinterest.com/pin/717620521908857147/ (Accessed 24 August 2024).

3.4.

Author. (2024). *Compares the systems of the Silk Pavilion to natural systems and current human systems.* [Poster] .Adapted from Oxman (2013).

Oxman, N.(2013). *Biologically-spun silk over robotically-spun silk & 6,500 silkworms spun for 3 weeks to complete the structure*. [Photograph]. Available at: https://oxman.com/projects/silk-pavilion-i1830 (Accessed 30 August 2024).

3.5.

Author. (2024) *The four principles of multispecies design from Metcalfe thesis*. [Illustration]. Adapted from Metcalfe (2015).

Metcalfe, D. (2015). *Tools for multispecies design*. [Table] Available at: https://www.researchgate.net/publication/368350770_MULTISPECIES_DESIGN (Accessed 30 August 2024).

3.6.

Author. (2024) *Chart showing the relationship between the general public's everyday activity and their exposure to knowledge of wildlife welfare*. [Illustration].

3.7.

Author. (2024). *Translation between a tree, to a facade system to create human and animal interactions.* [Poster] .Adapted from Wang (2022).

Wang, Z. (2022). *Live together: towards multi-species coexistence.* Available at: https://www.nonarchitecture.eu/2022/03/14/live-together-towards-multi-species-coexistence/#lightbox[group-328831]/2/ (Accessed 08 August 2024).

3.8.

Author. (2024). *Material and design decisions used to create a sustainable ecosystem.* [Poster] .Adapted from Jacques (2017).

Jacques, K. (2017). *Liberty Wildlife environmental education and wildlife rehabilitation campus transformed a former sand and gravel pit into an innovative environmental facility with a restored riparian habitat*. [Image]. Available at: https://www.usgbc.org/articles/leed-platinum-liberty-wildlife-rehabilitation-center-makes-strides-conservation (Accessed 08 August 2024).

3.9.

Author. (2024). *Flow of exterior space into the interior, through contours, planting and openings* **.** [Poster] .Adapted from Studio Iksha (2022).

Studio Iksha. (2022*). Haven The Eternal Experience Pavilion / Earthscape Studio*. [Image]. Available at: https://www.archdaily.com/989456/haven-the-eternal-experience-pavilion-rnd-earth (Accessed 08 August 2024).

3.10.

Author. (2024). *Layering of a space to merge inside and outside space***.** [Drawing]. Adapted from Krstic, H; Trentin, A and Jovanovic, G (2016)

Krstic, H; Trentin, A and Jovanovic, G (2016). *Scheamtic representation of space relations between inside and outside.* [Illustration]. Available at: https://www.researchgate.net/publication/314250322_Interior-exterior_connection_in_architectural_design_based_on_the_incorporation_of_spatial_in_between_layers_Study_of_four_architectural_projects (Accessed:02 September 2024).

3.11.

Author. (2024). *Animals released from captivity, rehabilitated and free in the urban wild* **.** [Drawing]

3.12.

Poem: Angelou, M. (1983) *Caged bird*, *Poetry Foundation*. Available at: https://www.poetryfoundation.org/poems/48989/caged-bird (Accessed: 02 September 2024).

Illustration: Author. (2024) Caged bird. [Drawing]. Adapted from NotMuchToSay (n.d)

NotMuchToSay.(n.d). *Artprint Hand Bird cage vintage paper image art print wall decor bird illustration birdcage print, birdcage vintage christmas gift.*[Print]. Available at: https://www.etsy.com/hk-en/listing/471569778/artprint-hand-bird-cage-vintage-paper(Accessed: 02 September 2024).

3.13.

Author. (2024). *College showing the new themes of healing harmony and building community***.** [Collage]

Chapter 4

4.1.

Author. (2024). *Short story panel 02.*[Drawing].Adapted from Philgreff (2017).

Philgreff. (2017). *People passing by... 62.*[Illustration]. Available at: https://philgreff.blogspot.com/2017/09/les-gens-qui-passent-62.html?spref=pi (Accessed 24 August 2024).

4.2.

Author. (2024). *Research themes to design develpment.*[Drawing].

4.3.

Author. (2024).*Design strategies for human and animal co-existence.*[Drawing]. Adapted from Long, (2024*)*

Long, N. (2024). *Introducing our Biodiversity Design Guide.*[Guide]. Available at: https://stridetreglown.com/introducing-our-biodiversity-design-guide/ (Accessed 24 August 2024).

Chapter 5

5.1.

Author. (2024). *Short story panel 04.*[Drawing]. Adapted from Penzi (2011).

Penzi. (2011). *Another thrush.* [Drawing]. Available at: https://www.deviantart.com/reptangle/art/another-thrush-216609855 (Accessed 10 August 2024).

5.2.

Author. (2024). *Joburg Zoo timeline.* [Timeline].Adapted from Munro (2015), Taylor, (2022), 'Rhino March' (2013) and Human Society International (2019).

Munro, K. (2015). *Nighttime at the Johannesburg Zoo (and some history).* Available at: https://www.theheritageportal.co.za/article/nighttime-johannesburg-zoo-and-some-history (Accessed 08 August 2024).

Taylor, S J. (2022). *A few memories of Indian Elephants at the Joburg Zoo.* Available at: https://www.theheritageportal.co.za/article/few-memories-indian-elephants-joburg-zoo (Accessed 08 August 2024).

Rhino March. (2013). Available at: https://www.facebook.com/photo/?fbid=10151591200515870&set=a.10151591188670870 (Accessed 08 August 2024).

Humane Society International. (2019). [Image]. Available at: https://www.hsi.org/news-resources/animal-protection-organisations-furious-as-johannesburg-zoo-ignores-pleas-to-freelammie-introduces-two-new-elephants-to-her-captivity-instead/ (Accessed 08 August 2024).

5.3.

Author. (2024). *Joburg Zoo current activity.*[Collage]. Adapted from Author (2024) and "Johannesburg Zoo" (n.d)

"Johannesburg Zoo" (n.d).[Map]. Available at:https://www.a4asa.co.za/johannesburg-zoo/ (Accessed 08 August 2024).

5.4.

Author.(2024) *.Joburg Zoo activity on weekdays and weekend.* [Drawing].

5.5.

Author.(2024).*Graphic representing survey results.* [Illustration]. Adapted from bsd studio (n.d), nicfz (n.d), Chadwick (2013).

bsd studio. (n.d). *Bible narratives linear icons set.* [Illustration]. Available at: https://stock.adobe.com/za/images/bible-narratives-linear-icons-set-resurrected-lazarus-virgin-mary-with-son-jesus-gifts-of-the-magi-pigeon-in-cage-thin-line-contour-symbols-isolated-vector-outline-illustrations-editable-stroke/310069020?prev_url=detail (Accessed 08 August 2024)

nickfz. (n.d). *Set Of Bulb And Brain Vector Illustration With Line Design Suitable For Idea Or Creativity Icon.* [Illustration]. Available at: https://pngtree.com/freepng/set-of-bulb-and-brain-vector-illustration-with-line-design-suitable-for-idea-or-creativity-icon_5071784.html (Accessed 08 August 2024)

Chadwick, C. (2013*). Free Valentine Hearts Clip Art Images.* [Illustration]. Available at: https://discover.hubpages.com/holidays/valentine-hearts (Accessed 08 August 2024)

5.6.

Author.(2024)*. Land use Mapping, main uses include Residential and Home offices.* [Map Illustration].

5.7.

Author.(2024). Circulation map, highlights key bus routes and stops, & roads with heavy vehicle traffic. [Map Illustration].

5.8.

Author.(2024*). Site circulation map, highlights car and pedestrian traffic patterns. While exploring the visitor flow and entrance types*. [Map Illustration].

5.9.

Author.(2024). Edge map: Illustrating the edge conditions around the site.[Map Illustration].

5.10.

Author.(2024). Edge Sections: Illustrating the edge conditions around the site. [Illustration].

5.11.

Author. (2024). *Frog landscape* .[Drawing} Adapted from Dale-Scott (2017)

Dale- Scott, L. (2017). *Leaves Autumn Pop-Up Book*. [Illustration]. Available at: https://www.frankieandclaude.com/products/leaves-pop-up-book (Accessed 06 September 2024)

5.12.

Author.(2024*). Conservation and protected areas for wildlife in South Africa, showing where animals can be released in a safe environment*. [Illustration]. Adapted from Protected Areas Register. (n.d).

Protected Areas Register. (n.d). [Map].Available at: https://egis.environment.gov.za/protected_areas_register (Accessed 08 August 2024)

5.13.

Author.(2024*). Terrain, trees and waterline in the Joburg Zoo*. [Illustration].

5.14.

Author.(2024*). Green areas around the site, that allow and make space for urban wildlife.* [Illustration].

5.15.

Author.(2024*). Axonometric Diagram: illustrating how various urban wildlife interact with and navigate the landscape within the Johannesburg Zoo*. [Drawing].

5.16.

Author. (2024). *Site Selection*.[Collage]. Adapted from Author (2024) and "Johannesburg Zoo" (n.d)

"Johannesburg Zoo" (n.d).[Map]. Available at:https://www.a4asa.co.za/johannesburg-zoo/ (Accessed 08 August 2024).

5.17.

Author. (2024). *Building Community*. [Drawing].

5.18.

Author.(2024). *Site strategy diagrams*. [Drawing].

5.19.

Author. (2024). *Healing Harmony*. [Drawing].

5.20.

Author.(2024*). Site photos collage, from exterior.* [Photograph].

5.21.

Author.(2024*). Site photos collage , from interior*. [Photograph].

5.22.

Author.(2024*). Design and site strategy, indicating vertical level changes and planting boundaries*.[Drawing].

CHAPTER 06

6.1.

Author.(2024). *Short story panel 05*. [Drawing].Adapted from Desrosiers (n.d).

Desrosiers, Y. (n.d). *For drawing an inside car*. [Drawing]. Available at: https://i.pinimg.com/originals/19/2a/fa/192afa6ba3e6b53b974854b998c3065b.jpg (Accessed 08 August 2024) .

6.2.

Author.(2024). Calculation Table illustrating average visitor numbers . [Table]

6.3.

Author.(2024). Graphic illustrating decrease in average visitor numbers from a traditional zoo to an alternative zoo . [Graphic]

6.4.

Schenck, T. (2021*). Little Island features a park with a landscape that undulates over the Hudson River.* [Photograph]. Available at: https://www.dezeen.com/2021/05/21/little-island-park-thomas-heatherwick-new-york/#/ (Accessed 30 August 2024.)

6.5.

Author. (2024*). Little Island Park, floor plan, illustrating different pathways & programming*. [Drawing]. Adapted from Schenck (2021).

Schenck, T. (2021). *Planting plan autumn*.[Photograph]. Available at: https://www.dezeen.com/2021/05/21/little-island-park-thomas-heatherwick-new-york/#/ (Accessed 30 August 2024).

6.6.

Wong, Z.L. (2022) *Buzz Hub - Ayda Malaysia - finalist finalist 2021*, *Nippon Paint Asia Young Designer Awards*.[Image]. Available at: https://www.asiayoungdesignerawards.com.my/finalist/6634/view (Accessed: 12 August 2024).

6.7.

Author. (2024). *Journey created through the placement of exhibitions*. [Drawing]. Adapted from Wong. (2022).

Wong, Z.L. (2022) *Buzz Hub - Ayda Malaysia - finalist finalist 2021*, *Nippon Paint Asia Young Designer Awards*.[Image]. Available at: https://www.asiayoungdesignerawards.com.my/finalist/6634/view (Accessed: 12 August 2024).

6.8.

Roto Architects. (2017). *Liberty wildlife campus.* [Photograph]. Available at:https://www.rotoark.com/liberty?lightbox=dataItem-l6cl3iab (Accessed: 12 August 2024).

6.9.

Author. (2024). *Programming bubble diagram.* [Drawing]. Adapted from Roto Architects (2017)

Roto Architects. (2017). *Liberty wildlife campus.* [Photograph]. Available at:https://www.rotoark.com/liberty?lightbox=dataItem-l6cl3iab (Accessed: 12 August 2024).

6.10.

Author.(2024*). Programming bubble diagram created from precedents* . [Diagram].

6.10.

Author. (2024). Bird Relaxing.[Drawing]. Adapted from "Greenorchid" (n.d)

Greenorchid (n.d)[Collage] . Available at: https://www.pinterest.com/pin/717620521909066233/ (Accessed: 06 September 2024).

6.11.

Author. (2024) *Flow diagram of animal management in the Joburg Zoo*.[Diagram]

6.12.

Author. (2024) *Urban animal activity and spaces study*.[Diagram]

6.13.

Author. (2024) *Programming bubble diagram created from interviews & study*.[Diagram]

CHAPTER 07

7.1.

Author. (2024). *Short story panel 05*. [Drawing]. Adapted from Creative Commons. (n.d)

Creative Commons.(n.d). *Fiat 500 F Hatchback 1973*. [Drawing]. Available at: https://findblueprints.com/catalog/cars/fiat/fiat-500-f-hatchback-1973 (Accessed 08 August 2024).

7.2.

Author. (2024) *Different layers of the tree and how it supports different species*.[Drawing].

7.3..

Author. (2024). *Human & wildlife figures in the Zoo cage*. [Drawing]. Adapted from Licha (2018).

Licha, B. (2018*). Dance 2019*. [Sculpture]. Available at: https://lichabarbara.com/artwork/sculpture/ (Accessed 15 April 2024)

7.4.

Author. (2024). *Wildlife restrictive movements in the enclosure cage*. [Drawing] Adapted from Licha (2018.

Licha, B. (2018). *Dance* 2019. [Sculpture]. Available at: https://lichabarbara.com/artwork/sculpture/ (Accessed 15 April 2024).

7.5.

Author. (2024). Human and wildlife forms when cage is opened. [Drawing] Adapted from Licha (2018).

Licha, B. (2018). *Dance* 2019. [Sculpture]. Available at: https://lichabarbara.com/artwork/sculpture/ (Accessed 15 April 2024).

7.6.

Studio Ossidiana. (2021). *Platform for Humans and Birds La Biennale di Architettura di Venezia, Italy. 2021*.[Photograph]. Available at: https://www.studio-ossidiana.com/platform-for-humans-and-birds-la-biennale-di-venezia (Accessed 30 August 2024).

7.7.

Author. (2024). *Platform for humans and birds, the different programs explored through a single modular element.* [Drawing] Adapted from Studio Ossidiana (2021).

Studio Ossidiana. (2021). *Platform for Humans and Birds*
La Biennale di Architettura di Venezia, Italy. 2021.[Photograph]. Available at: https://www.studio-ossidiana.com/platform-for-humans-and-birds-la-biennale-di-venezia (Accessed 30 August 2024).

7.8.

Author.(2024). *Cage broken down into individual components*. [Drawing].

7.9.

Author. (2024). *Models exploring animal and human spaces*. [Photograph].

7.10.

Author.(2024). *The cage redefined as a space for interaction between humans and various small wildlife, using tools from precedent and model elements to develop the concept*. [Drawing].

7.11.

Wang, Z.(2022). *Live together: towards multi-species coexistence.[*Image]. Available at: https://www.nonarchitecture.eu/2022/03/14/live-together-towards-multi-species-coexistence/#lightbox-[group-328831]/2/ (Accessed 08 August 2024).

7.12.

Author. (2024). Pod system. [Drawing] Adapted from Wang (2022).

Wang, Z.(2022). *Live together: towards multi-species coexistence.[*Image]. Available at: https://www.nonarchitecture.eu/2022/03/14/live-together-towards-multi-species-coexistence/#lightbox-[group-328831]/2/ (Accessed 08 August 2024).

7.13.

Author.(2024). *Words associated and contrasted with a cage*. [Drawing]

7.14.

Author. (2024). *Models exploring the contrasting words*. [Photograph]

7.15.

Author. (2024). *The cage redefined through colour, shape and movement, using tools from precedent and model elements to develop the concept*. [Drawing].

CHAPTER 8

8.1.

Author. (2024). *Short story panel 08*. [Drawing].

8.2.

Author. (2024). *Conceptual drawings of views in sections and landscaping*. [Drawing].

8.3.

Author. (2024). *Conceptual drawings of movement and the spaces*. [Drawing].

8.4.

Author. (2024). *Conceptual drawings of views in sections and landscaping*. [Drawing].

8.5.

Author. (2024). Conceptual drawings of movement and the spaces. [Drawing].

8.6.

Author. (2024). *Collage exploring human and animal spaces with walkable roofs*. [Collage].

8.7.

Author. (2024). *Initial 3D concept sketch8*. [Drawing].

8.8.

Author. (2024). *Sections and elevations exploring volume, views and material*. [Drawing].

8.9.

Author. (2024). *Cad drawing derived from sketches*. [Drawing].

8.10.

Author. (2024). *Model formed from plans and sections*. [Photograph].

8.11.

Author. (2024). *Sketches over previous plans for new model* . [Drawing].

8.12.

Author. (2024). *Collage introducing ramp, with human and animal spaces*. [Collage].

8.13.

Author. (2024). *Maze movement sketches* . [Drawing].

8.14.

Author. (2024). *Model created from plans* . [Photograph].

8.15

.Author. (2024). *Cad plan drawing* . [Drawing].

8.16.

Author. (2024). *Sketches over previous plans for new model.* [Drawing].

8.17.

Author. (2024). *Kit of parts, shapes, stairs, walkways and viewing portals*. [Drawing].

8.18.

Author. (2024*). Collages exploring conceptual ideas of building material and roofs, ramp movement and connection to community and wildlife*. [Collages]. Adapted from Toffu (n.d), Houzz (n.d).

Toffu. (n.d). *Cad Curious People*. [Image]. https://toffu.co/products/cad-curious-people?variant=43062378594532 (Accessed: 12 August 2024).

Houzz. (n.d).*29"x29" Artificial Living Wall UV Resistant, Indoor/Outdoor. [*Image]. https://www.houzz.com/products/29x29-artificial-living-wall-uv-resistant-indoor-outdoor-prvw-vr%7E118712811?m_refid=houzzm-pl-pinterest-pictures-all-2022&epik=dj0yJnU9bEJ4YTJFZmJGRXQ2bXFuMkJxc1dhNWg3SVdBRlY4RUImcD0wJm49dFMxYzVsNlFaR0hSS2sxZFFaWEcwZyZ0PUFBQUFBR2JURVdB (Accessed:12 August 2024).

8.19.

Author. (2024). *Models created from kit of parts*. [Photograph].

8.20.

Author. (2024). *Collage showing programing for human and animal space*. [Collage].

8.21.

Author. (2024). *Drawings showing various building and landscaping elements for human and animal interaction*. [Drawing].

8.22.

Author. (2024). *Model showing heights, form and walkways*. [Model].

8.23.

Author. (2024). *Perspectives showing the buildings form and programming*. [Drawing].

8.24.

Author. (2024). *Plans showing the buildings form, programming and landscaping features*. [Drawing].

8.25.

Author. (2024). *Elevations showing the buildings form, programming and landscaping features*.[Drawing].

8.26.

Author. (2024). *Sections showing the buildings form, programming and landscaping features*. [Drawing].

8.26.

Author. (2024). *Sections showing the buildings form, programming and landscaping features*. [Drawing].

8.27.

Author. (2024). *Existing Entrance Building at Joburg Zoo showing materiality.* [Drawing].

8.28.

Author. (2024). *Materials most commonly found at Joburg Zoo*. [Photograph].

8.29.

Marcus,A. (2023). *Multispecies Materialities*. [Illustration]. Available at: https://www.rocagallery.com/articles/multispecies-materialities (Accessed 08 August 2024).

8.30.

Author. (2024). *Rammed Earth columns at ground level to support small mammals with perching or crevices*.[Drawing]. Adapted from Marcus (2023)

Marcus,A. (2023). *Custom molded rammed earth columns incorporate crevices and pockets for small mammals at the ground level, while supporting an elevated timber structure for humans to occupy above the ground* [Illustration]. Available at: https://www.rocagallery.com/articles/multispecies-materialities (Accessed 08 August 2024).

8.31.

Batlleiroig. (2017). *Vallmora Park + Insect Hotel*.[Drawing]. Available at:https://www.archdaily.com/887751/vallmora-park-plus-insect-hotel-batlle-i-roig-arquitectura/5a696279f197ccbe7700025e-vallmora-park-plus-insect-hotel-batlle-i-roig-arquitectura-section-and-elevation-insect-hotel (Accessed 08 August 2024).

"June Gardening Advice". (n.d). [Photograph]. Available at: *https://www.ashwoodnurseries.com/gardeners-corner/calendar/months/june/* (Accessed 08 August 2024).

RISE Design Studio. (2019).*Rammed earth walls: natural and sustainable living*.[Photograph]. Available at:https://risedesignstudio.co.uk/blog/rammed-earth-walls/ (Accessed 08 August 2024).

Terreform ONE. (2024). *A multispecies habitat made of living trees*.[Photograph]. Available at:https://materialdistrict.com/article/a-multispecies-habitat-made-of-living-trees/ (Accessed 08 August 2024).

8.32.

Wong, Z.L. (2021) *Buzz Hub - Ayda Malaysia - finalist finalist 2021*, *Nippon Paint Asia Young Designer Awards*.[Image]. Available at: https://www.asiayoungdesignerawards.com.my/finalist/6634/view (Accessed: 12 August 2024).

8.33

Author. (2024). *Bee tower structure fit for comfortable bee habitation*. [Drawing].Adapted from Wong (2021)

Wong, Z.L. (2021) *Buzz Hub - Ayda Malaysia - finalist finalist 2021*, *Nippon Paint Asia Young Designer Awards*.[Image]. Available at: https://www.asiayoungdesignerawards.com.my/finalist/6634/view (Accessed: 12 August 2024).

8.34.

Author. (2024). *Rough Sketches of technical systems, tree through building, floatation devices, ramp and materiality.* [Drawing].

8.35.

Author. (2024). *Initial sketch for section and elevation .* [Drawing].

8.36.

Author. (2024). *Technical System section and key plan.* [Drawing].

8.37.

Author. (2024). *Models exploring new themes of site, landscaping.* [Drawing].

CHAPTER 9

9.1.

Author. (2024). *Short story panel 09*. [Drawing].

9.2.

Author. (2024). *Projects timeline of development*. [Drawing].

9.3.

Author. (2024). *Axonometric view and schedule for event*. [Drawing].

9.4.

Author. (2024). *Approach from Zoo Lake*. [Drawing].

9.5.

Author. (2024). *Circulation Diagram*. [Drawing].

9.6.

Author. (2024). *Roof Plan*. [Drawing].

9.7.

Author. (2024). *Sketches of rammed earth wall and landscaping mounds for multispecies* . [Drawing].

9.8.

Author. (2024). *Site Section AA.* [Drawing].

9.9.

Author. (2024). *Ground storey plan*. [Drawing].

9.10.

Author. (2024). *Diagram showing ground storey position*. [Drawing].

9.11.

Author. (2024). *North Elevation*. [Drawing].

9.12.

Author. (2024). *Visitor Circulation Diagram*. [Drawing].

9.13.

Author. (2024). *Observation Deck 01 Plan.* [Drawing].

9.14.

Author. (2024). *Diagram showing observation deck 01 position*. [Drawing].

9.15.

Author. (2024). *Section A*. [Drawing].

9.16.

Author. (2024). *Observation Deck 02 Plan*. [Drawing].

9.17.

Author. (2024). *Diagram showing Observation Deck 02 position*. [Drawing].

9.18.

Author. (2024). *Humans in cage Interior Render of Observation deck 02*. [Drawing].

9.19.

Author. (2024). *Wildlife view of cage.Exterior render of observation deck 02, from wildlife perspective*. [Drawig].

9.20.

Author. (2024). *Key Map for detail sections*. [Drawing].

9.21.

Author. (2024). *Sketch of roof design for multispecies* . [Drawing].

9.22.

Author. (2024). *Details of roof* . [Drawing].

9.23.

Author. (2024). *Details of base*. [Drawing].

9.24.

Author. (2024). *Detail Section of Main Building with ramp*. [Drawing].

9.25.

Author. (2024). *Visitors Circulation diagram continued*. [Drawing].

9.26.

Author. (2024). *First storey position.* [Drawing].

9.27.

Author. (2024). *First Storey Plan*. [Drawing].

9.28.

Author. (2024). *Rehabilitation clinic process and wildlife treated*. [Drawing].

9.29.

Author. (2024). *Treatment exhibition render*. [Drawing].

9.30.

Author. (2024). *Staff & Services Circulation diagram*. [Drawing].

9.31.

Author. (2024). *View from parking entrance*. [Drawing].

9.32.

Author. (2024). *Basement Storey position*. [Drawing].

9.33.

Author. (2024). *Basement storey*. [Drawing].

9.34.

Author. (2024). *Technical system diagram*. [Drawing].

9.35.

Author. (2024). *Section B*. [Drawing].

9.36.

Author. (2024). *East Elevation*. [Drawing].

9.37.

Author. (2024). *Release and Feeding exhibition render*. [Drawing].

9.8.

Author. (2024). *Sketch of balustrade for multispecies* . [Drawing].

9.39.

Author. (2024). *Detail Section of walkway and Brickwork*. [Drawing].

9.40.

Author. (2024). *Mezzanine storey position*. [Drawing].

9.41.

Author. (2024). *Section C*. [Drawing].

9.42.

Author. (2024). *Mezzanine storey plan*. [Drawing].

9.43.

Author. (2024). *Sketch of sculptures and an open ground floor design for multispecies*. [Drawing].

9.44.

Author. (2024). *Wildlife circulation*. [Drawing].

9.45.

Author. (2024). *South Elevation*. [Drawing].

9.46.

Author. (2024). *Eco-market render*. [Drawing].

9.47.

Author. (2024). *West Elevation*. [Drawing].

9.48.

Author. (2024). *Programming for a weekday and a weekend*. [Drawing].

9.49.

Author. (2024). *Abstract Model | Human & Animal Co-existence.* [Photgraph].

9.50.

Author. (2024). *Building Model | 1: 500.* [Photgraph].

9.51.

Author. (2024). *Future envisioning of project*. [Drawing].

CHAPTER 10

10.1.

Author. (2024). *Short story panel 10.* [Drawing].

10.2.

Author. (2024). *Flower Food*. [Drawing]

Appendicx

1.

Author. (2024). *Table illustrating funders and funding contribution*. [Table].

2.

GeoLis. (2024). *SG Diagram of site & Amendment notices* . [Image].

3.

Author. (2024). *Table showing the total cost of the project, based on the program's total area and the cos t per m2*. [Table].

4.

Author. (2024). *Table showing Fee Calculations* . [Table].

5.

Author. (2024). *Table showing Estimated Project Cost*. [Table].

6.

Author. (2024). *Table showing estimated yearly income and expenses and the gross profit*. [Table].

7.

Author. (2024). Turtles.[Drawing] Adapted from

Kim, H. (n.d).*Endangered animal - tortoise*.[Illustration]. Available at: https://www.pinterest.com/pin/71762 0521909066457/ (Accessed: 12 August 2024).

8.

Author. (2024). Flowera & insects.[Drawing] Adapted from Kim (n.d) "Hallmark Signature Paper Wonder Mother's Day Pop Up Card (Thankful for You) for Easter, Friendship, Thank You"

"Hallmark Signature Paper Wonder Mother's Day Pop Up Card (Thankful for You) for Easter, Friendship, Thank You" (n.d).[Card]. Available at:https://www.amazon.com/Hallmark-Signature-Wonder-Moth ers-Thankful/dp/B0BTV1NVMT?ref_=pinterest_fplfs&th=1 (Accessed: 12 August 2024).

9.

Author. (2024). Freshwater fish.[Drawing]

Bibliography

Abdel, H. (2022) *Haven the eternal experience pavilion / earthscape studio*, *ArchDaily*. Available at: https://www.archdaily.com/989456/haven-the-eternal-experience-pavilion-rnd-earth (Accessed: 31 August 2024).

Acampora, R. (2004) '*oikos*and*domus*: On constructive co-habitation with other creatures', *Philosophy & Geography*, 7(2), pp. 219-235. doi:10.1080/1090377042000285426.

Adamczak, S.A. (2016) *The educational significance of human and non-human animal interactions* [Preprint]. doi:10.1057/9781137505255.

AECOM (2022) *Africa Property and Construction Cost Guide 2022/23*. AECOM SA (Pty) Limited

Ainslie, O. (2002) The zoo as paradoxical discourse: A social space of paradoxical construction and deconstruction of knowledge about animals, Google Scholar . thesis. Available at: https://open.uct.ac.za/handle/11427/3639 (Accessed: 2024).

Allcock, B.A. (2016) *Unzoo: Creating conservational conscience - A progressive development scheme for johannesburg zoo*, *Wired Space*. thesis. Available at: https://wiredspace.wits.ac.za/items/a3f7687f-bfaf-4e92-945c-501d78231b1f (Accessed: 2024).

Aspinall, D. (2019) *The Great Zoo Con*, *Aspinall foundation*. Available at: https://www.aspinallfoundation.org/media/4353/the-great-zoo-con-damian-aspinall-2019.pdf (Accessed: 31 August 2024).

Bailey, C. (2013) 'Book symposium/tribune du livre*zoopolis*, by Sue Donaldson and will Kymlicka Oxford: Oxford University Press, 2012 zoopolis*: A political renewal of animal rights theories*', *Dialogue*, 52(4), pp. 725-737. doi:10.1017/s0012217313000851.

Bakharia, U. (2023) *No evidence of animal neglect, says Joburg Zoo, in response to online petition*, *The Mail & Guardian*. Available at: https://mg.co.za/news/2023-11-08-no-evidence-of-animal-neglect-says-johannesburg-zoo-nspca/ (Accessed: 31 August 2024).

Bashaw, M.J. *et al.* (2001) 'A survey assessment of variables related to stereotypy in captive giraffe and okapi', *Applied Animal Behaviour Science*, 73(3), pp. 235-247. doi:10.1016/s0168-1591(01)00137-x.

Bellotti, G. (2018) *Between birds and humans: The design of the Encounter*, *DSpace*. thesis. Available at: http://hdl.handle.net/1721.1/118504 (Accessed: 2024).

Block, I. (2022) *Thomas Heatherwick's Little Island Park and outdoor theatre opens on the Hudson*, *Dezeen*. Available at: https://www.dezeen.com/2021/05/21/little-island-park-thomas-heatherwick-new-york/#/ (Accessed: 31 August 2024).

Boyle, K.E. (2017) Enclosing nature: Naturalism, Animal Welfare, and the evolution of Zoo Design. thesis.

Bracke, B. *et al.* (2022) 'A multispecies design approach in the Eure Valley. Three lessons from a design studio in Landscape Architecture', *Cahiers de la recherche architecturale, urbaine et paysag're* [Preprint], (14). doi:10.4000/craup.9824.

Browning, H. and Veit, W. (2020) 'Perspectival pluralism for Animal Welfare', European Journal for Philosophy of Science, 11(1). doi:10.1007/s13194-020-00322-9.

City of Johannesburg. (2018). *City of Johannesburg Land Use Scheme*.https://joburg.org.za/documents_/Documents/City%20of%20Johannesburg%20Land%20Use%20Scheme%20-%20FINAL%202018.pdf [Accessed: 14 May 2024].

Cmv.io (no date) *Geolis*. Available at: https://ags.joburg.org.za/cgismobi/ (Accessed: 14 May 2024).

Coe, J.C. (1985) 'Design and perception: Making the zoo experience real', *Zoo Biology*, 4(2), pp. 197-208. doi:10.1002/zoo.1430040211.

Desai, S. and Smith, H. (2018) 'Kinship across species: Learning to care for nonhuman others', *Feminist Review*, 118(1), pp. 41-60. doi:10.1057/s41305-018-0104-0.

Dodington, E.M. (2009) *How to design with the animal: Constructing Posthumanist Environments*, *Rice University Electronic Theses and Dissertations Architecture Theses and Dissertations*. thesis. Available at: https://hdl.handle.net/1911/61887. (Accessed: 2024).

Dorkin, E. *et al.* (2010) *Beasts of burden*. Oregon, Milwaukie: Dark Horse Books.

Fahlquist, K. (2014) *Creating new experience for zoo visitors by using media techniques*, *Diva-porta*. thesis. Available at: http://umu.diva-portal.org/ (Accessed: 2024).

Fernando, R.A. (2020) 'Non-anthropocentric view towards animal welfare: A moral philosophical analysis', *International Journal of Multidisciplinary Studies*, 7(1), p. 69. doi:10.4038/ijms.v7i1.122.

Fernandez, E.J. *et al.* (2009) 'Animal-Visitor Interactions in the modern zoo: Conflicts and interventions', *Applied Animal Behaviour Science*, 120(1-2), pp. 1-8. doi:10.1016/j.applanim.2009.06.002.

Gillespie, K. (2020) *CFP (edited volume): 'radical intimacies: A multispecies politics of care and kinship'*, *H-net*. Available at: https://networks.h-net.org/node/73374/announcements/6578999/cfp-edited-volume-radical-intimacies-multispecies-politics-care (Accessed: 31 August 2024).

Govindrajan, R. (2018) *Animal intimacies interspecies relatedness in India's central Himalayas*. Chicago, Illinois: The University of Chicago Press.

Grobman, Y.J. *et al.* (2023) 'Architectural multispecies building design: Concepts, challenges, and design process' *Sustainability*, 15(21), p. 15480. doi:10.3390/su152115480.

Hauskeller, M. and Rice, T. (2019) 'A jungly feeling: The atmospheric design of Zoos', *Atmosphere and Aesthetics*, pp. 147-158. doi:10.1007/978-3-030-24942-7_8.

Hernandez-Wolfe, P. and Acevedo, V.E. (2021) 'Helping injured animals helps the helper, too: Vicarious resilience and the animal-human bond', *Ecopsychology*, 13(1), pp. 19-26. doi:10.1089/eco.2020.0038.

Henke, J.E. (2000) *Designing for those without voices: Transitions from nature to built form -- from animal to human*, *DSpace*. thesis. Available at: http://hdl.handle.net/1721.1/67279 (Accessed: 12 June 2024).

Houck, K (2021) "An Application of Philosophical Theories Regarding Animals and An Argument for the for the Replacement of Zoos". Senior Theses. https://scholarcommons.sc.edu/senior_theses/47

Jacques, K. (2017) *LEED Platinum Liberty Wildlife Rehabilitation Center makes strides in conservation*, *U.S. Green Building Council*. Available at: https://www.usgbc.org/articles/leed-platinum-liberty-wildlife-rehabilitation-center-makes-strides-conservation (Accessed: 12 August 2024).

JCPZ (n.d) *Research papers*, *JCPZ*. Available at: https://www.jhbcityparksandzoo.com/reports/research-papers (Accessed: 31 August 2024).

Johannesburg City Parks and Zoo. (2022). *Business plan 2021-22 financial year*.https://joburg.org.za/documents_/Documents/Entities%20Business%20Plans/Annexure%20_A7_2021-22_JCPZ%20final%20Draft%20Business%20Plan-19%20March.pdf [Accessed: 14 May 2024].

Kagan, R., Carter, S. and Allard, S. (2015) 'A universal animal welfare framework for zoos', *Journal of Applied Animal Welfare Science*, 18(sup1). doi:10.1080/10888705.2015.1075830.

Kemmerer, L. (2010) 'Nooz : Ending zoo exploitation', in *Metamorphoses of the zoo: Animal encounter after Noah*. Maryland, Lanham: Lexington Books, pp. 37-56.

Krstic, H., Trentin, A. and Jovanovic, G. (2016) 'Interior-exterior connection in architectural design based on the incorporation of spatial in between layers. study of four architectural projects', *Spatium*, (36), pp. 84 91. doi:10.2298/spat1636084k.

Lanxon, N. (2013) *The orbi story: BBC and Sega collaborate on Experimental Natural History Theme park*, Wired. Available at: https://www.wired.com/story/the-story-of-orbi/ (Accessed: 14 May 2024).

Lanxon, N. (2013) *The orbi story: BBC and Sega collaborate on Experimental Natural History Theme park*, Wired. Available at: https://www.wired.com/story/the-story-of-orbi/ (Accessed: 14 May 2024).

Licha, B. (n.d) *Barbara Licha artworks*, *Saatchi Art*. Available at: https://www.saatchiart.com/en-za/account/artworks/88340 (Accessed: 31 August 2024).

List of documents (no date) *Chief Surveyor General*. Available at: http://csg.drdlr.gov.za/esio/listdocument.jsp (Accessed: 14 May 2024).

Lindholm, J. 2013. 4. Zoo History. In: Irwin, M., Stoner, J. and Cobaugh, A. ed. *Zookeeping: An Introduction to the Science and Technology. Chicago: University of Chicago Press, pp. 31-42.https://doi.org/10.7208/9780226925325-005*

Luo, M. *et al.* (2022) 'Multispecies coexistence in fragmented landscapes', *Proceedings of the National Academy of Sciences*, 119(37). doi:10.1073/pnas.2201503119.

Marcus, A. (2006) *Multispecies materialities: Cohabitation*, *Roca Gallery*. Available at: https://www.rocagallery.com/articles/multispecies-materialities (Accessed: 12 August 2024).

Maulana, R. (2018) 'Architecture for animals: The expanding challenges of Sustainable Development', IOP Conference Series: Earth and Environmental Science, 195, p. 012079. doi:10.1088/1755-1315/195/1/012079.

Mcelroy, M.L (2015) The role of zoos in educating visitors about conservation of wildlife and habitats: A design for sunset zoo in Manhattan, Kansas. thesis

Melfi, V.M. and Hosey, G.H. (2019) *Anthrozoology: Human-animal interactions in domesticated and wild animals*. Oxford, England: Oxford University Press.

Metcalfe, D.J. (2015) *Multispecies design*, *Research Gate*. thesis. Available at: https://www.researchgate.net/publication/368350770_MULTISPECIES_DESIGN (Accessed: 12 August 2024).

Morgan, K.N. and Tromborg, C.T. (2007) 'Sources of stress in captivity', *Applied Animal Behaviour Science*, 102(3-4), pp. 262-302. doi:10.1016/j.applanim.2006.05.032.

Milstein, T. (2009) 'somethin' tells me it's all happening at the zoo': Discourse, power, and conservationism1', *Environmental Communication*, 3(1), pp. 25-48. doi:10.1080/17524030802674174.

Nature Safari India (2024) *Animals in the Wild Vs in captivity - advantages & need*, *Nature Safari India*. Available at: https://www.naturesafariindia.com/animals-in-the-wild-vs-in-captivity/ (Accessed: 31 August 2024).

Come see the big 5 at the Joburg Zoo . (2024). Available at: https://www.sabcnews.com/sabcnews/follow-the-sun-come-see-the-big-5-at-the-joburg-zoo/ (Accessed: 08 February 2025).

Oxman, N. (2013) *Oxman*, *Silk Pavilion I*. Available at: https://oxman.com/projects/silk-pavilion-i (Accessed: 31 August 2024).

Pacheco,P X. (2019) 'How technology can transform wildlife conservation', *Green Technologies to Improve the Environment on Earth* [Preprint]. doi:10.5772/intechopen.82359.

Petitt, A. and Brandt-Off, K. (2022) 'Zoocialization: Learning together, becoming together in a multispecies triad , *Society & Animals*, 32(2), pp. 178-195. doi:10.1163/15685306-bja10082.

Pierce, J. and Bekoff, M. (2018) 'A Postzoo Future: Why welfare fails animals in zoos', *Journal of Applied Animal Welfare Science*, 21(sup1), pp. 43-48. doi:10.1080/10888705.2018.1513838.

Rabb, G.B. (2004) 'The evolution of zoos from menageries to centers of conservation and caring', *Curator: The Museum Journal*, 47(3), pp. 237-246. doi:10.1111/j.2151-6952.2004.tb00121.x.

Rosińska, M. (2019) 'Zoepolis: Non-anthropocentric design as an experiment in multi-species care', *Nordic Design Research Conference* [Preprint]. doi:10.21606/nordes.2019.006.

Roto Architects (2017) *Wildlife refuge architecture: Roto architects inc*, *rotoark*. Available at: https://www.rotoark.com/liberty (Accessed: 12 August 2024).

Salas, M. and Mamut, X. (2024) *Visitor effect on Zoo Animals*, *Animal Welfare Education Centre*. Available at: https://awecadvisors.org/en/wild-animals/visitor-effect-on-zoo-animals/ (Accessed: 31 August 2024).

Sampaio, M.B., Schiel, N. and Souto, A. da (2020) 'From exploitation to conservation: A historical analysis of zoos and their functions in human societies', *Ethnobiology and Conservation*, 9. doi:10.15451/ec2020-01-9.02-1-32.

Sierra Club (n.d) *Anthologies*, *Anthologies, John Muir Bibliography - John Muir Exhibit*. Available at: https://vault.sierraclub.org/john_muir_exhibit/bibliographic_resources/john_muir_bibliography/anthologies.aspx (Accessed: 31 August 2024).

Somu, Y. and Palanisamy, S. (2023) 'Human-wild animal conflict', Veterinary Medicine and Science [Preprint]. doi:10.5772/intechopen.107891.

Soulsbury, C.D. and White, P.C. (2015) 'Human-wildlife interactions in urban areas: A review of conflicts, benefits and opportunities', *Wildlife Research*, 42(7), p. 541. doi:10.1071/wr14229.

South African Council for the Architectural Profession. (2023). *Board notice 471 of 2023*.GOVERNMENT GAZETTE

Spooner, S.L. *et al.* (2023) 'The value of zoos for species and society: The need for a new model , *Biological Conservation*, 279, p. 109925. doi:10.1016/j.biocon.2023.109925.

Studio Ossidiana (2021) *Platform for humans and birds / la biennale di venezia*, *Studio Ossidiana*. Available at: https://www.studio-ossidiana.com/platform-for-humans-and-birds-la-biennale-di-venezia (Accessed: 31 August 2024).

Sueur C. and Pelé M. (2019) 'Importance of living environment for the welfare of captive animals: behaviours and enrichment' In: Hild S. & Schweitzer L. (Eds), Animal Welfare: From Science to Law, 2019, pp.175-188.

Tallo-Parra, O., Salas, M. and Manteca, X. (2023) 'Zoo Animal Welfare Assessment: Where do we stand?', Animals, 13(12), p. 1966. doi:10.3390/ani13121966.

Tarmahomed, M. (2021) *Hambani Kahle: re-imagining Avalon Cemetery as a space for social integration*, *Wired Space*. thesis. Available at: https://hdl.handle.net/10539/32794 (Accessed: 2024).

The Johannesburg Zoo.(2022). *Annual report*. https://joburg.org.za/documents_/Documents/Annual%20Reports/20092010/Jhb%20Zoo%20Annual%20Report%202009-2010.pdf [Accessed: 14 May 2024].

Tüzen, M. and Aycý, H. (2023)'The role of animal-aided design in sustainable architecture', *International Journal of Built Environment and Sustainability*, 11(1), pp. 59-74. doi:10.11113/ijbes.v11.n1.1195.

van Dooren, T., Kirksey, E. and Münster, U. (2016) 'Multispecies Studies', *Environmental Humanities*, 8(1), pp. 1-23. doi:10.1215/22011919-3527695.

Wang, Z. (2022) *Live together: Towards multi-species coexistence*, *Non Architecture Competitions*. Available at: https://www.nonarchitecture.eu/2022/03/14/live-together-towards-multi-species-coexistence/#lightbox[group-328831]/2/ (Accessed: 12 August 2024).

Wong, Z.L. (2022) *Buzz Hub - Ayda Malaysia - finalist finalist 2021*, *Nippon Paint Asia Young Designer Awards*. Available at: https://www.asiayoungdesignerawards.com.my/finalist/6634/view (Accessed: 12 August 2024).

Yerbury, R. and Weiler, B. (2020) 'From human wellbeing to an ecocentric perspective: How nature-connectedness can extend the benefits of marine wildlife experiences', *Anthrozoös*, 33(4), pp. 461-479. doi:10.1080/08927936.2020.1771054.

Ólafsson, B. (2023)*Are zoos good or bad for animals? the argument, explained*, *Sentient*. Available at: https://sentientmedia.org/pros-and-cons-of-zoos/ (Accessed: 12 August 2024).

Zengin, S E. (2019) 'Normalizing human-animal power relations through media: Zoo discourses in Turkey', *Galatasaray universitesi yleti-im Dergisi*, (31), pp. 9-33. doi:10.16878/gsuilet.580339.

Zipkin, E.F. et al. (2023) 'Integrated Community models: A Framework combining multispecies data sources to estimate the status, trends and dynamics of Biodiversity', Journal of Animal Ecology, 92(12), pp. 2248-2262. doi:10.1111/1365-2656.14012.

