Balasaheb Thackeray Gorewada International Zoological Park

MASTER PLAN 2023-2043

FDCM GOREWADA ZOO LTD, NAGPUR
(A Subsidiary Company of FDCM Limited)
www.wildgorewada.com

WILD Gorewada
INDIA'S LARGEST ZOO

FDCM

Balasaheb Thackeray Gorewada International Zoological Park

MASTER PLAN 2023-2043

FDCM GOREWADA ZOO LTD, NAGPUR
(A Subsidiary Company of FDCM Limited)
www.wildgorewada.com

Master Plan Preparation Team

From Bernard Harrison & Friends Ltd.

Bernard Harrison,
Principal Consultant, BH&F,
Singapore

Alex Stingl,
General Manager,
BH&F, Singapore

Mike Graetz,
Zoo Designer, BH&F,
Singapore

Dave Morgan,
Animal Expert, South Africa

Aditya Behl,
Architect, Lucknow

Trevor Hillier,
Landscape Architect

From Gorewada Project

Rishikesh Ranjan (IFS),
General Manager, Nagpur Region,
FDCM Ltd., Nagpur

Shatanik Bhagwat,
Zoo Director, BTGIZP,
Nagpur

Dipak Sawant,
General Curator, FGZ Ltd,
Nagpur

Arjun Tyagi,
Project Manager, FGZ Ltd,
Nagpur

Abhijit Pashine
Company Secretary

Sarika Khot
Assistant Manager (Unit-1)

CERTIFICATE

This is to certify that the Master Plan (2023 to 2043) for Scientific & long-term Management and development plan of Balasaheb Thackeray Gorewada International Zoological Park, Nagpur has been prepared by FDCM Gorewada Zoo Limited through Bernard Harrison and Friends, Singapore in consultation with the expert group on Zoo Designing of Central Zoo Authority (CZA) and Principal Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, Maharashtra State.

(Chandrasekaran Bala)
Chief Executive officer
FDCM Gorewada Zoo Ltd,
Nagpur

(Maheep Gupta)
The Principal Chief Conservator of Forests
(Wildlife) & Chief Wildlife Warden,
Nagpur M.S.

Master Plan for Balasaheb Thackeray Gorewada International Zoological Park, Nagpur and details for development is approved subject to the condition that the responsibility of mobilizing the financial resources for implementation of the Master plan will be sole responsibility of Gorewada International Zoo, Nagpur.

The Master Plan (2023-2043) of Balasaheb Thackeray Gorewada International Zoological Park, Nagpur is approved in the 109th Meeting of the Technical Committee, CZA held on November 10, 2023 vide agenda no. 5.2 and subsequently in 40th Meeting of the CZA held on 28.11.2023. Approval is communicated to the Zoo vide letter C. No. 147415 dated 31-01-2025.

सदस्य सचिव/Member Secretary
केन्द्रीय चिड़ियाघर प्राधिकरण/Central Zoo Authority
पर्यावरण वन और जलवायु परिवर्तन मंत्रालय
Ministry of Environment, Forest & Climate Change
भारत सरकार, नई दिल्ली
Govt. of India, New Delhi

Member Secretary
Central Zoo Authority, New Delhi

ACKNOWLEDGEMENT

This Master Plan covers the strategic period from 2023 to 2043, this document is a testament to our commitment to conservation, education, and the holistic development of one of Maharashtra's most iconic zoological parks. It also reflects our collective commitment to safeguarding the rich biodiversity of our region, providing a sanctuary for diverse flora and fauna, and fostering a deeper connection between nature and the community.

The Master Plan is not just a roadmap for the next two decades; it is a blueprint for sustainable growth, wildlife protection, and enhanced visitor experiences. The initiatives outlined within this document align with our broader goals of biodiversity conservation, habitat restoration, and environmental education.

The dedicated contribution of the General Manager Shri Rishikesh Ranjan, Zoo Director Shri Shatanik Bhagwat, Project Manager Shri Arjun Tyagi and General Curator Shri Deepak Sawant and all stakeholders involved for their unwavering passion and tireless efforts in the development of this comprehensive Master Plan.

It is a testament to the collaborative spirit that defines our approach to wildlife management and conservation.

Also, the contribution of the Assistant Manager Shrimati Sarika Khot, Assistant Manager Shri K.J Shinde and Assistant Manager Shri Venkatraman Jangilwad for their continuous support in the development of this comprehensive Master Plan.

The commitment of FDCM GOREWADA ZOO LIMITED in developing the Balasaheb Thackeray Gorewada International Zoological Park goes beyond creating a world-class facility; it is about fostering a deep sense of responsibility and connection with the natural world. Through this Master Plan, it is aimed to create an enduring legacy that will not only benefit the current generation but also leave a lasting impact on the conservation efforts for generations to come.

FDCM GOREWADA ZOO LIMITED express sincere gratitude to the Chairman Shri Vikas Gupta, Chief General Manager (MPB) Shri Sanjeev Gaur and the Maharashtra State Government in this endeavour, and the implementation of this Master Plan will solidify Balasaheb Thackeray Gorewada International Zoological Park as a beacon of wildlife conservation, environmental education and community.

FDCM Gorewada Zoo Limited

FOREWORD

SHRI VIKAS GUPTA

Chairman
FDCM Gorewada Zoo Limited

It is with great pleasure and pride that I present the Master Plan Report for the Balasaheb Thackeray Gorewada International Zoological Park, Nagpur. This ambitious and visionary project stands as a testament to our commitment to wildlife conservation, environmental sustainability, and educational outreach.

The Government of Maharashtra entrusted the Forest Development Corporation of Maharashtra with the task of establishing an international standard zoo in Nagpur. In response, FDCM Gorewada Zoo Ltd was founded as a subsidiary to carry out this responsibility, with a vision to match the latest developments in zoos across the world.

We believe that Gorewada Zoo will bring a paradigm shift to the zoo industry in India. The development of Gorewada Zoo aims to set new standards in zoo design and operation, integrating modern concepts of animal welfare, habitat enrichment, and public engagement. Our vision is to create a world-class zoological park that not only provides an exceptional visitor experience but also serves as a centre for conservation, education, and research.

This report outlines the comprehensive plan for the development of the zoo, covering all aspects from infrastructure and landscaping to animal welfare and visitor amenities. The animal enclosures strive for immersive exhibition methods, and veterinary care and animal welfare have been given the highest priority throughout the planning.

The zoo is being planned to achieve financial sustainability without dependence on external donations or grants for its operations. This is likely the first time in India that a zoological park has been designed with commercial success as a core objective from its planning stage. The report is not just a road map for next two decades; but a commitment for sustainability, conservation and visitor experience.

The successful realization of this project would not be possible without the tireless efforts of our dedicated team of professionals, whose expertise and passion have been instrumental in shaping this vision. I extend my deepest gratitude to all who have contributed to this endeavour.

I am confident that the Balasaheb Thackeray Gorewada International Zoological Park will become a landmark destination, fostering a deeper appreciation for wildlife and promoting a sustainable coexistence between humans and nature.

Thank you and best wishes to this noble cause.

Executive Summary

SHRI CHANDRASEKARAN BALA

Chief Executive Officer
FDCM Gorewada Zoo Limited

The Balasaheb Thackeray Gorewada International Zoological Park, spanning an expansive 1914 hectares within the Gorewada Reserve Forest in Nagpur, promises to be a groundbreaking addition to wildlife conservation and tourism. This ambitious project is designed with a series of immersive and diverse components, each offering a unique window into the world's fauna and the rich cultural heritage of the region. Among its main attractions are the Indian Safari, African Zoo, Night Zoo, Gondwana Park, Bio Park, and Archaeological Theme Park. These components are meticulously designed to showcase animals in habitats that closely mimic their natural environments, adhering to the innovative concept of "unzooing" which prioritizes the well-being and authenticity of animal exhibits.

A significant feature of the zoological park is the inclusion of the Gorewada Rescue Centre and the Wildlife Research and Training Centre (WRTC). These facilities are integral to the park's mission of conservation, providing sanctuary and rehabilitation for rescued animals while also serving as a hub for research and education in wildlife management and conservation practices. The park's establishment has been guided by the expertise of internationally renowned consultant M/s Bernard Harrison, whose vision has been instrumental in the unique design concept, particularly the pioneering Night Zoo, which will offer visitors a rare glimpse into the nocturnal activities of various species.

The master plan for the zoological park seamlessly integrates the cultural aspects of the region, ensuring that visitors gain a profound appreciation not only for the biodiversity but also for the local heritage. The northern side of the Gorewada Reserve Forest is designated for jungle safaris and nature parks, providing additional opportunities for visitors to engage with the natural environment through guided tours and educational experiences.

In line with global conservation efforts, the Balasaheb Thackeray Gorewada International Zoological Park will also focus on significant conservation and breeding initiatives. These programs aim to protect endangered species, promote biodiversity, and contribute to global efforts to sustain wildlife populations. Through these comprehensive efforts, the park aspires to be a beacon of conservation, education, and cultural preservation, offering a sanctuary for wildlife and a haven for nature enthusiasts from around the world.

Equally important is our commitment to entertainment. We understand that by captivating the hearts and minds of our visitors, we can amplify the impact of our conservation efforts. We have integrated arrange of awe-inspiring attractions, captivating live shows, and interactive experiences that will create lasting memories and forge strong emotional connections between our guests and the animal kingdom.

Thank you all for your exceptional work and unwavering commitment, let us now embark on this remarkable endeavor and make our shared vision a reality.

Preface

SHRI SHATANIK BHAGWAT

Zoo Director
Balasaheb Thackeray International Zoological Park,
Gorewada, Nagpur

It is with great pleasure and a sense of responsibility that I present the Master Plan Report for Balasaheb Thackeray International Zoological Park in Gorewada, Nagpur, covering the strategic period from 2023 to 2043. This document encapsulates our collective vision, commitment, and aspirations for the sustainable development and conservation efforts of our esteemed institution.

Balasaheb Thackeray International Zoological Park holds a special place in the hearts of the community, and this Master Plan is a testament to our dedication to fostering an environment where wildlife thrives, and visitors are inspired to connect with the wonders of the natural world. Our mission is not only to showcase the incredible diversity of flora and fauna but also to actively contribute to global efforts in biodiversity conservation and education.

As the Zoo Director, I am immensely proud of the collaborative efforts put forth by our team in crafting a comprehensive roadmap for the next two decades. This Master Plan envisions a dynamic and evolving zoological park that adapts to the changing landscape of wildlife management, incorporating advancements in animal care, visitor engagement, and environmental sustainability.

Key highlights of the Master Plan include strategic initiatives for animal welfare, conservation programs, habitat enrichment, and educational outreach. Additionally, we emphasize sustainable practices to minimize our ecological footprint and contribute to the broader goals of environmental stewardship.

This report is not merely a document; it is a commitment to the future. It is a pledge to uphold the legacy of Balasaheb Thackeray, whose vision for a world-class zoological park continues to inspire us. I express my gratitude to the dedicated staff, stakeholders, and the local community for their unwavering support and collaboration throughout the planning process.

As we embark on this exciting journey, I am confident that the implementation of the Master Plan will further solidify Balasaheb Thackeray International Zoological Park as a leader in wildlife conservation, education, and recreation. Together, let us strive to create a harmonious coexistence between humans and the magnificent biodiversity we are privileged to steward.

Table of Contents

Chapter: 2 Appraisal of the present arrangement and constraints

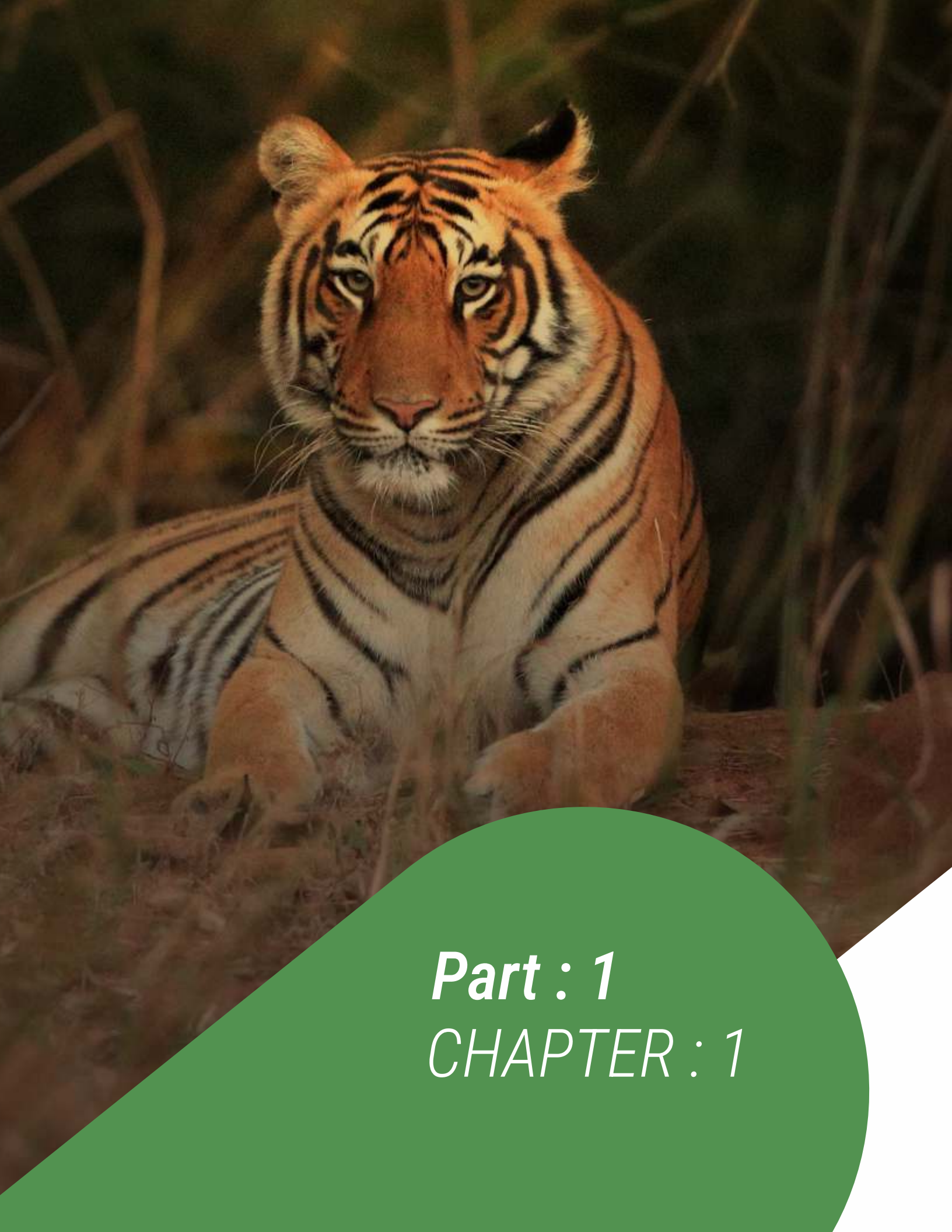
Part: 2

Chapter: 5 Personnel planning

Chapter: 6 Disaster management

Chapter: 7 Contingency plan

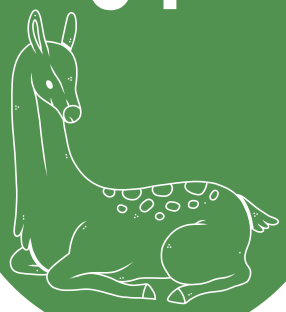
Rajkumar, the majestic tiger at Gorewada International Zoological Park, is a prominent attraction known for his regal presence and striking appearance. Visitors are captivated by his grandeur and the opportunity to observe this magnificent creature up close in a naturalistic setting



Part : 1

CHAPTER : 1

01



Introduction

1.1. History of the Zoo

The Gorewada Zoological Project is an ambitious initiative which aims to develop the global standard zoo in the region, with high levels of animal welfare, strong conservation programs, and a fantastic visitor experience. Announced by the Government of Maharashtra in 2005, the project includes a reserve forest, the BTGIZP & rescue centre, and supporting tourism infrastructure, aims to provide a high-quality and personal wildlife experience.

The site is located at the fringe of Nagpur city and is famous for its rich biodiversity. It was handed over to forest department under compensatory land and now important for protection of Gorewada Lake, Nagpur's drinking water source. The 1914 Ha is divided into two zones, North (Unit 1) and South (Unit 2), by the Nagpur-Katol Highway.

Nagpur, also known as Orange City, Central India's largest city and Maharashtra's winter capital. As the country's "Tiger Capital," Nagpur is surrounded by vast forests and tiger sanctuaries, making it an ideal location for the international standard zoo.

In 2008, the Forest Department appointed Mr. Bernard Harrison from Singapore as a consultant for conceptualizing and developing the project's concept plan and DPR. The land and project were handed over to the Forest Development Corporation of Maharashtra (FDCM) in 2009 for faster implementation. A 539 Ha in Gorewada Forest's Unit 2, characterized by sparse vegetation, was proposed for the zoo's development. A proposal for the Forest Conservation Act (FCA) was submitted, and a tender was called to appoint a consultant for the zoo's master plan preparation. M/s. Ashfaq Ahmad Architectural Associates was selected in 2013-14, and the first master plan was approved in 2014.

The FDCM constructed a 29km boundary wall to protect the land and enhance the region's biodiversity. In 2015, Unit 2 opened to tourists as the Gorewada Jungle Drive, featuring wildlife such as leopards, spotted deer, sambars, nilgai, and over 200 bird species.

In 2016, the largest rescue centre in Central India commenced its operations at Gorewada. During the same year, the government made the decision to establish a Special Purpose Vehicle (SPV) in partnership with a private investor for the development and operation of the zoo. After several rounds of selection, Essel World Tourism Infra Pvt. Ltd. was chosen as

the private investor, leading to the establishment of a joint venture company. The private investor requested a revision of the approved master plan for enhanced economic viability and international appeal.

The new zoo's founding principles were based on environmental soundness, aesthetics, ecological and financial sustainability, and operational practicality. Bernard Harrison and Friends Ltd designed the revised master layout plan, and Phase-I, the Indian Safari, was approved in March 2019 and operationalized in January 2021.

The zoo started its operation with four safaris, namely Leopard, Sloth bear, Herbivores and Tiger. Leopard, Tiger, and Sloth bear are spread over 25 Ha each while herbivore safari is spread over 40 Ha A walking zoo is being developed in 2 Ha area next to Indian safari will have 10 animal enclosures.

Fig. 1: BTGIZP : Existing Entry Gate

1.1.1. Regulatory History

In the year 2005, Government of Maharashtra had taken a decision, in principle, to set up an International Standard Zoo and Bio Park at Gorewada (Nagpur, Maharashtra) vide its resolution (G.R) No. WLP-1099/C.R.89/F-1 dated 12 Dec 2005. Principal Chief Conservator of forest (wildlife), Maharashtra State, Nagpur had submitted a proposal to establish a zoo and rescue center vide PCCF (WL) M.S. Nagpur's letter no. Desk 22 (6)/Plan/1044/2009-20 dated 03.02.2010.

Accordingly, a detailed project report (DPR) was prepared by M/S Bernard Harrison & Friends Ltd and revised by Forest Development Corporation of Maharashtra (FDCM) Ltd, Nagpur. The DPR was submitted to Central Zoo Authority (CZA) for scrutiny and its approval. The DPR along with Master Layout Plan was examined by expert group on zoo design of CZA. Later, the proposal was examined by the technical committee of CZA, in the meeting dated 22 March 2013. The technical committee recommended its approval with certain conditions. The CZA letter of approval is placed as Annexure–1. One of the main conditions was to obtain approval of Hon'ble Supreme Court to establish a new Zoological park and Rescue Centre at Gorewada, Nagpur.

Fig. 2: Aerial View of Rescue Center at Gorewada

The Government of Maharashtra obtained the approval of Hon'ble Supreme Court to establish a new zoo and rescue center at Gorewada and is placed as Annexure –2. The Central Zoo Authority had approved the layout and DPR of the project wide letter no F.No.23-11/ 99- CZA (403) (Vol.1) (AK)/7196 dated 27.05.2015. The Gorewada Safari was inaugurated on 26th January 2021 and was officially opened to public on 27th January 2021. At the time of inauguration Gorewada International Zoo was renamed as 'The Balasaheb Thackeray Gorewada International Zoological Park' for convenience, henceforth it is referred as BTGIZP in this document.

The Indian Safari was inaugurated on 26th January 2021 and was officially opened to public on 27th January 2021.

Fig. 3: Aerial View of Gorewada Lake

1.1.2. Design History

The concept for The Gondwana Reserve @ Gorewada and Rescue Centre was first developed for the Forest Department of Maharashtra, India, by Bernard Harrison and Friends (BH&F) in a workshop held in November 2008. The 1914 Ha site is bisected by the main road from Nagpur to Kalmeshwar. The northern portion is 1064 Ha and the southern portion is 850 Ha. The initial concept (2008) for the project was for the Gondwana, a complex of safaris, a Biopark and walking trails to be developed on the northern part of the site and the southern portion, to be developed as The Reserve @ Gorewada. These concepts were set out in the Master Plan layout below:

MASTER LAYOUT PLAN OF THE GONDWANA & THE RESERVE @ GOREWADA, NAGPUR

Fig.4: Master Plan developed by Bernard Harrison and Friends LTD in 2008

However an objection was raised by Nagpur Municipal Corporation on the project that this will pollute the Gorewada reservoir, which is drinking water source to the city Nagpur, hence the concept was abandoned.

For administrative reasons, the project was handed over to Forest Development Corporation of Maharashtra (FDCM) in November 2011, which floated a tender for a Public Private Partnership (PPP) and development of Master Plan for the proposed Gorewada Project. No Private Investor responded to this tender at this stage.

Due to rising cases of man-animal conflict in vidharba landscape, it was thought necessary to construct a rescue center first to house the injured or captured conflict animals. A separate Master Plan was submitted for construction of Rescue Centre at Gorewada in 2013 and received approval from CZA. The Rescue Centre was constructed and was made operational in 2015.

In absence of Private Investor, the Government of Maharashtra decided to start development of Gorewada Project through FDCM and appointed "Ashfaque Ahmed Consultancy Services Private Limited" to develop a new Master Plan which reversed The Gondwana zoo complete to the southern site and The Reserve to the northern site. The Master Plan has been approved by the Central Zoo Authority (CZA) vide letter number F. No. 23-11/ 99-CZA (403)(Vol.I)(AK) /7196 dated 27/05/2015.

This layout was revised in 2017 which moved the Night Safari to the southern site, freeing up the Northern Site of any zoo components, except the Rescue Centre. At this stage, The Forest Advisory Committee (FAC) of the Ministry of Environment, Forest and Climate Change (MoEFCC) granted Stage II Forest clearance for 564 Ha (539 Ha on the Southern site and 25 Ha on the northern site for the Rescue Centre).

Fig.5 : Approved Master Plan May 2015

Fig.6 : Master Plan developed by Ashfaque Ahmed Consultancy Services Private Limited in 2017

In 2016, the FDCM floated a new tender for selection of Private Partner under Public Private in Partnership development of Gorewada Project based on the Master Plan approved by the CZA in 2015. M/s. Esselworld Tourism Infra Private Limited was selected as a Private Partner through competitive selection procedure and was awarded a work order to establish a Joint Venture Company in 2017 between Forest Development Corporation of Maharashtra and Esselworld Tourism Infra Private Limited. A Special Purpose Vehicle (SPV) was formed as a joint venture (JV) to develop Gorewada Project later called as FDCM ESSELWORLD GOREWADA ZOO LTD (FEGZ).

While the primary focus of a zoo is conservation, research and education, commercial aspects provide the necessary financial resources to support these endeavors and ensure the long-term viability of the institution. By balancing commercial success with the core objectives of animal welfare and conservation, zoos can continue their valuable work in protecting and preserving the natural world. For International appeal and long-term sustainability, the Private Investors insisted planning for commercial success and financial viability with following arguments for the revision of Master Plan.

Financial Sustainability : Generating revenue through commercial activities is crucial for the financial sustainability of a zoo. The funds generated from ticket sales, merchandise and other commercial ventures help cover the operational costs, maintenance, and animal care expenses. It allows the zoo to continue its conservation efforts, research programs, and educational initiatives without solely relying on public funding or donations.

Animal Welfare: Commercial success enables zoos to provide better care for the animals under their stewardship. It allows for the development and maintenance of state-of-the-art enclosures, enrichment programs, veterinary care, and specialized diets. Adequate funding enables zoos to create habitats that closely mimic the natural environment of the animals, promoting their physical and psychological well-being.

Conservation Efforts: Zoos often contribute to breeding programs for endangered species, habitat restoration projects, research on conservation biology, and public awareness campaigns. By supporting these initiatives, zoos actively contribute to the preservation of threatened species and their habitats. Commercial aspects of a zoo can fund conservation programs.

Education and Outreach: Zoos play a vital role in educating the public about wildlife conservation and environmental issues. Commercial activities can support the development of educational programs, interactive exhibits, guided tours, and workshops that help raise awareness and inspire visitors to take conservation action. The revenue generated from commercial aspects helps enhance the educational experiences offered by the BTGIZP, making it an effective platform for learning and engagement.

Visitor Experience: Commercial activities within a zoo, such as food and beverage options, gift shops, and entertainment facilities, contribute to a positive visitor experience. These amenities enhance the overall enjoyment and satisfaction level of visitors, making them more likely to return and support the BTGIZP mission. Positive visitor experiences can also lead to word-of-mouth promotion, attracting more visitors and generating additional revenue.

In 2018, Bernard Harrison & Friends Ltd was appointed to revise the Master Plan for BTGIZP to have an international appeal and long-term sustainability of Project. After series of workshops and detailed deliberations, a layout was submitted to CZA in 2018 and an approval was received vide letter no. F. No. 23-11/99-CZA (403) (Vol.II) (PKR) /510/2019 dated 08/03/2019. However, Master Plan Report submitted with the layout had details of only Phase-I of the project at this stage. Therefore, CZA demanded submission of complete Master Plan Report for its approval.

Subsequently, due to Covid-19 situations, there was no progress in the Master Plan development. Meanwhile, the revised guidelines of CZA increased the limit of Exotic animals from 10% to 25% of total animal collection. The present submission addresses all these issue in Layout and Master Plan report. In addition, the current revision also focuses to address various operational challenges experienced in working of Phase-1; i.e. Indian Safari of BTGIZP.

Fig.7 : 2018 Draft concept

Fig.8 : Master Plan layout prepared for submission to CZA in 2018 with respective colour coding

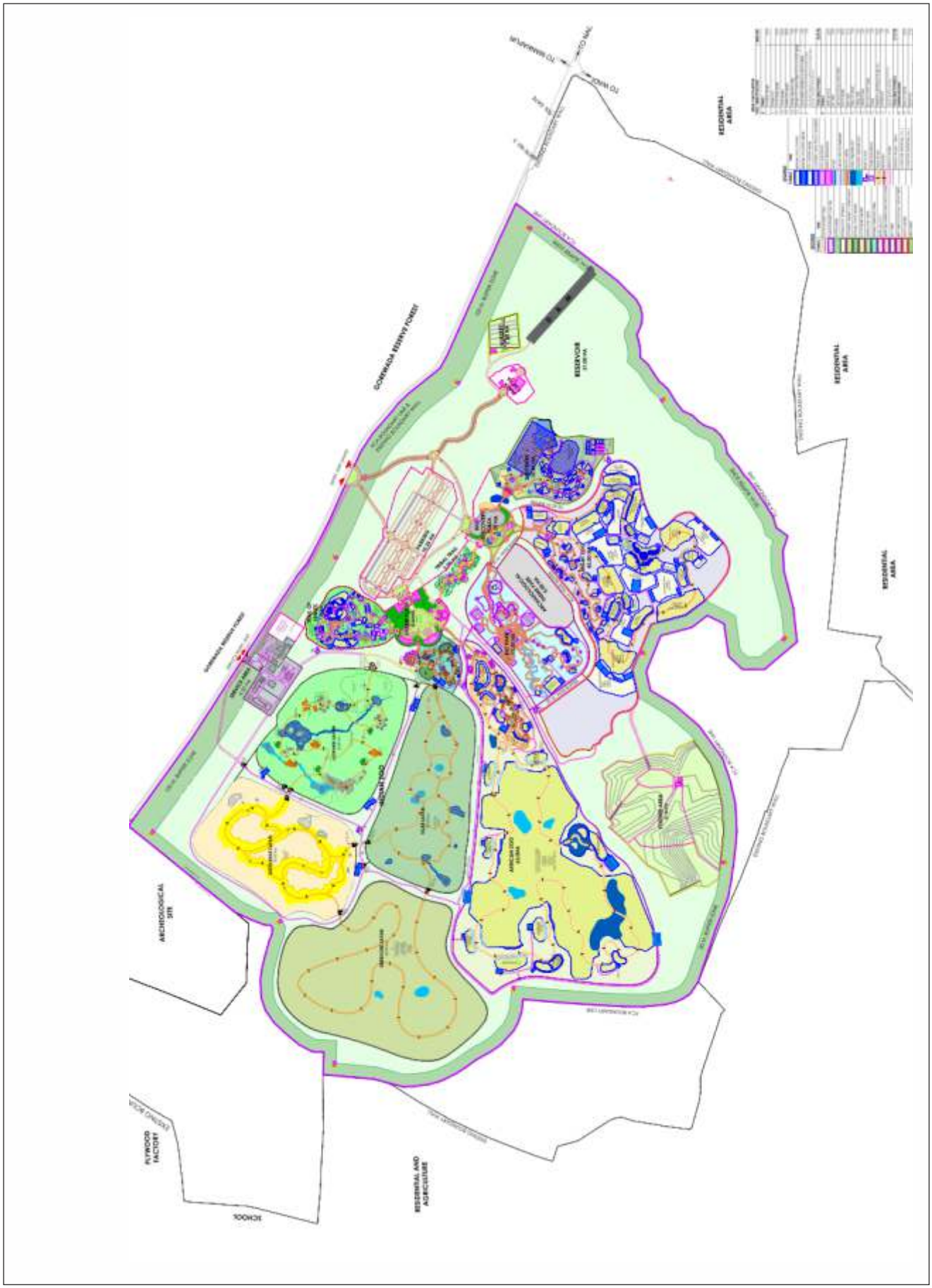


Fig.9 : Master Plan Layout approved by CZA in March 2019

The Original Concept Plan (2008) vs. The Master Plan (2015)

Bernard Harrison and Friends LTD (BH&F) was appointed to review and redevelop the Master Plan (2017). On review of that iteration of the Master Plan it became obvious that the following points needed to be addressed at the first Master Planning Workshop held from 19th to 23rd June 2018:

A. Product Quality

The original 2008 DPR had a strong storyline intertwined with the unique geology of the region; tectonic plate activity; meteorites strikes, especially Shiva's crater and the 300,000 year eruption of super volcano Deccan which laid down the huge Deccan Plateau; that lead to the demise of the world's dinosaurs, that there are local Indian dinosaur fossils in Madhya Pradesh; the creation of the Himalayas by the drifting Indian subcontinent; and the fact that the Gond tribes had given their name to Gondwana (one of two ancient supercontinents). This concept was not given due importance in the 2015 master plan and therefore this development strategy was found to be lacking.

The fundamental storyline in the 2008 Mater Plan was: ***"Life on Earth: Its Evolution and Diversity".***

In addition to this, the walking trails attached to the various safaris were not incorporated. This meant that the smaller animals (mammals, birds, reptiles, and some fish and amphibians) would be not be displayed at all, again contributing to a poor visitor satisfaction. Also, a wide range of themed garden had been lost. The predator islands would be to CZA zoo standards of 2,000 - 6,000 sqm rather than 20 Ha which is the minimal requirement for a large carnivore safari. However; the 2015 Master Plan consists of the safari park model based on Central Zoo Authority (CZA) guidelines for drive-through enclosures, a series of 25 Ha "safaris" for carnivores (leopard, tiger and sloth bear) in low-diversity. It is difficult for tourist in enclosed vehicles to spot a solitary or a pair at most, in such expansive enclosures.

B. Product Quantity

The main issue that needed to be addressed in the Master Plan workshop was that the original product was estimated to cost Rupees 750 crores while the 2015 Master plan budget was Rupees 451 crores. Thus, whereas product quantity had to be reduced, considerably, the essence of the product's quality should have been retained, at all cost. This was an obvious conundrum as serious cuts should have to be made, yet the components, by and large, were the same (the river Safari was substituted with a Bird Park). However, all other important components remained unchanged.

Potential to Commercialize

The operator aims to run the project in a responsible commercial manner. Therefore, tight commercially oriented rules and practices must be put into place, in addition to a reduced capital investment. Thus, amortization costs would be substantially reduced.

> *"Life on Earth : Its Evolution & Diversity."*

C. Balance Capital and Operating Budget with the Phasing of Investment

The phasing of the capital investment in developmental phases is an extremely important aspect of its progression, as the project should commence business operations as quickly as possible, to generate revenue. However, it needs to be strategically balanced, if the initial components are insufficient to warrant visitors' perceived value for money and at the risk of disappointment from poor visibility of animals, lack of sufficiently visitor absorption capacity of Phase 1 (without a walking trail to absorb visitors waiting for a safari ride), trained staff, and effective operating system to deliver a product of excellence.

If the first offering fails to deliver on the product promise, it will take many years of repair to gain the public's trust and confidence again, especially as currently, with the societal tendency towards instantaneous, and unforgiving social media posts.

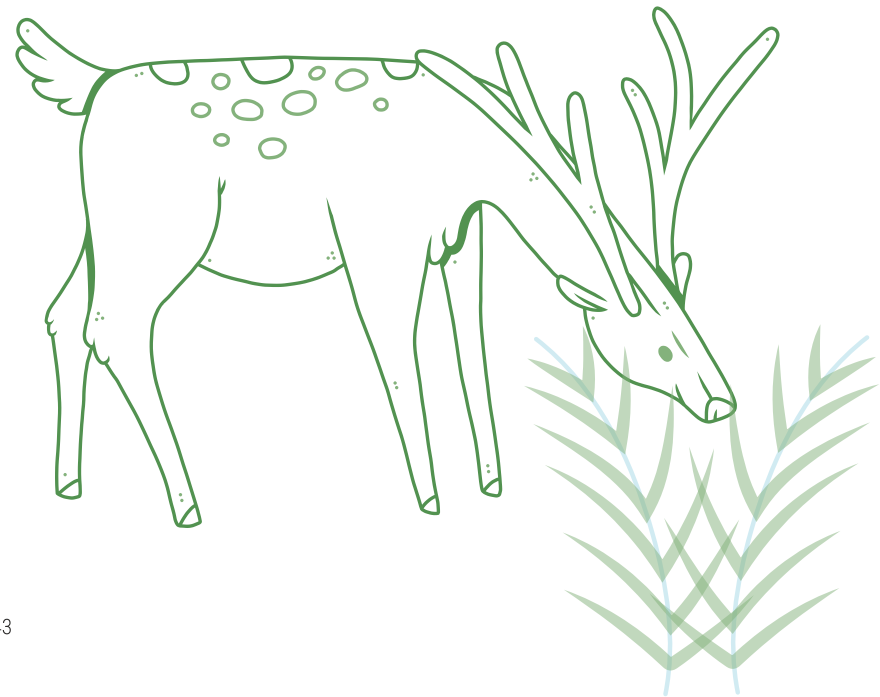
D. Potential for Product Enhancement and Commercialization

To strive for commercial sustainability, possible product enhancements, which are deemed acceptable by the Central Zoo Authority, should be considered. The introduction of the more subtle and sophisticated attractions, technology was proposed in 2008 DPR compatible to a zoological institution, helping to create a more educational and exciting experience.

Such as, the use of high-tech in the form of animatronics, computer generated imagery and holograms to bring extinct animals, like dinosaurs and sabre toothed tigers to life; motion based simulators and moving sidewalks to take one on a journey to prehistory and feel tectonic plate movements while standing in a simulated Great Rift Valley; the use of the talking head of an ancient African tribal chief who narrates a story of how life was simple then when they hunted giraffe; and peppers ghost which creates a ghostly image of animals species that are no longer with us, on the planet.

These effects enhance the learning and entertainment aspects of the visitors' experience and should be seriously considered to be used to tell the story. Similarly, themed restaurants (think Rainforest Café) and retail of exceptional quality; catering for functions and over-night stays, where acceptable, will all add to the experience and quality of the product.

The 2015 Master Plan had approval to develop the site amounting to 564 Ha. A total of 79.06 Ha was approved for deforestation (built up area) of which 76.99 Ha was utilized by the 2015 Master Plan. The balance of land, while degraded, thus should be retained for forest or appropriate vegetation.



1.2. Vision of the BTGIZP

Our mission is to provide our visitors a unique zoological experience that takes our visitors on an immersive journey through a forest teeming with a diverse array of flora and fauna. A journey that will inspire their minds and captivate their hearts towards conservation of the natural world.

As part of our commitment to conservation, education, awareness, and recreation, the BTGIZP will aim to meet and exceed international standards and become a leading zoo in India offering a cohesive collection of attractions, and conservation initiatives.

The Balasaheb Thackeray Gorewada International Zoological Park(BTGIZP) will offer naturalistic habitats for animals that provide good animal welfare, with the goal of transforming each visitor's experience into a lasting memory.

Fig. 10 : Sangai - Rarest deer in the world. Breeding successfully in BTGIZP

1.3. Mission of the BTGIZP

The BTGIZP will actively engage in the conservation of nature, scientific research, and public education concerning the significant flora and fauna of the Gondwana land.

This mission will be achieved by providing enlightening activities to enhance visitors' perspectives towards wildlife. The BTGIZP will be an amalgamation of entertainment, education, recreation, and scientific exploration, incorporating elements of zoos, aquariums, and botanical gardens, all consolidated into one unique location.

Fig.11 : Lee the tiger, using the natural water bodies in the current safari

1.4. Strategy of the BTGIZP

The BTGIZP will aim to be a conservation leader. Participating in a wide-ranging conservation effort by fostering an appreciation of the wonders of nature among its visitors, we plan to make them responsible citizens, thereby creating a desire to preserve the wildlife and the natural environment, supporting the achievement of the objectives of the BTGIZP.

Fig.12 : Education Activities for young minds.

1.5. Objectives of the BTGIZP

A professionally run zoological park serves a variety of roles to benefit both; the animals it houses and the visiting public. It acts as an Institution for animal conservation, research and a public facility for education, recreation as well as a tourism attraction. The principal objective of the BTGIZP will be animal welfare shown towards every species and individual in the animal collection.

Carefully planned breeding programs can help propagate endangered species and continue gene pools for species whose habitats have been obliterated. Pure as well as applied research on animals in captivity can benefit not only the animals in the BTGIZP but also in the wild.

Educational programs can help foster the respect that wild animals deserve and familiarize the visitors with the important role these animals play in the ecosystem. Large scale habitat destruction has resulted in the extinction of many species. BTGIZP may have to serve as the last bastion for threatened and endangered species.

The key objectives of the BTGIZP are as below: -

1. Promote wildlife conservation (Undertaking breeding program of endangered species).
2. Care and rehabilitation of injured, sick and orphan wild animals.
3. To collect and collate the scientific data on the biology, behaviour and health care of various species of wild animals housed in the BTGIZP and use the same in future management.
4. To assist in conservation of the in-situ population of various species of endangered animals and their habitat by sensitizing the people.
5. To promote research and education on wildlife conservation
6. To create amongst the visitors empathy towards wild animals through appreciation & better understanding.
7. To promote international eco-tourism.
8. To create the opportunities of employment / self-employment.

Fig. 13 : Conservation educational outreach to schools carried out by FGZ staff

1.6. Topography

A photogrammetric drone survey was undertaken of the whole site to understand and review for its character, topography, vegetation and soil. The northern side is more undulating having a large artificial reservoir in its north-eastern corner. The vegetation represented here is mostly dry-deciduous scrub. The soil is sandy with very less moisture holding capacity.

There are 2 streams in southern side that flow towards large waterbody in north. These are seasonal streams mostly flowing in the monsoon. The vegetation in valleys is tall and dense compared to flats. The southern vegetation is most thorny bushes and dry scrublands.

The Photogrammetric generated contour survey of the site will be used as the base plan for all future planning and design work. There is little variation in the topography of the southern side, with the highest points of the site being approximately 10m above the lowest. This encourages the introduction of man-made hillocks and mounds to give topographical relief and greater visual variety.

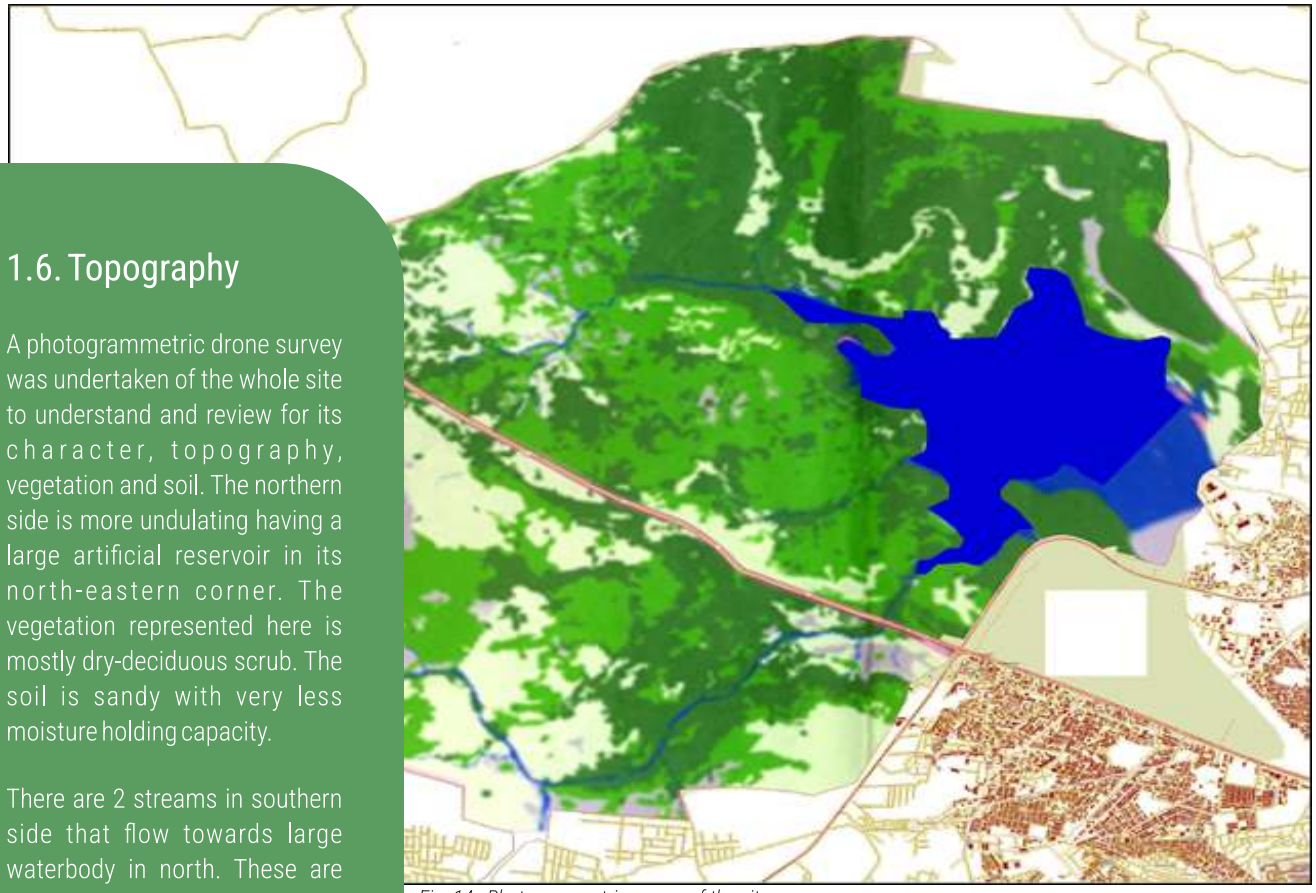


Fig. 14 : Photogrammetric survey of the site

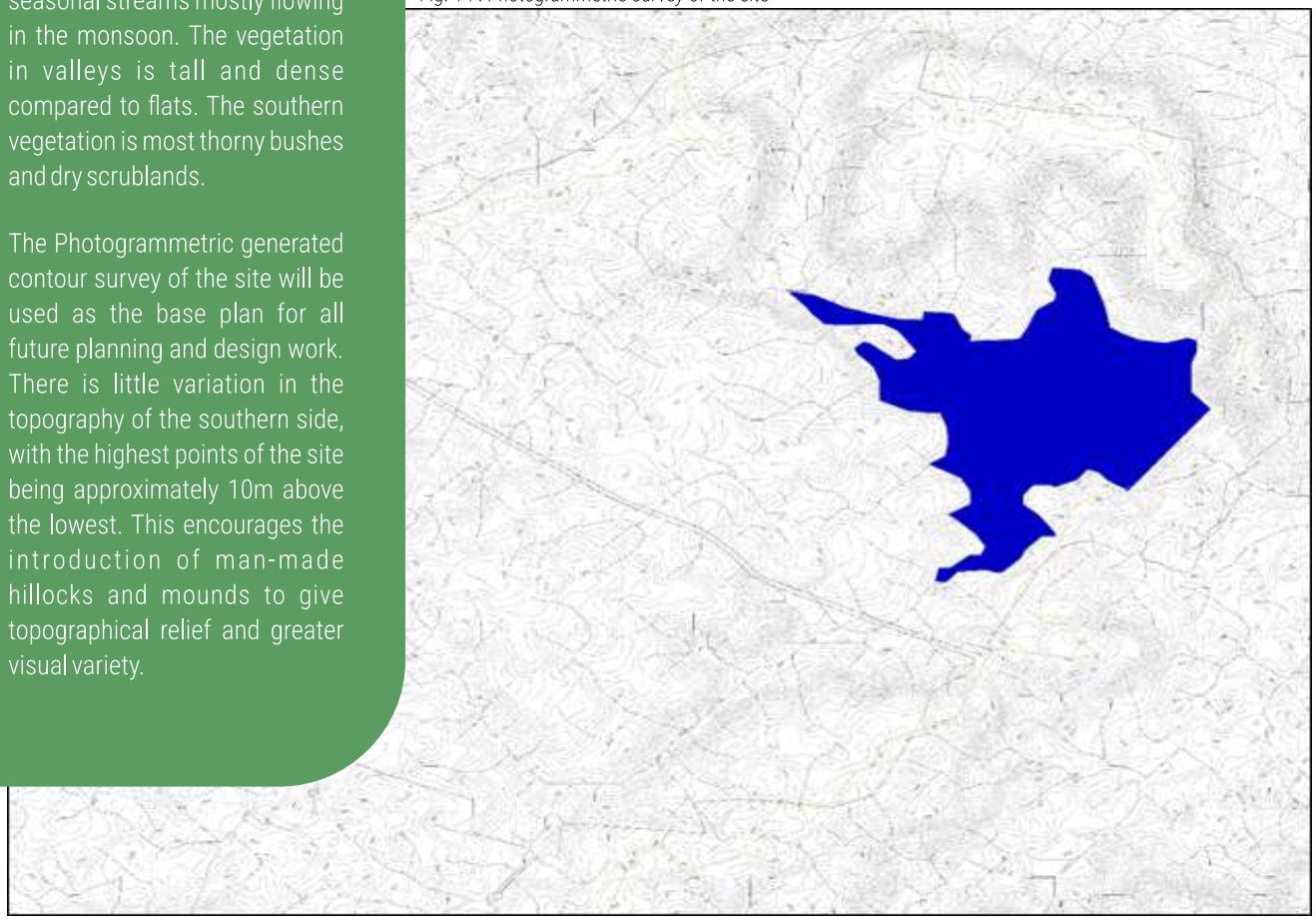


Fig.15 : Satellite generated micro-contours of the site

1.7. Rock and Soil

The study of the geology broadly reveals Basalt originated in Deccan Trap associated with sediments belonging to lower Eocene to Upper Cretaceous. Basalt originated in Deccan Trap soil is shallow, well drained, and clayey with moderate erosion. The texture of soil is clayey in nature.

To evaluate the usability of soil, samples were collected from the area and sent to laboratory for testing. The results are appended as Annexure –7.

Fig.16 : Basalt rock with columnar faults in Northern site of Gorewada

1.8. Flora and fauna in BTGIZP Premises

The Gorewada Forest being an urban forest is home to variety of flora and fauna. Following are the key animals found in Gorewada Reserve Forest.

Mammal	Birds	Reptiles
Nilgai	White-eyed Buzzard	Indian Rat Snake
Sambar	Grey Francolin	Russell's Viper
Leopard	Painted Francolin	Saw-scaled Viper
Jungle Cat	Indian Peafowl	Wolf Snake
Spotted Deer	Ring Dove	Indian Rock Python
Common Palm Civet	Black-winged Kite	Common Cat Snake
……and more	Great-horned Owl	Monitor Lizard
	……more than 200 species of birds	…….and many more

A detailed checklist of flora and fauna is attached separately in Annexure-6.

The Forest Department took over the site in 1991. Most of the original and indigenous vegetation had succumbed to over-grazing and harvesting for firewood. The site is vegetated with mostly thorny scrub vegetation and has been planted with Acacia varieties as well as leguminous trees and other plants. There are also some timber trees like Teak (*Tectona grandis*), Sissoo (*Dalbergia sissoo*) and some other commercial species for possible future timber harvesting. Construction of boundary wall has helped in restoration of natural vegetation.

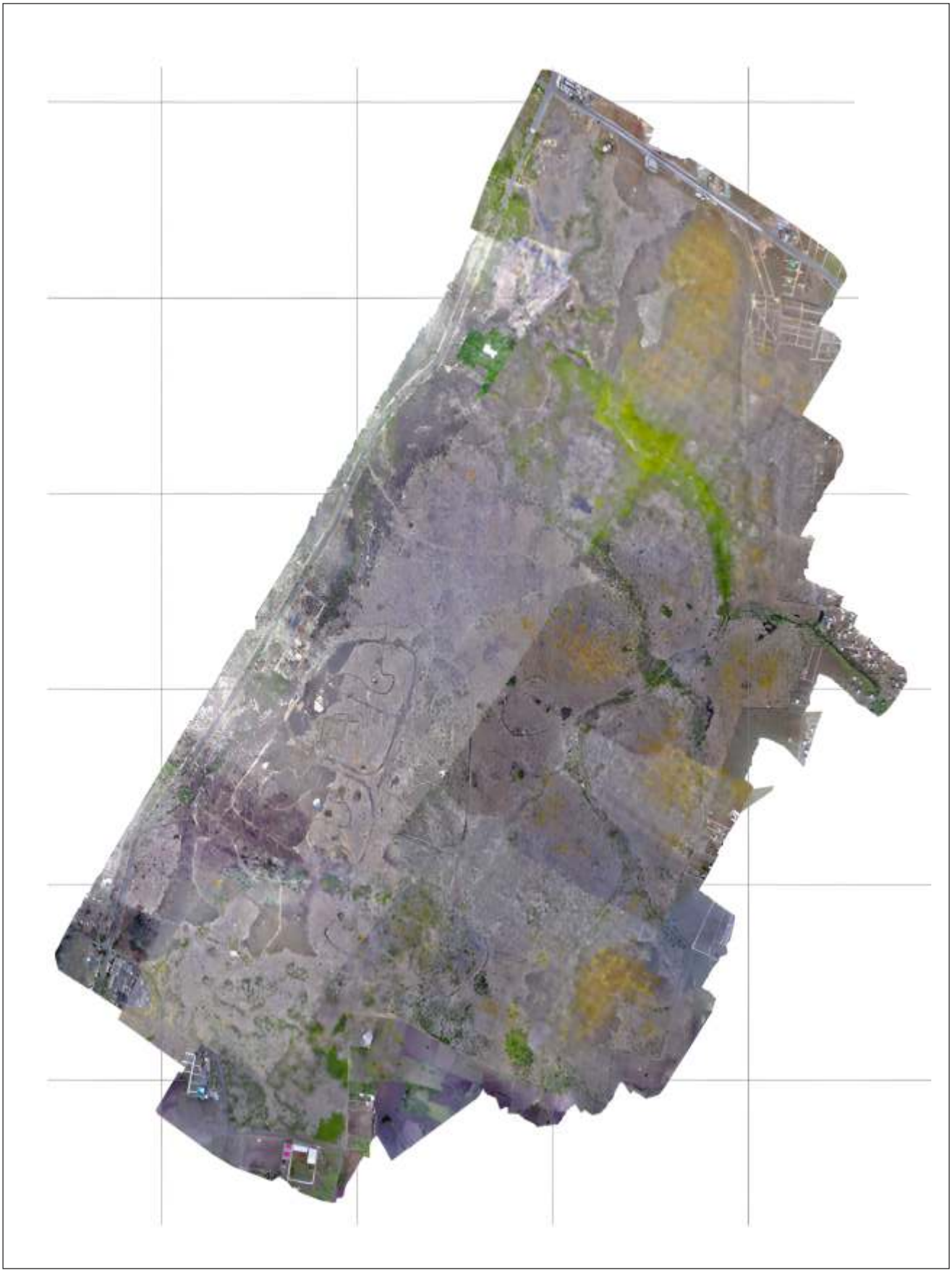


Fig. 18: Aerial drone photography survey of the site indicating sparse vegetation on the southern site

1.9. Climate and Seasons

Nagpur, a city characterized by dry weather for the majority of the year, experiences a significant amount of rainfall during the monsoon season, which typically spans from June to September. The average annual rainfall in Nagpur is approximately 1205 mm. However, a notable event occurred on July 14, 1994, when the city witnessed a record-breaking rainfall of 304 mm in a single day.

During the summer months of March to June, Nagpur remains equally warm, with May being the hottest month of the year. The temperatures can soar during this period, subjecting the city to high levels of heat. From November to January, Nagpur experiences its winter season. During this time, temperatures drop, and it is not uncommon for the mercury to fall below 10 degrees Celsius. The city has seen its lowest temperature of 3.9 degrees Celsius recorded in 1937. On May 29, 2012, Nagpur faced extreme heat, with the city recording a scorching temperature of 48.6 degrees Celsius. This stands as a significant high temperature record for the area.

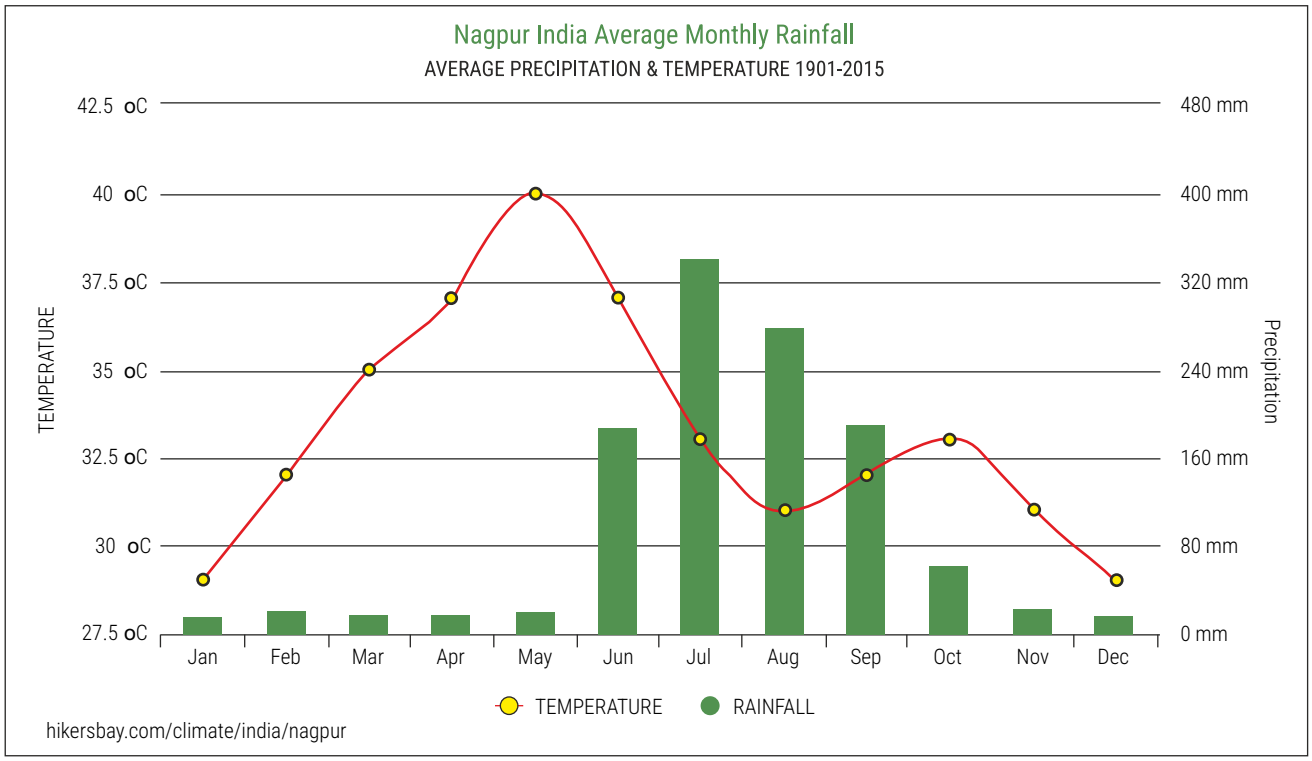


Fig. 19: Climate Graph - Weather by month Nagpur

1.10. Approach

The BTGIZP is located at about 10 km west from the Zero Milestone of Nagpur city on Nagpur - Katol highway. Nagpur city is well connected by air, road, and rail.

Nagpur-Katol State Highway No. 248 passes through this forest land and bifurcates it into two parts. Gorewada Lake, which functions as a reserve drinking water storage for of Nagpur city, is surrounded by the site. Being located on the Nagpur-Katol State Highway, the proposed site is very well connected with the city. It is also well connected with the nearby villages.

Landmark	Approximate distance from site
Zero Mile	10 kms
ST Bus Stand	9 kms
Nagpur Railway Station	7 kms
Nagpur Airport	14 kms

1.11. Demography of the Surrounding Area

The adjoining area of Gorewada is mainly private area comprising of agriculture land, residential buildings and municipal corporation land. There are 9 villages surrounding this forest land. Borgaon and part of Gorewada village are situated on the eastern side, Bodhala, Chicholi and part of Fetri village are on western side, Pitesur and Mahurzari are on the northern side and Hazaripahad and Dabha villages are situated on the southern side.

Gorewada forest falls in the new metro region created by Nagpur Improvement Trust. The site is free of all encumbrances, water logging, and storm water drains.

Demography of the surrounding area:

Nagpur District	Year 2021
Total Population	46.53 Lakh
Area in Sq. Km.	9897
Density of population	470 / sq. km.
No. of Villages	1874

Fig. 20: Visitors to the BTGIZP

1.12. Legal Status of the Land

The land of the BTGIZP and Rescue centre belongs to FDCM Ltd, Nagpur. The proposed site is notified as a Reserve Forest.

The main road from Nagpur to Katol bisects the site into two parts. The northern portion is 1064 Ha and the southern portion is about 850 Ha. It does not have any human habitation and is free of all encumbrances.

1.13. Sources of Pollution

The site is divided into two parts i.e. southern and northern, by Nagpur-Katol highway. The Gorewada lake falls into Northern side. The planning has been done in such a way that most of the activities are on southern side. All activities planned in Northern site have been carefully designed to minimise disturbance to native flora-fauna and disturbance to Gorewada Lake.

Since the site is located on State Highway, the possibility of sound pollution is there. Hence to protect animals from sound pollutions, the activities have been planned at min. 150 mts. from highway with 100m buffer zone on roadside and 50m buffer zone on all the other sides.

Fig. 21: Stream on the Northern Site

The Reserve Forest at Gorewada spans a lush, protected area teeming with diverse flora and fauna, offering visitors a glimpse into the region's rich biodiversity. It serves as a crucial conservation space, promoting environmental sustainability and wildlife protection

Part:1

CHAPTER : 2

02

Appraisal of the present arrangement & constraints

2.1. Appraisal of the Present Arrangement

The present arrangement of the BTGIZP demonstrates a commendable effort in ensuring the welfare of animals, providing a positive visitor experience, and prioritizing health and safety. The management's active monitoring of operations reflects their dedication to maintaining high standards in all aspects of BTGIZP management.

The focus on animal welfare is evident in the measures taken to provide suitable habitats, nutrition, and veterinary care for the animals. By closely monitoring their well-being and continually assessing their needs, the management ensures that the animals are living in conditions that promote their physical and mental health.

The emphasis on visitor experience highlights the management's commitment to creating a memorable and enjoyable visit for guests. By actively seeking and considering visitor feedback, the management can make necessary adjustments and improvements to enhance exhibits, educational programs, and overall facilities. This customer-centric approach contributes to positive word-of-mouth promotion and encourages repeat visits.

Health and safety considerations are given due importance, which is crucial for both animals and visitors. The management's commitment to regular inspections, risk assessments, and adherence to safety protocols helps mitigate potential risks and ensures a safe environment within the BTGIZP premises. By maintaining effective emergency response plans, they demonstrate their preparedness in handling unforeseen situations.

However, a comprehensive appraisal would require a detailed assessment of specific aspects, such as the conditions of animal enclosures, the effectiveness of educational programs, visitor feedback analysis, and the extent of collaboration with conservation initiatives. Such evaluations would provide a more comprehensive understanding of the strengths and areas for improvement in the present arrangement.

The Gorewada project is a comprehensive tourism initiative aimed at promoting the Gorewada reserve forest located on the outskirts of Nagpur city. The project includes a range of activities such as a reserve forest, nature and birding trails, an international standard zoo, a wildlife rescue center, a wildlife research and training institute, and an amusement park. The Gorewada reserve forest covers an area of 1914 Ha, of which 850 Ha is reserved for the BTGIZP. The entire area is enclosed by a 2m tall wall to protect against encroachment.

In addition, a 25 Ha commercial land situated next to the project has been identified for the development of tourist infrastructure and amusement activities. This will provide additional facilities to visitors and enhance the overall experience of the Gorewada project. The project aims to promote eco-tourism and to provide a platform for wildlife conservation and research while also creating employment opportunities for the local community. The Gorewada project is a significant step towards promoting sustainable tourism and conserving the natural beauty of the region.

BTGIZP under the Gorewada project is a comprehensive tourism initiative aimed at promoting the Gorewada reserve forest located on the outskirts of Nagpur city.

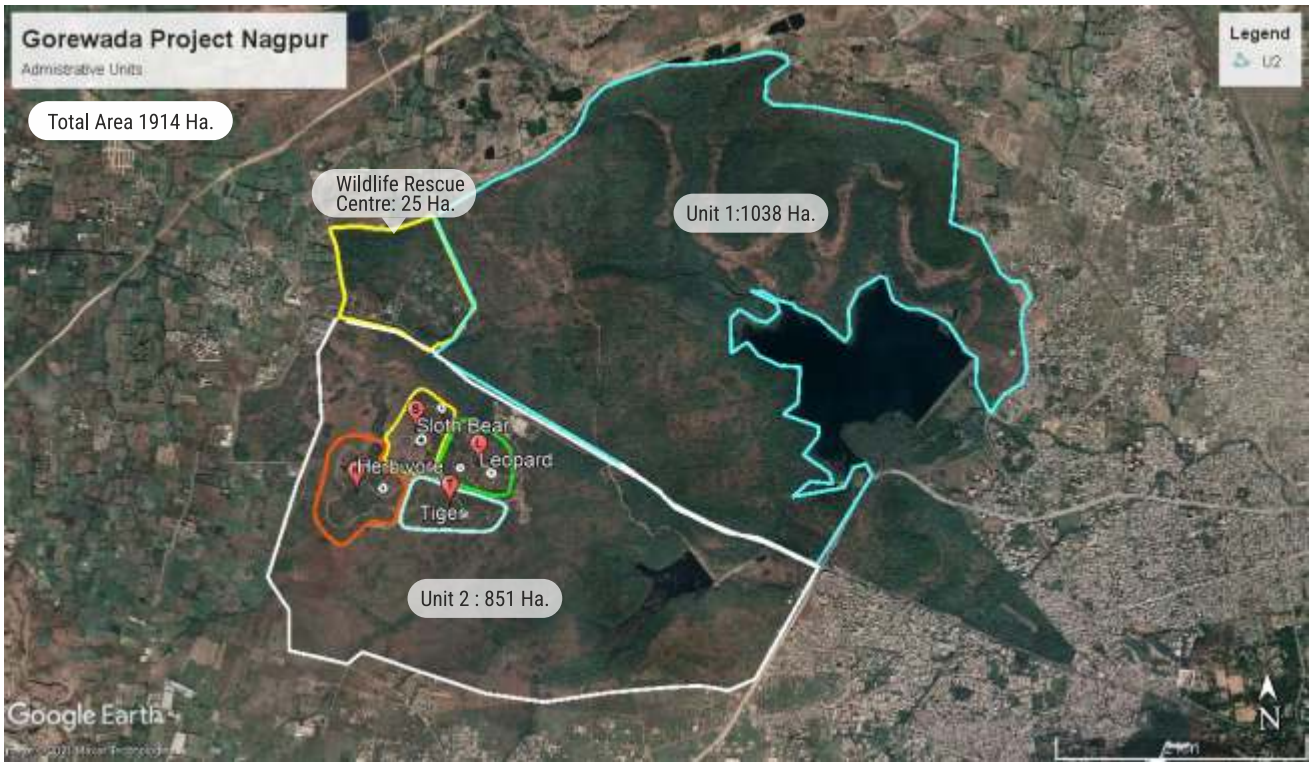


Fig. 22: Satellite view of Gorewada Reserve from Google Earth

The Gorewada reserve forest is bisected by a state highway that connects Nagpur and Katol. The northern part of the reserve is characterized by high-quality forest and naturally sustains a high density of wild animals. This particular section of the forest has been deliberately preserved and protected from any form of development or construction activities. Its primary function is to act as a buffer zone for the Gorewada Lake, which serves as a vital source of drinking water for the city of Nagpur.

By keeping this forest undisturbed, the natural habitat is preserved, ensuring the ecological balance and the well-being of the wildlife that resides within it. The preservation of this forest not only supports the conservation of biodiversity but also safeguards the crucial water resource that sustains the local community.

The southern part of forest which is relatively degraded forest and relatively less wildlife activity was chosen for development of the BTGIZP . The entire BTGIZP was proposed with international standard development having components like Indian safari, African Safari, Night Safari etc. The first phase of this development was initiated with development of Indian Safari and Walking trail. The Central Zoo Authority approved Layout for Phase-I of revision vide letter no. F. No. 23-11/99-CZA (403)(Vol.II) (PKR) /510/2019 dated 08/03/2019.

2.2. Existing Visitor Facilities

It is main entry point for visitors spread in approximately 4 Ha area. This includes a 2 Ha spacious parking. Visitor amenities like toilet blocks, drinking water facilities, cafeteria and administrative buildings are part of this plaza. Following structures are part of Entrance Plaza.

Fig. 23: Main Entry to the Zoo

Buildings:

- Administrative Block
- Ticketing Block & Souvenir Shop
- Cafeteria
- Pick-up & Drop Station
- Parking
- Water & Sanitation arrangements (ESR, GSR, Toilets, STP)

Fig. 24: Ariel view of Entrance areas of the BTGIZP

Fig. 25: Ticketing and Souvenir shop Building

Fig. 26: Cafeteria and Visitor Photo Spot

2.3. Zoological Facilities

The display of animals has been done zone wise in safaris (Indian) and walking trail. The visitors will be able to see the animal of a particular zone in one location for better understanding of their behaviour and differences. The animals will be grouped according to biological themes. The focus will be on creating inherently educational settings that provide multiple opportunities for educational messages and information, performances, and art works of quality so that the visitors will have exciting experience of safaris, bio-park, bird park and night safari.

The component of each exhibit is given as under:

Animal Section (Safari Area & Walking Trail):

In first phase of the BTGIZP, Indian Safari has been inaugurated. Indian Safari is a typical safari park comprising of 4 drive through enclosures connected to each other.

2.3.1. Indian Safaris

Leopard Safari - It is spread in 25 Ha area. This is a drive through enclosure with double gate entry system. Enclosure is built with 4m high chain-link fence with 1.5m steel plate inside overhang at 45^0 angle. The habitat in this enclosure is naturally degraded scrub forest dominated by *Butea* and *Acacia spp*. To match with natural habitat of Leopards, various thematic structures have been created to match the theme and storyline.

Fig. 27: Leopard Safari Entrance

S-Gate, Emergency Gate and Exit Gate

These gates are made with double gate entry system. All the gates are electro-mechanical and designed for manual and remote-control operations. The S-gate is entry point for all the safaris; therefore, a tyre bath has been placed at the beginning of this gate.

Abandoned Village

The preferred habitat of leopard in Central & Western India is mostly human dominated semi cultivated landscapes. More leopards are seen in the buffer zone and forest fringes than in the dense forest areas. Many leopards are seen habituated to live along the village outskirts. To match its natural behaviour and habitat, the leopard enclosure has been made to mimic these conditions. An artificial abandoned village like structure is made inside the leopard safari to highlight natural behaviour of animal. This village also signifies the efforts of forest department in wildlife conservation and issues related to human-wildlife conflict.

Fig. 28: Abandoned Village theme on Rehabilitation from National Parks.

Rock shelters and Termite mounds

Various natural features like Rocky Mountains, snags and dead trees are used by leopards. Similar structures have been created inside this enclosure for naturalistic enrichment. Similarly, to sensitise about smaller creatures in nature, some artificial termite mounts have been created as an additional interpretation.

Fig. 29: Artificial Rock Shelter

Fig. 30: Artificial Termite Mounds – Role of microfauna in nature

Vulture and Carcass

An artificial carcass and a vulture statue has been created to create awareness about endangered species and their threat. Vulture is representative of scavenging community as well as endangered wildlife.

Fig. 31: Artificial Carcass and Vulture Conservation message in Leopard Safari

Archaic Cave (Bhimbetka theme)

To highlight linkage of ancient human history and place of wildlife in human evolution, Bhimbetka themed caves have been recreated in the leopard enclosure. These archaic paintings depict the historic relation of humans with wildlife.

Fig. 32 : Artificial Tunnel with Archaic cave paintings on inside wall

Artificial waterbodies

To enhance natural beauty of the landscape and provide drinking water, artificial waterbodies have been created inside every enclosure. These waterbodies are lined with geomembrane for water retention however, to maintain its natural looks, stone and sand is used to cover artificial materials.

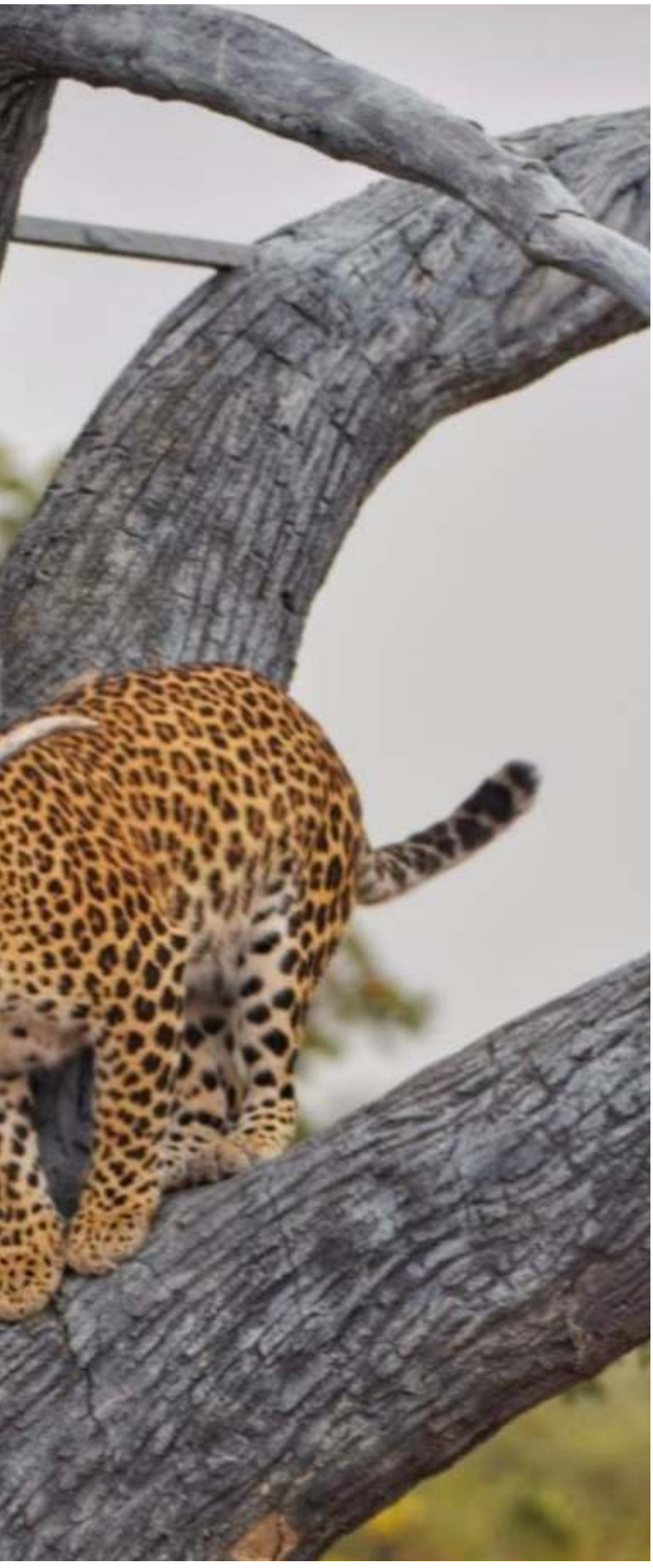
Fig. 33: Artificial Water Body

Wooden and Artificial Perches

Tall perches are installed for long vantage is one of the natural behavioural requirements of leopard. Such wooden perches are made at multiple locations to enhance the activity of leopards.

Fig. 34: Leopard using Artificial perches

Fig. 35: Artificial Tree in the Leopard Safari and a curious leopard in safari



Night Shelters

Total holding capacity of Leopard Safari is 12 animals. Two-night shelters having 7 feeding cells each have been provided. Each night shelter is attached to 2 kraals for off exhibit holdings. They are also provided with treatment cages. A keeper room is part of night shelter structure for storage of equipment's and food. Night shelters have provision of overhead water tanks and proper drainage system.

Fig. 36: Leopard Safari Night Shelters

Fig. 37: Visitors Experience in The Leopard Safari

2.3.2. Sloth Bear Safari

Sloth Bear Safari is spread across 25 Ha area. The enclosure is quite similar to the Leopard safari in terms of construction. It is made up of 4m high chain-link fence with 1.5m steel plate overhang inside. It has 3 double gate entry points of which 2 are provided with watch tower. All the gates are electro-mechanical with provision of manual and remote-control operations.

Fig. 38: Sloth Bears in the Safari

This part of safari is designed to natural habitat and behavioural reequipments of Sloth Bear. The landscape is naturally dominated by fruiting trees like *Ziziphus* and *Cassia fistula*. More plantation is planned to consider natural food requirements of the animal.

Fig. 39: Sloth Bear Safari

Wooden perches, swings, wooden platforms and plenty of dry logs are placed inside for behavioural and dietary enrichment. This Safari has holding capacity of 6 animals in Night shelter with 7 feeding cells and 2 kraals. Kraals are also provided with wooden furnishings and natural substrate to support natural activities of bears.

Fig. 40: Sloth Bear Outdoor Kraals

Fig. 41: Sloth Bear In The Safari

2.3.3. Herbivore Safari

It is spread in area of 40 Ha. The enclosure has a 2.5m electric fence in addition to 4m vertical chain-link fence. The electric fence consists of 26 strands of alternate neutral and high voltage low ampere current.

This electric fence is on advance system that can be monitored from a computer system for electric flow and incidences of breach. The additional electric fence was created to avoid wild leopard entering in the safari area. The enclosure has 3 double gate entry-exit points.

This 40 Ha drive through enclosure comprises different microhabitats and includes natural features like meadows, thick forest patches and seasonal streams. Soil and water conservation measures are proposed for enhancing the greenery and natural vegetation in the enclosure.

Rain shelters and feeding points have been created to enhance animal sighting. The Safari has 2 Night shelters with 6 kraals for secondary holding and isolation. The storage room for fodder and feed supplement is part of night shelter.

Fig.42: Animals in the Herbivore Safari

Fig.43: Variety of herbivore in the safari

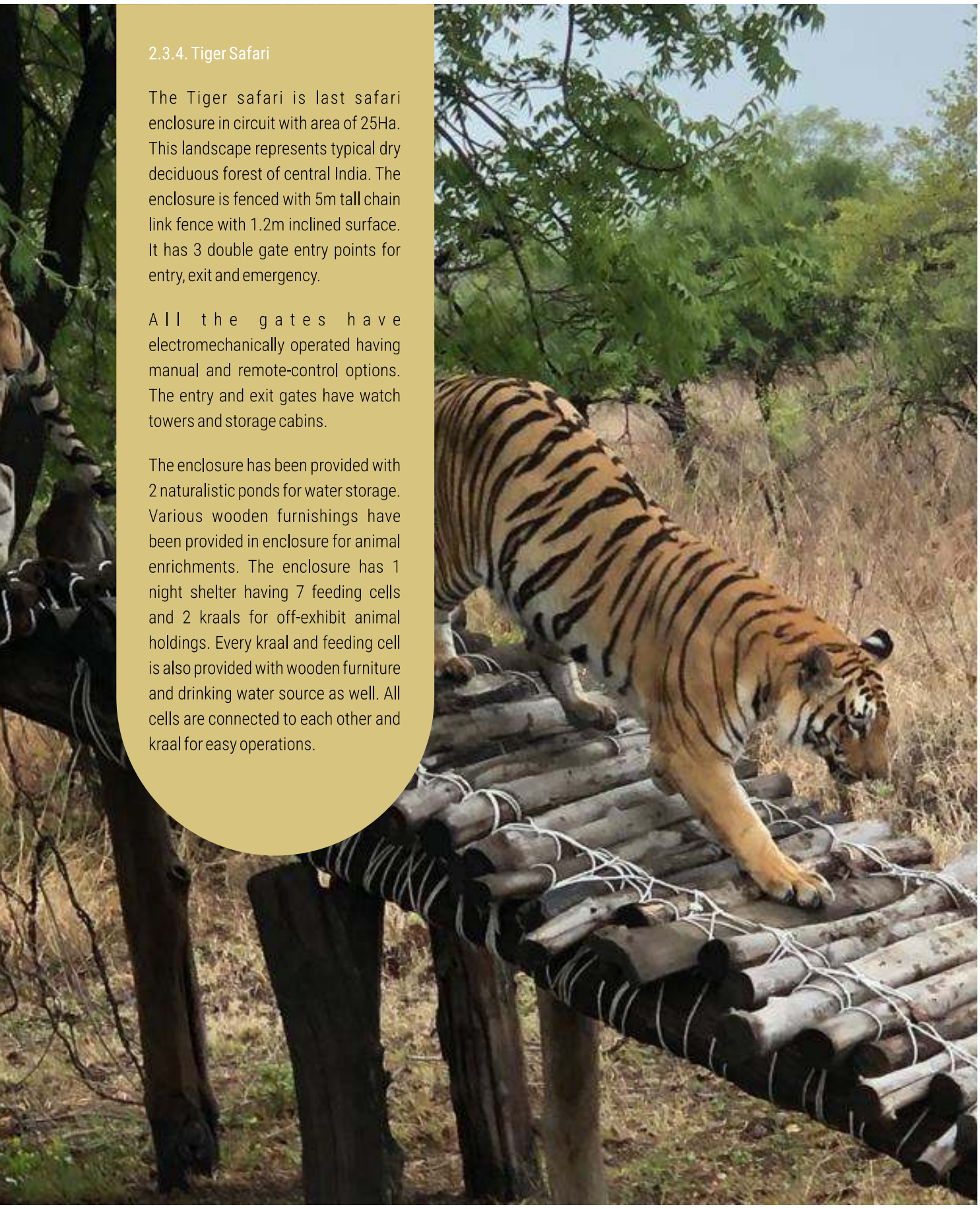
Fig. 44: Tigers in the Safari Area

2.3.4. Tiger Safari

The Tiger safari is last safari enclosure in circuit with area of 25Ha. This landscape represents typical dry deciduous forest of central India. The enclosure is fenced with 5m tall chain link fence with 1.2m inclined surface. It has 3 double gate entry points for entry, exit and emergency.

All the gates have electromechanically operated having manual and remote-control options. The entry and exit gates have watch towers and storage cabins.

The enclosure has been provided with 2 naturalistic ponds for water storage. Various wooden furnishings have been provided in enclosure for animal enrichments. The enclosure has 1 night shelter having 7 feeding cells and 2 kraals for off-exhibit animal holdings. Every kraal and feeding cell is also provided with wooden furniture and drinking water source as well. All cells are connected to each other and kraal for easy operations.



2.3.5. Indian Walking Trail

The Indian walking trail is the second component of the Phase 1 development of the BTGIZP, and this zone is currently under development and will be commissioned shortly.

India is a land of diverse fauna. However, due to a burgeoning human population leading to habitat fragmentation and loss, many of the biodiversity hotspots on the subcontinent are becoming more and more remote and inaccessible to the average layperson. As a consequence, zoos offer an opportunity to showcase biodiversity in a readily attainable manner. From this perspective, the species selection criteria on the Indian Walking Trail reflects the intent to demonstrate the range and array of this diversity in microcosm.

The species designated on the Trail are ones that the average Indian citizen is highly unlikely to see in the flesh due to their occurrence in distant habitats or else for the reason of their very secretive nature in the wild. Such difficult to get to creatures include conservation-dependent species such as the Rufous-necked Hornbill, Indian Desert Monitor Lizard and Nilgiri Langur; secretive and rarely-seen species include the Small-clawed Otter and Leopard.

The exhibits will follow several educational themes ranging from the conservation status of each species, through to its cultural significant in both ancient and modern Indian society, and also giving simple, easily understood messages about each species biology and factoids relating to its mode of existence. These smaller faunas will complement the larger species then on exhibit in the safari sections of the facility, and both will contribute to the exhibit of the array of Indian biodiversity.

The display methods incorporated follow CZA guidelines for design. The viewing structures along the Trail are designed to follow the Gond Village architectural theme.

The Desert Monitor Lizard and the Indian Rock Python are the first animals to be encountered. The otter is next with the path ramping down to view them underwater (from this point on, all exhibits with viewing structures have a bypass path which allows service vehicles in the form of electric carts to reach all exhibits).

At this point (on reaching the Nilgiri Langur) visitors can take a short cut to the tram stop or continue past the langurs. A footbridge crosses a stream cascading down the small hill on the right. The langur is fully moated. The Giant Squirrel, Hornbill, aviary and Leopard Cat follow in a circuit around the hill.

The Leopard exhibit has two viewing shelters separated by the Indian Mongoose. The two leopard views due to their spacing, different angle to the cage and with the mongoose between, will seem like two separate exhibits. Within the large galleries of leopard viewing there is a large glass display of Leopard exhibit. The Leopard is the last exhibit which allows people to easily revisit it after taking the Indian Safari ride.

The Gond village is at the entrance of Walking Zoo. The walking zoo having Indian animals are called Walking Trail. It has total 10 enclosures in traditional zoo set up. Following animals are displayed here in sequence.

We have tried to create a mosaic of different types of enclosure giving appropriate habitat and environmental requirements of the species. All enclosures are spacious having separate kraal, feeding cells and keeper galleries. All the enclosures have glass viewing themes.

Reptiles like Monitor Lizard, Python have been given basking windows in top in addition to natural substrate and natural vegetation. Otters have been made in consideration of amphibious habitat requirements of species with scope of underwater viewing. The Langur enclosure is a wet moat structure with sufficient natural vegetation on island and a closed viewing gallery.

1.	Leopard
2.	Malabar Pied Hornbill
3.	Desert Monitor
4.	Indian Rock Python
5.	Indian Giant Squirrel
6.	Leopard Cat
7.	Small-clawed Otter / Common Otter
8.	Nilgiri Langur / Hanuman Langur
9.	Indian Grey Mongoose

10.	Aviary
	• Rose-ringed Parakeet
	• Alexandrine Parakeet
	• Plum-headed Parakeet
	• Red-breasted Parakeet
	• Spotted Munia
	• Red Munia
	• Tricoloured Munia
	• White-throated Munia

Fig. 45: MLP section of the Indian Walking Trail

2.3.6. Gond Village

The Gond Village is a colourful and vibrant place which has a cluster of Gond village structures formed to resemble a village setting. All the structures are functional such as: an information centre; toilets; snack kiosks selling handheld held street food (no plastics or potential rubbish); retail stores selling Gond paintings and other artefacts; displays of Gond farming and village life artefacts; a small theatre (for a short standing show on Gond village life and man/animal conflicts); tram alighting and boarding shelters; a temple and some functional administrative/maintenance structures. Simple crops such as millet and village domestic animals are corralled here.

The Gond village is a welcome plaza for walking trail, and is part of Indian Safari, following components are involved.

There will be visitor facilities here such as drinking water, amphitheatre, toilet block, etc.
1) Bus Station (Pick-up & Drop) 2) Cafeteria
3) Toilet Block 4) Amphitheatre 5) Interpretation Centre

Fig. 46: Gond Art and Village examples (South Central Zone Cultural Centre, Nagpur)

2.3.7.Ticket Rates for the BTGIZP

Indian Safari	Weekdays	Weekend & Public Holidays	Discount for School trips	Discount for College trips
AC Bus	300	400	50%	25%
Non-AC Canter	200	300	Not applicable	Not applicable

2.3.8.Ticket Rates for Safari Jungle Drive

Entry Fees	Through Private Vehicle	For Gypsy Safari	Through Non-AC Canter
Vehicle Entry Fees	Rs. 500	Rs. 600	-
Per person charges	Rs. 100	Rs. 100	Rs. 200/ person
Vehicle Rental		Rs. 1200/ trip	-
Guide Charges (Mandatory)	Rs. 300	Rs. 300	-

Fig. 47 : Current Indian Safari Pick up & Drop Station

2.3.9. Rescue Center

FDCM established a Rescue center in 2015 at Gorewada for lifetime care and treatment facility to injured, orphaned and animals in conflict. It is the largest rescue facility in central India. The master plan was approved separately for development of this rescue facility in 2013 and it is operational since 2015. This facility is part of 1914 Hectares of Gorewada Reserve Forest and was first step towards vision of Gorewada Project.

FDCM formed an SPV as FDCM Gorewada Zoo Limited for establishment and operation of BTGIZP in 539 Ha. In 2019, this zoo situated on southern side of Gorewada Project received recognition. Both these facilities are operated under administration of Gorewada Project, FDCM.

In current master plan we are proposing to merge southern side of the project with the Northern side under banner of BTGIZP. This will facilitate better management and effective control of 1914 Ha.

2.3.10. Conservation and Education

The BTGIZP has carried out several initiatives and events to promote conservation education in the wider community and among visitors to the BTGIZP, in line with the mission of the BTGIZP. Such events have proved challenging during the Covid-19 Pandemic, however innovative means to do this through virtual events were carried out.

Moving forward into a post pandemic situation, the BTGIZP will continue and expand its efforts to carry out such activities. With a greater focus on activities that promote conservation efforts, thereby providing visitors to the BTGIZP an engagement and meaningful experience.

The following are some examples of such events that have been carried out:

Fig. 48: Introduction of the Talking Tree APP at BTGIZP

Balasaheb Thackeray Gorewada International Zoological Park, Nagpur;
Wildlife Rescue Centre, Gorewada Project, Nagpur
& Wildlife Research & Training Centre, Gorewada

celebrating

BIG BUTTERFLY MONTH 2021

Virtual Tour of BNHS Butterfly Museum

24th September, 2021, 02:00 PM (IST)

ISAAC DAVID KEHIMKAR
'Butterfly Man of India'
Retd. from BNHS as Deputy Director (Natural History)

BNHS Butterfly Museum

This is one of the important insect collections in India. Out of the 1500 species of butterflies found in India, around 730 species are present in the collection. The insects are preserved and stored in wooden boxes and cabinets. The collection was basis for the book 'Butterflies of Sikkim Himalayas' and 'The Book of Indian Butterflies.'

PRATHAMESH JOSHI, JRF
Natural History Collection Department, BNHS, M. Sc. Entomology, University of Mumbai

: JOIN THE VIRTUAL TOUR AT :

https://maharashtraforest.webex.com/maharashtraforest/j.php?MTID=m2476c4c9fa0331af6ca2b1589fec47c8

Meeting number: 2515 062 5654 | Password: 8ZCA4234

Organizers

Fig. 49 : Virtual Celebration of Big Butterfly Month

Fig. 50 : Celebration of World Forest Day

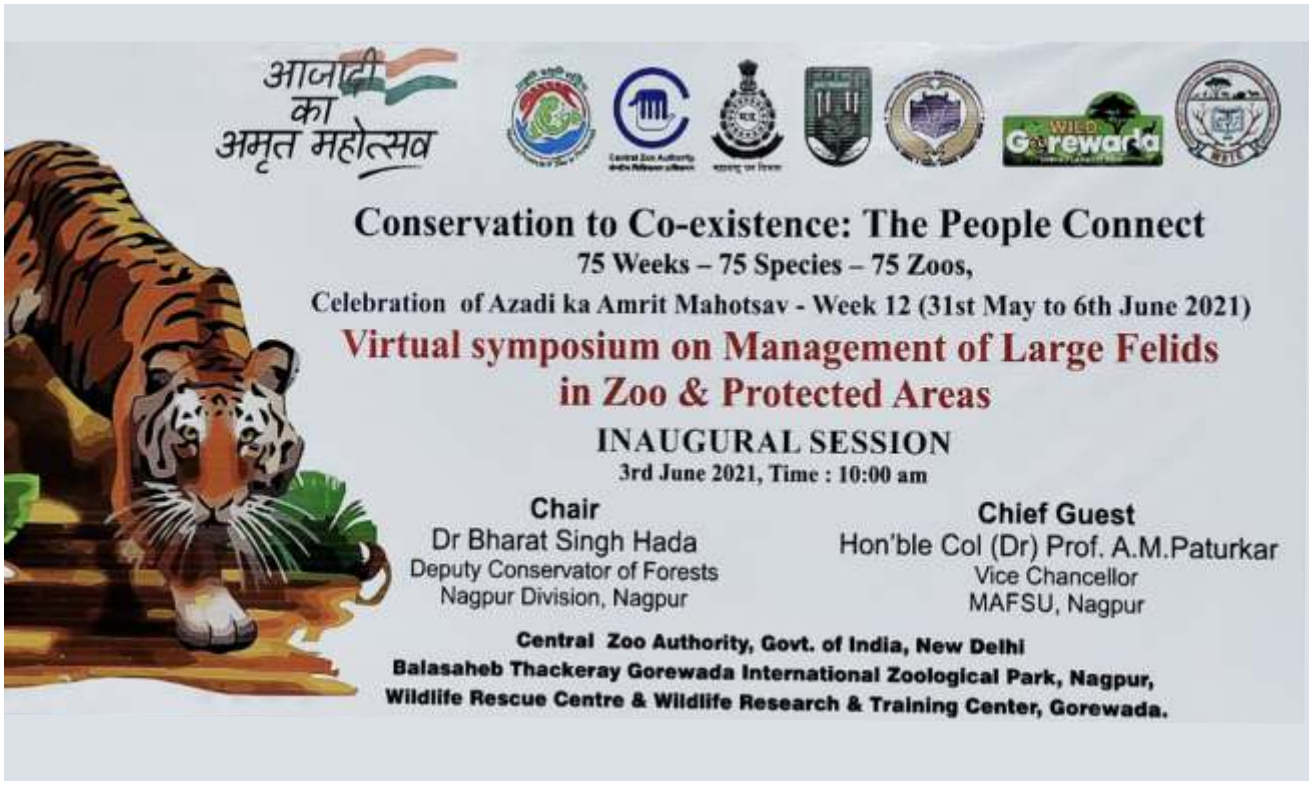


Fig. 51: Virtual Celebration of Big Butterfly Month

2.4. Management Challenges

Since its inception, the BTGIZP management has diligently monitored the operational aspects to ensure the smooth functioning of the facility. The primary focus of this monitoring has been on prioritizing animal welfare, providing visitors with a positive and enjoyable experience, and maintaining a high standard of health and safety of animals.

Animal welfare holds paramount importance in the BTGIZP operations. The management consistently monitors the well-being of the animals, ensuring that they are provided with appropriate habitats, nutrition, veterinary care, and enrichment activities to promote their physical and mental health. Regular assessments and evaluations are conducted to identify and address any issues or improvements needed to enhance animal welfare.

In parallel, the management places great emphasis on providing visitors with a memorable experience. They carefully monitor visitor feedback, assess visitor flow, and make necessary adjustments to enhance visitor engagement. This may involve improving exhibit design/ enrichments, introducing educational programs, organizing events, and ensuring the availability of amenities that contribute to a positive visitor experience.

By actively monitoring the operational situation, the BTGIZP management can address any challenges promptly and make informed decisions to optimize animal welfare, visitor experience, and health and safety standards. This diligent approach contributes to the overall success of the BTGIZP and reinforces its commitment to providing a safe, educational, and enjoyable environment for both animals and visitors.

The following are some key areas where management has identified key issue and are working toward corrective actions.

Area	Identified Issue	Corrective Action
Entrance Plaza	No waiting area / Shed area for visitors	A main entrance plaza is suitably designed having Waiting area as well as relevant amenities. The Management is also concerned to minimise waiting time of visitors for Safari. Alternative attractions and parallel activities are proposed in addition to safari. Baby feeding rooms are proposed.
	Require lawns and garden space with public access. Large paved areas in phase 1 restrict scope for plantation and natural green sheds.	The current entry point was designed as a temporary arrangement, in absence of bigger entry plaza. This gate has Parking lot, ticketing facility, a cafeteria and small administrative office. Lots of green areas and Garden spaces are proposed in New Entrance Plaza.
	Parking area has no shed or greenery.	A suitable provision for shed / greenery is considered in future development.
	Limited space for addressing children, education activities or public gathering.	An Open Amphitheatre, audio-visual hall and classrooms are proposed in Entrance Plaza.
	Limited and insufficient space for staff.	Office space from Rescue Centre is also used. Bigger Administrative section proposed in new plaza.
	High electricity demand for lightening and ventilation in existing buildings. Limited and insufficient space for staff	Green designing aspects are being considered in all New constructions that take advantage of natural light and ventilation whenever possible.

Area	Identified Issue	Corrective Action
Water Requirements	The current capacity of Reservoir is not sufficient to meet the future water requirements of the BTGIZP.	A proposal is under consideration for increasing the capacity of reservoir from 0.9MCM to 2.7MCM for addressing the water requirements. A dedicated water supply and treatment facility shall ensure clean water supply for zoo demands. Additionally, alternative options like Ground Water, supply from Municipal Water Supply scheme are also being explored.
	Hardwater- automatic flush and high-end branded fittings get clogged with salts in water. Stains from hardwater on floor and tiles.	Current water supply is dependent on ground water having very high TDS content. Hard water has reduced the life of fittings and fixtures. Water efficient or fittings are suggested in new toilet blocks. Alternative source of water with better Water Treatment Facility are being developed.
Indian Safari Operations	**Limited carrying capacity** Current carrying capacity: max 38-seater buses can operate at 10 min interval	Currently, Diesel buses having max 38-seater capacity are used for visitor movement in India Safari. Considering 10 bus max carrying capacity is about 2400 visitors per day. Improved ticketing System having online booking and advance booking facility has been implemented for better visitor management. **Options to increase carrying capacity :** Increase in number of tourists per bus by increasing length or use double decker bus are impractical in present situation due to dimensions of double door gate system. These gates will be redesigned in redevelopment for increase in visitor capacity.
	Animal Sighting & vegetation management	In absence of grazing in carnivore safari areas, grass and vegetation requires manual intervention to maintain sighting of animals. This is very expensive and labour-intensive activity. A habitat themed safari with free-ranging herbivores and floating islands of Carnivores in proposed to overcome this issue.
	Gate Operation: Gates are very heavy making them slow and high maintenance. S-gate design of leopard safari do not allow manual access in case of electric or mechanical failure.	Increasing speed is dangerous with heavy gates as the inertia may be fatal in case of an accident. Gate Need to be lighter in weight with better mechanical and manual control. The placement of door sensors and control measures require improvements to avoid accidents.

Area	Identified Issue	Corrective Action
	Vegetation in Indian Safari: The existing vegetation on site is of thorny dry deciduous scrub type. It gives very dry look during summer. Previous plantations did not give good results due to poor soil quality and lack of irrigation facility.	Apart from animal requirements, Aesthetic appeal of site is compromised. Plantations are proposed as per the habitat theme with appropriate Soil Moisture Conservation (SMC) measures and artificial irrigation facilities, as required. New plantations are planned with larger pits filled with good garden soil and irrigation facilities.

2.5. Other Components

As a majority of the BTGIZP has not been developed, details of the current assessment on those areas is not possible at this stage.

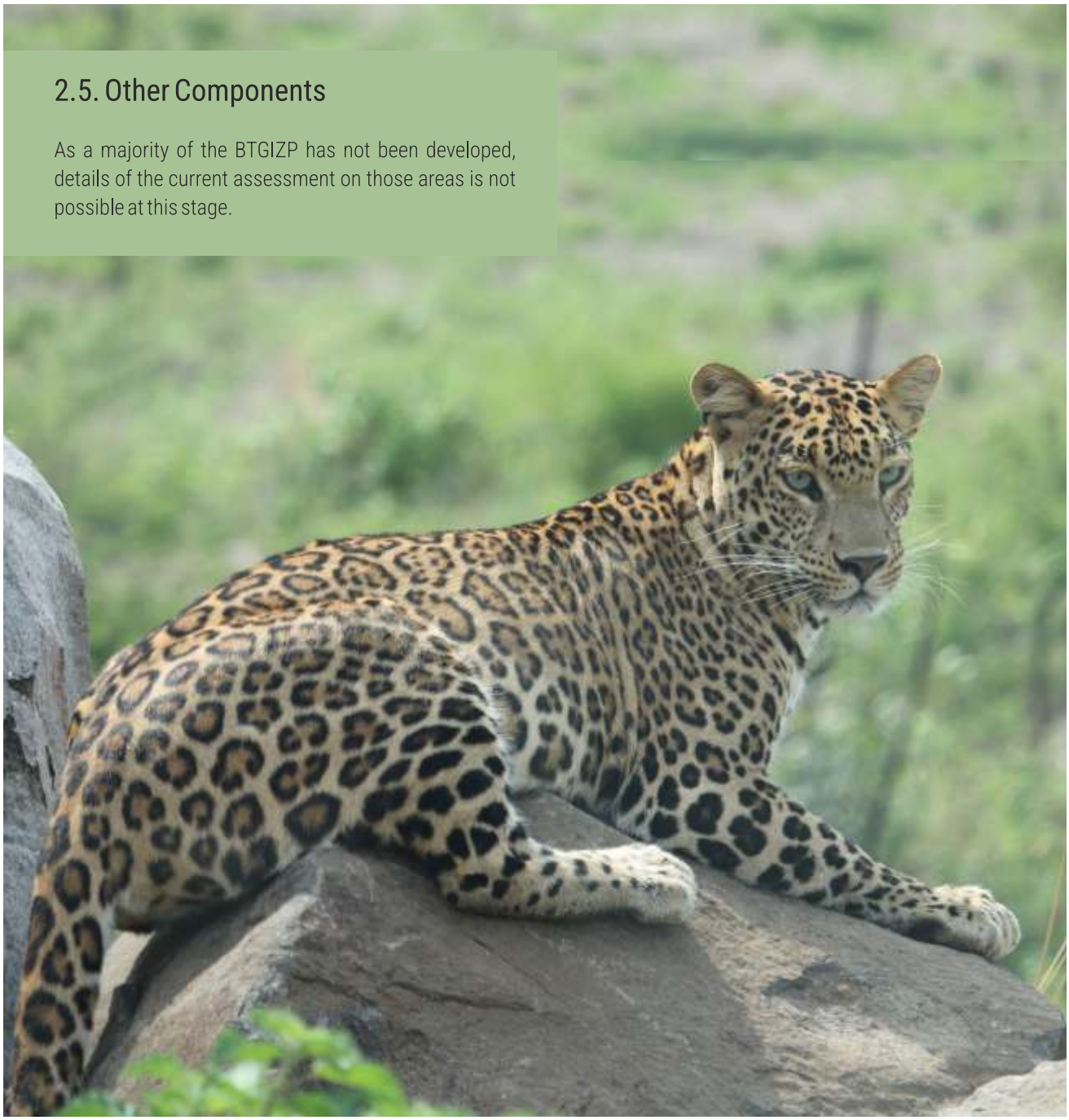


Fig. 52: Leopard in safari

2.6. Current Animal Collection

Endangered Species * # - Modified Closing Balance

Sr. No.	Animal Name	Scientific Name	Opening Stock (01-Apr-2022)				Births		
			M	F	U	T	M	F	U
Aves									
1	Golden Pheasant	*Chrysolophus tietus*	0	0	0	0	0	0	0
2	Red Junglefowl	*Gallus gallus*	0	0	0	0	0	0	0
3	Silver Pheasant	*Lophura nyethemera*	0	0	0	0	0	0	0
Total Aves	3		0	0	0	0	0	0	0
Mammalia									
1	Chital Spotted Deer	*Axis axis*	2	3	2	7	0	0	4
2	Nilgai	*Boselaphus tragocamelus*	7	7	3	17	0	0	4
3	Indian Muntiacus	*Muntjak*	6	10	2	18	0	0	0
4	Sambar Deer	*Rusa uncolor*	4	3	0	7	0	1	0
Total Mammalia	4		19	23	7	49	0	1	8
Total			19	23	7	49	0	1	8
Grand Total			39	52	11	102	2	4	12

Endangered Species * # - Modified Closing Balance

Sr. No.	Animal Name	Scientific Name	Opening Stock (01-Apr-2022)				Births		
			M	F	U	T	M	F	U
Mammalia									
1	Black Buck	*Antilope cervicapra*	4	6	0	10	0	0	2
2	Black Buck (leucistic/White)	*Antilope cervicapra*	3	6	4	13	0	0	0
3	Indian Jackal	*Canis aureus indicus*	1	2	0	3	0	0	0
4	Indian Frey Mongoose	*Herpestes edwardsi*	0	0	0	0	0	0	0
5	Sloth Bear	*Melursus ursinus*	3	3	0	6	0	0	0
6	Leopard	*Panthera pardus*	2	5	0	7	1	1	0
7	Bengal Tiger	*Panthera tigris tigris*	1	1	0	2	1	2	0
8	Asian Palm Civet	*Paradoxurus hermaphroditus*	0	0	0	0	0	0	0
9	Eld's Deer (Brow-antiered Deer)	*Rucervus eldi*	4	4	0	8	0	0	2
10	Bengal Fox	*Vulpes bengalensis*	2	2	0	4	0	0	0
Total Mammalia	10		20	29	4	53	2	3	4
Reptillia									
1	Reticulated python	*Malayopython reticulatus*	0	0	0	0	0	0	0
Total Reptillia	1		0	0	0	0	0	0	0
Total			20	29	4	53	2	3	4

**Animal under Sch-I and Sch-II of Wild Life (Protection) Act, 1972*

Acquisitions			Disposals			Deaths			Closing Stock (31-Mar-2023)			
M	F	U	M	F	U	M	F	U	M	F	U	T
2	2	0	0	0	0	0	0	0	2	2	0	4
2	2	0	0	0	0	0	0	0	2	2	0	4
2	2	0	0	0	0	0	0	0	2	2	0	4
6	6	0	0	0	0	0	0	0	6	6	0	12
0	0	0	0	0	0	0	0	0	2	5	4	11
0	0	0	2	2	0	0	0	0	5	5	7	17
0	0	0	0	0	0	0	0	0	6	10	2	18
1	0	0	0	0	0	0	0	0	5	4	0	9
1	0	0	2	2	0	0	0	0	18	24	13	55
7	6	0	2	2	0	0	0	0	24	30	13	67
14	13	0	4	4	0	5	5	0	47	62	20	129

Acquisitions			Disposals			Deaths			Closing Stock (31-Mar-2023)			
M	F	U	M	F	U	M	F	U	M	F	U	T
0	0	0	0	0	0	1	0	0	3	6	2	11
0	0	0	2	2	0	2	0	0	0	4	3	7
0	0	0	0	0	0	0	1	0	1	1	0	2
2	2	0	0	0	0	0	0	0	2	2	0	4
0	0	0	0	0	0	0	0	0	3	3	0	6
0	0	0	0	0	0	1	2	0	2	4	0	6
0	0	0	0	0	0	1	2	0	1	1	0	2
2	2	0	0	0	0	0	0	0	2	2	0	4
0	0	0	0	0	0 0	0	0	0	4	4	2	10
0	0	0	0	0		0	0	0	2	2	0	4
4	4	0	2	2	0	5	5	0	20	29	7	56
3	3	0	0	0	0	0	0	0	3	3	0	6
3	3	0	0	0	0	0	0	0	3	3	0	6
7	7	0	2	2	0	5	5	0	23	32	7	62

Sungai, or Malayan tapirs, are intriguing nocturnal animals native to the forests and grasslands of Southeast Asia. At Gorewada, they are part of the conservation efforts to protect this endangered species and provide education about their habitat and behavior.

Part:2

CHAPTER : 3

03

Future Objectives Vision and Mission

Objectives

This BTGIZP will serve purpose of the conservation of the rich bio-diversity of the central India along with the following objectives:

1. Promote wildlife conservation (Undertaking breeding program of endangered species and releasing them into wild).
2. Care and rehabilitation of injured, sick and orphan wild animals.
3. To collect and collate the scientific data on the biology, behaviour and health care of various species of wild animals housed in the BTGIZP and use the same in future management of the BTGIZP.
4. To assist in conservation of the in-situ population of various species of endangered animals and their habitat by sensitizing the people.
5. To promote research and education on wildlife conservation
6. To create amongst the visitor's empathy towards wild animals through appreciation and better understanding.
7. To promote international eco-tourism.
8. To create the opportunities of employment / self-employment.

All these objectives must be achieved without compromise to any individual of any species in the collection

Strategy to achieve the objectives

Ex-situ Conservation: This BTGIZP will display a variety of endemic and exotic species which will be provided more than the minimal standards of space and facilities specified by CZA for movement and an appropriate diet for their health, breeding and longevity. Special care will be taken to enrich the exhibits to check the boredom and ensure a well-rounded behavioral environment.

Education and awareness

In order to achieve the objectives, an Education Department will be created in the park with adequate teachers and infrastructure such as an interpretation center, (which contains classrooms, a theatrette and eco-garden) environmental educational programs, published material and audio-visuals.

The BTGIZP will develop an education and awareness program as under: -

1. To develop static and interactive ways to dispense environmental educational information to students and visitors
2. This will be in the form of signs, graphics, video and interactive computer terminals and video mini-theatrettes, located in logical and prominent places around the parks
3. To conduct guided tour, organize lectures, talks and competitions.
4. To publish guidebook, brochures, guide map & leaflets about the BTGIZP and its inmates.
5. To organize orientation programs for the selected groups.
6. To conduct various competitions on the eve of wildlife week and other specific days.

Research on wildlife

The BTGIZP offers ample opportunities for conducting research on wild life in captivity. For that a research section will be created with adequate staff & infrastructure. The section will be responsible to conduct research in ex-situ and in-situ conditions and also interact with other institutes for collaboration in formulation and conducting research. The probable research projects that can be taken up are as under:

The probable research projects that can be taken up are as under

1. Reproductive biology, Food and Nutrition, Habitat, Diseases and Cures, Physiology and Genetics.
2. Flora of the park and adjoining area.
3. Fauna of the BTGIZP and its surrounding area.
4. Breeding behaviour of endangered species.
5. To study the parasites of the BTGIZP animals.
6. To identify the medicinal plants & their advantages.
7. Population behaviour in safaris.
8. Pure and applied research of endemic species.

Recreation and Education

The BTGIZP aims to serve as an ecological recreation centre and expected to attract tourists from Vidarbha region offering a wholesome family-based infotainment.

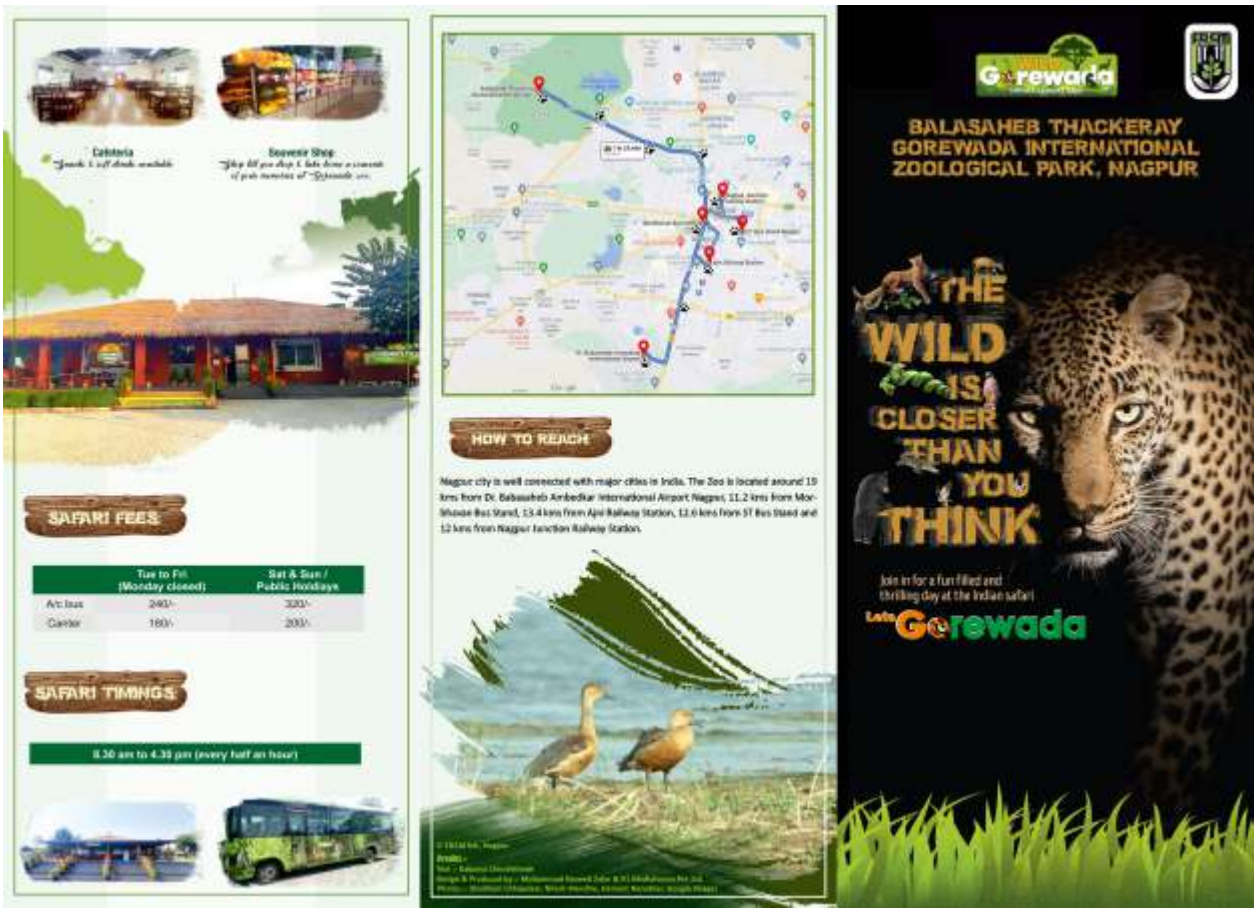


Fig. 53 : Zoo's Brochure for Visitors

Visitor Comfort

Visitors are guests are treated as such. The following amenities will be added to ensure that guests are made to feel welcome:

1. Adequate visibility and interpretation of the exhibits
2. Clean and sufficient toilets with handicapped and baby care facilities.
3. Sufficient garbage bins and a high standard of ground maintenance
4. Sufficient rain shelters and shade along walking trails with trees in the car park for beautification and to provide shade
5. Sufficient water drinking fountains
6. Ramps instead of steps for strollers and wheelchairs
7. Landscape and sheltered open-spaces for picnics
8. Food and beverage (F&B) and retail outlets selling affordable merchandize in the BTGIZP areas

Fig. 54 : Cafeteria at Gorewada Zoo Indian Safari

The natural streams flowing through Gorewada enrich the park's landscape, creating picturesque settings and sustaining the diverse ecosystems within. These streams add to the park's charm, offering visitors scenic spots for relaxation and nature appreciation.

Part:2

CHAPTER : 4

04

Future action plan

4.1. Future Planning

The future planning is aimed at providing directions for development of the BTGIZP, Nagpur for 20 years from i.e., 2022-23 to 2042-2043 and will be reviewed after 10 years. The proposal of development is based on the site requirements, visitors' profile, and availability of water, electricity, vegetation, climatic conditions, and resources available with the management.

The guidelines of CZA and advice from zoo experts have been taken into consideration in the formulation of the action plan. The development has been planned to keep in view the strategy to achieve the prescribed objectives.

4.1.1. Design Approach

The BTGIZP at Gorewada is proposed to be of international standards and will follow world's-best-practice in zoo design at par with other world's renowned Zoos (like Singapore Zoo & Night Safari; Wildlife Conservation Society (Bronx Zoo, New York), San Diego Zoo Wildlife Alliance (which operates San Diego Zoo and San Diego Safari) and Hamburg Zoo, Germany, etc.) in terms of visitor's experience, exhibit display, animal management, park management, visitor's facilities, etc. Key criteria will be followed, including but not limited to:

The biological needs of the animals: Environments will be created that reflect the habitat of the species being displayed. The essential elements of suitably abundant space, appropriate landscape forms and natural vegetation will provide an engaging context for animal lives. The comfort and well-being of the animals will be the paramount concern, providing the foundation upon which the other essential elements of aesthetic and educational value and operational efficiency are built. Support facilities for animals will be focused on the professional delivery of their daily care and welfare and will use materials and designs that provide utility and comfort for animals as well as ease and efficiency for animal care staff

The exciting engagement of BTGIZP visitors: Exhibits will be grouped according to engaging themes. Exhibits will be designed and arranged to immerse visitors in simulated natural landscapes, using the elements of natural vegetation and apparent

landforms to define exhibit areas, to contain animals and to present an authentic experience of natural habitats and the way of life followed by each species. The focus will be on creating inherently educational settings that provide multiple opportunities for education, conservation, cultural awareness, and art works of quality.

The appreciation and utilization of the animals and their exhibits as a conservation resource: Exhibit-support facilities will be designed to support animal populations that directly contribute to breeding programs recognized by the Central Zoo Authority. This will require the selective creation of support facilities in which numbers of animals may be held for breeding purposes. These support facilities will meet the biological needs of animals to the same quality and standard as the exhibit displays, ensuring the health and well being of all of the animals in the BTGIZP.

Sound environmentally sustainable design: Exhibits will be designed to minimize the ongoing use of energy and natural resources in their daily operation. Durable materials, the potential for future recycling, from sustainable sources, will be used wherever possible. The emphasis will be away from architectural statements and grand designs towards sympathetic, naturalistic structures and forms that reflect the landscapes and natural history of India. Renewable energy sources will be employed wherever practical. The carbon footprint of the BTGIZP will be minimized and its exemplary approach to environmental sustainability will, in itself, be openly featured.

The aesthetic integrity of the entire development: Everywhere the aim of the design will be to create a sense of harmony and unity of design. Discordant functional elements will be hidden. Fences, barriers, rooflines and all structural elements will harmonize with the naturalistic exhibits.

Operational efficiency and life-span issues: Designs will be focused on ease of access for regular maintenance, replacement of components and future deconstruction of recycling and alternative use. It is a hallmark of progressive zoos that they change and evolve continuously. This will be recognized in the design of all facilities.

Fig. 55 : Aerial view of Indian Safari in BTGIZP

4.2. Animal collection plan

The BTGIZP aims to display animals, keeping in view the local habitat, climatic conditions and the resources available. The required local and exotic animal species as per the below list will be procured through Animal Exchange Program from Indian Zoos, with exotic species not available in Indian Zoos to be procured from foreign Zoos. As per the revised guidelines for species composition in Animal Collection Plan of zoos recognized by the Central Zoo Authority issued by CZA vide Office Memorandum number 7-7/2020-CZA, Computer No. 135325, dated 04.11.2020, will be followed while acquisition of animal in Phase II. Following proportions of exotic and indigenous species will be maintained during acquisition of animal. It is also proposed to offer memberships to interested agencies or individuals for sponsoring the animal feed.

1) Species of local area / ecosystem	75% of the total sp. displayed.
(2) Species of region	
(3) Species of nation	
(4) Exotic species displayed	Not more than 25% of the total sp.

The animal collection plan of the BTGIZP has been prepared exhibit wise which will give clear picture of the animal life there. Animal Enclosures are design to ensure that the natural habitat of the individual species is simulated as closely as possible, and no compromise is made in the welfare of the individual animals.

4.2.1. Acquisition

Animal acquisition for a project of this size, nature and time-scale is a highly specialized undertaking. It requires the deployment of a full-time dedicated, appropriately-capacitated and empowered animal acquisition specialist. Such a specialist is characterized by the following attributes:

- a requisite background of knowledge of local Indian zoo procedures and policies;
- collegial relationships with personnel within the Central Zoo Authority (CZA) and also within the Indian zoo community at large;
- an effective communicator with demonstrable social skills;
- highly self-motivated, enjoys travel and can operate in stressful circumstances;
- significant general knowledge of the natural sciences and ethics;
- fluent in idiomatic English and has travelled outside of India;
- Ideally, also have collegiate relationships with personnel in foreign zoos.

The current projected collection plan for the project incorporates mostly indigenous Indian species of wildlife, although 20% of the collection will consist of exotic, non -Indian species. Of these many will be of African in origin (African Zoo and African Walk-in Aviary) but animals originating from South America, Australia, South East Asia will also be sourced.

4.2.2. Local Indian Species

Most of the indigenous species will be acquired within India from Indian Zoos, according the tenants of the Indian Wildlife (Protection) Act, 1972 and under the guidelines of the Central Zoo Authority (CZA).

The CZA produces an annual inventory of all animals in Indian Zoos (Annual Inventory Report), copies of which may be

downloaded from www.cza.nic.in consultation of the inventory will indicate which Indian Zoos have what species, and their numbers and sexes. It will designate which zoos are likely to have any surplus of species and provide a starting point for their potential transfer to BTGIZP.

The Curator (Animal Acquisitions) will directly liaise with the concerned Zoo and develop a dialogue with them to secure the required animals in terms of CZA regulations and procedures. It should be noted that very often, particularly for high profile species, this will entail travelling to those zoos to initiate such discourse in person. The Curator (Animal Acquisitions) will appropriately authorize and funded to carry out this effectively.

However, Several species in the collection plan, with especial reference to the other phases of development, following Phase One, will entail the acquisition of lower vertebrate and invertebrate fauna such as fish, amphibians, and invertebrates (insects - butterflies, spiders, beetles, molluscs and crustaceans). This will require a different approach as for the most part, most of these are not usually maintained in public Indian zoos, butterfly parks, public aquariums or Government Fisheries Departments and university collections. Sustainable, pioneer, breeding colonies of some species of these lower vertebrates and invertebrates will have to be set up by the BTGIZP.

Four in particular are the most important:

1. The World Association of Zoos and Aquariums (WAZA), www.waza.org
2. The South East Asian Zoos Association (SEAZA), www.seaza.asia
3. The Association of Zoos and Aquariums (AZA), www.aza.org
4. The European Association of Zoos and Aquariums (EAZA), www.eaza.net

4.2.3. Non-Indian, Exotic Species

The acquisition of other non-Indian and exotic species will be done via overseas zoos and will be predicated upon developing relationships with the senior management of foreign zoos. The best method of doing this will be to attend regional zoo association meetings in different parts of the world.

Developing such professional relationships does not happen overnight and the international transfer of animals is complex one with significant lead-in times. It is therefore important for the Zoo Director to attend these meetings as soon as possible, possibly giving presentations on the project at the conferences, to acquaint the international zoo community with the facility and its aims. The CZA usually sends high-ranking personnel to the annual conferences of these associations, so it may be possible to liaise with the CZA for appropriate introductions and establishment of bona-fides.

Proposed Animal Collection Plan

Zone	Exotic	Indian	Total
Indian Safari	0	35	35
African Zoo	28	0	28
Bio Park	11	146	157
Gondwana Park	39	33	72
Night Safari	1	24	25
Trail of Senses	4	23	27
Total	82	258	343
Species Ratio	23%	77%	

Proposed Animal Collection Plan

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Indian Safaris													
Arid India - Safari													
Asiatic lion	*Panthera leo persica*	0	0	4	22	1	3	0	4	1	3	0	4
Blackbuck	*Antilope cervicapra*	8	10	0	0	4	8	0	12	-4	-2	-4	-10
Chinkara	*Gazella bennettii*	0	0	0	0	2	4	0	6	2	4	0	6
Indian Wild Ass	*Equus hemionus khur*	0	0			3	5	0	8	3	5	0	8
Indian Wolf	*Canis lupus pallipes*					1	3	0	4	1	3	0	4
Nilgai	*Boselaphus tragocamelus*	8	7	12	27	6	12	0	10	-2	5	-12	-17
Striped Hyena	*Hyaena hyaena*									0	0	0	0
Central India - Safari													
Hard-ground Barasingha	*Rucervus duvaucelii branderii*					2	4	0	6	2	4	0	6
Barking Deer	*Muntiacus muntjak*	5	9	3	17	2	4	0	6	-3	-5	-3	-11
Bengal Tiger	*Panthera tigris tigris*	1	1	0	2	1	1	0	2	0	0	0	0
Chital	*Axis axis*	5	6	4	15	5	5	0	10	0	-1	-4	-5
Chowsingha/ Four horned Antelope	*Tetracerus quadricornis*					2	4	0	6	2	4	0	6
Dhole	*Cuon alpinus*					1	1	0	2	1	1	0	2
Indian Gaur	*Bos gaurus*					1	2	0	3	1	2	0	3
Nilgai	*Boselaphus tragocamelus*	8	7	12	27	4	8	0	12	-4	1	-12	-15
Sambar	*Rusa unicolor*	5	4	1	10	5	5	0	10	0	1	-1	0
Sloth Bear	*Melursus ursinus*	3	3	0	6	2	2	0	4	-1	-1	0	-2
Wild Boar	*Sus scrofa*	4	6	0	10	3	6	0	9	-1	0	0	-1
Ganges - Safari													
Swamp Barasingha	*Rucervus duvaucelii*					2	3	0	5	2	3	0	5
Gharial	*Gavialis gangeticus*					2	3	0	5	2	3	0	5
Goral	*Naemorhedus goral*					1	3	0	4	1	3	0	4
Mishmi Takin	*Budorcas taxicolor*					1	3	0	4	1	3	0	4
Himalayan Tahr	*Hemitragus jemlahicus*					1	3	0	4	1	3	0	4
Himalayan Black Bear	*Ursus thibetanus laniger*					1	1	0	2	1	1	0	2
Hog deer	*Axis porcinus*					4	8	0	12	4	8	0	12
Indian Rhinoceros	*Rhinoceros unicornis*					2	2	0	4	2	2	0	4
Manipur Brow antlered deer	*Rucervus eldii*	5	6	0	11	4	6	0	10	-1	0	0	-1
Northern Pig-tailed Macaque	*Macaca leonina*					2	3	0	5	2	3	0	5
Water Buffalo	*Bubalus arnee*					2	3	0	5	2	3	0	5

The highlighted species will be free ranging and share common enclosures.

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Indian Safaris													
Western Ghats - Safari													
Bengal Tiger	*Panthera tigris tigris*	1	1	0	2	1	2	0	3	0	1	0	1
Chital	*Axis axis*	5	6	4	15	2	8	0	10	-3	2	-4	-5
Barking Deer	*Muntiacus Muntjack*	5	9	3	17	5	5	0	10	0	-4	-3	-7
Gaur	*Bos gaurus*					1	2	0	3	1	2	0	3
Leopard (Black)	*Panthera pardus*					1	1	0	2	1	1	0	2
Marsh Crocodile	*Crocodylus palustris*					2	3	0	5	2	3	0	5
Nilgiri Langur	*Trachypithecus johnii*					2	3	0	5	2	3	0	5
Nilgiri Tahr	*Nilgiritragus hylocrius*					2	3	0	5	2	3	0	5
Sambar	*Rusa unicolor*	5	4	1	10	2	8	0	10	-3	4	-1	0
Walking Trail													
Monitor Lizard	*Varanus benghalensis*					2	2	0	4	2	2	0	4
Malabar Giant Squirrel	*Ratufa indica*					1	1	0	2	1	1	0	2
Indian Grey Mongoose	*Herpestes edwardsi*	2	2	0	4	2	2	0	4	0	0	0	0
Indian Rock Python	*Python molurus*					0	0	6	6	0	0	6	6
Leopard	*Panthera pardus*	2	4	3	9	2	2	0	4	0	-2	-3	-5
Leopard Cat	*Prionailurus bengalensis*					1	1	0	2	1	1	0	2
Hanuman Langur	*Semnopithecus entellus*					2	3	0	5	2	3	0	5
Great Hornbill	*Buceros bicornis*					1	1	0	2	1	1	0	2
Small-clawed Otter	*Aonyx cinereus*					2	3	0	5	2	3	0	5
Spotted Munia	*Lonchura punctulata*					5	5	0	10	5	5	0	10
Tricoloured Munia	*Lonchura malacca*					5	5	0	10	5	5	0	10
White-throated Munia	*Euodice malabarica*					5	5	0	10	5	5	0	10
Baya Weaver	*Ploceus philippinus*					5	5	0	10	5	5	0	10
Red headed bunting	*Emberiza bruniceps*					5	5	0	10	5	5	0	10
Spot-billed Duck	*Anas poecilorhyncha*					2	2	0	4	2	2	0	4
Sarus Crane	*Grus antigone*					2	2	0	4	2	2	0	4
Red Munia	*Amandava amandava*					5	5	0	10	5	5	0	10
Painted Stork	*Mycteria leucocephala*					3	3	0	6	3	3	0	6
African Zoo													
Kopje Walk													
Ring Tailed Lemur	*Lemur catta*					2	4	0	6	2	4	0	6
Vervet Monkey	*Chlorocebus pygerythrus*					2	3	0	5	2	3	0	5
Klipspringer	*Oreotragus oreotragus*					2	3	0	5	2	3	0	5
Naked Mole Rat	*Heterocephalus glaber*					2	1	9	12	2	1	9	12
Banded Mongoose	*Mungos mungo*					2	4	0	6	2	4	0	6
Serval	*Leptailurus serval*					1	1	0	2	1	1	0	2
African Wild Dog	*Lycaon pictus*					2	3	0	5	2	3	0	5

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
African Zoo													
Kopje Walk													
Barbary Sheep	*Ammotragus lervia*					2	4	0	6	2	4	0	6
Meerkat	*Suricata suricatta*					2	4	0	6	2	4	0	6
Rock Hyrax	*Procavia capensis*					2	3	0	5	2	3	0	5
Southern Ground Hornbill	*Bucorvus leadbeateri*					1	1	0	2	1	1	0	2
Savannah													
Common Eland	*Taurotragus oryx*					2	4	0	6	2	4	0	6
Blue Wildebeest	*Connochaetes taurinus*					3	5	0	8	3	5	0	8
Burchell's Zebra	*Equus quagga burchellii*					1	4	0	5	1	4	0	5
Gemsbok	*Oryx gazella*					2	4	0	6	2	4	0	6
Giraffe	*Giraffa camelopardalis*					2	2	0	4	2	2	0	4
Impala	*Aepyceros melampus*					3	5	0	8	3	5	0	8
Kudu	*Tragelaphus strepsiceros*					2	4	0	6	2	4	0	6
Ostrich	*Struthio camelus*					3	3	0	6	3	3	0	6
Hippopotamus	*Hippopotamus amphibius*					2	2	0	4	2	2	0	4
White Rhinoceros	*Ceratotherium simum*					1	3	0	4	1	3	0	4
Red River Hog	*Potamochoerus porcus*					2	3	0	5	2	3	0	5
Patas Monkey	*Erythrocebus patas*					2	3	0	5	2	3	0	5
African Lion	*Panthera leo*					2	2	0	4	2	2	0	4
Chimpanzee	*Pan troglodytes*					2	2	0	4	2	2	0	4
Spotted Hyena	*Crocuta crocuta*					2	2	0	4	2	2	0	4
Hamadryas Baboon	*Papio hamadryas*					2	3	0	5	2	3	0	5
Cheetah	*Acinonyx jubatus*					1	1	0	2	1	1	0	2
Biopark													
Aquarium (Godavari River)													
Asian Stinging Catfish	*Heteropneustes fossilis*									0	0	10	10
Barilius	*Barilius bendelisis*									0	0	10	10
Bronze Featherback	*Notopterus notopterus*									0	0	10	10
Butter Catfish	*Ompok bimaculatus*									0	0	10	10
Deccan Mahseer	*Tor khudree*									0	0	10	10
Deccan Rita	*Rita kuturnee*									0	0	10	10
Dussumier's Catfish	*Clarias dussumieri*									0	0	10	10
Elongate Glassy Perchlet	*Chanda nama*									0	0	10	10
Gangetic Mystus	*Mystus cavasius*									0	0	10	10
Giant Danio	*Danio aequipinnatus*									0	0	10	10
Helicopter Catfish	*Wallago attu*									0	0	10	10
Humpback Mahseer	*Tor mussullah*									0	0	10	10
Ilish	*Tenualosa ilisha*									0	0	10	10

The highlighted species will be free ranging and share common enclosures.

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Biopark													
Aquarium (Godavari River)													
Indian Flying Barb	*Esomus danricus*							10	10	0	0	10	10
Indian Glassy Fish	*Parambassis ranga*							10	10	0	0	10	10
Major Carp	*Catla catla*							10	10	0	0	10	10
Mola Carplet	*Amblypharyngodon mola*							10	10	0	0	10	10
Mountain Catfish	*Glyptothorax lonah*							10	10	0	0	10	10
Mrigal Carp	*Cirrhinus cirrhosus*							10	10	0	0	10	10
Nilgiri Garra	*Garra gotyla stenorhynchus*							10	10	0	0	10	10
Orangefin Labeo	*Labeo calbasu*							10	10	0	0	10	10
Pool Barb	*Puntius sophore*							10	10	0	0	10	10
Rohu	*Labeo rohita*							10	10	0	0	10	10
Sind Danio	*Devario devario*							10	10	0	0	10	10
Snakehead	*Channa marulius*							10	10	0	0	10	10
Stone Loach	*Indoreonectes evezardi*							10	10	0	0	10	10
Swamp Barb	*Puntius chola*							10	10	0	0	10	10
Tank Goby	*Glossogobius giuris*							10	10	0	0	10	10
Ticto Barb	*Puntius ticto*							10	10	0	0	10	10
Tiretrack Eel	*Mastacembelus armatus*							10	10	0	0	10	10
White Catfish	*Silonia childreni*							10	10	0	0	10	10
Aviary													
Rose-ringed Parakeet	*Psittacula krameri*					5	5	0	10	5	5	0	10
Golden pheasant	*Chrysolophus pictus*	2	2	0	4	2	2	0	4	0	0	0	0
Silver pheasant	*Lophura nycthemera*	2	2	0	4	2	2	0	4	0	0	0	0
Red jungle fowl	*Gallus gallus*	2	4	0	4	2	2	0	4	0	-2	0	0
Grey jungle fowl	*Gallus sonneratii*					2	2	0	4	2	2	0	4
Lady amherst's pheasant	*Chrysolophus amherstiae*					2	2	0	4	2	2	0	4
Ring neck pheasant	*Phasianus colchicus*					2	2	0	4	2	2	0	4
Reeves's Pheasant	*Syrmaticus reevesii*					2	2	0	4	2	2	0	4
Butterfly House													
Blue Bottle	*Graphium sarpedon*					1	1	0	2	10	10	0	20
Blue Mormon	*Papilio polymnestor*					1	1	0	2	10	10	0	20
Blue Tiger	*Trimala limniace*					1	1	0	2	10	10	0	20
Brown Awl	*Badamia exclamationis*					1	1	0	2	10	10	0	20
Common Castor	*Ariadne merione*					1	1	0	2	10	10	0	20
Common Crow	*Euploea core*					1	1	0	2	10	10	0	20
Common Emmigrant	*Catopsilia pomona*					1	1	0	2	10	10	0	20
Common Gull	*Cepora nerissa*					1	1	0	2	10	10	0	20
Common Jay	*Graphium agamemnon*					1	1	0	2	10	10	0	20

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Biopark													
Butterfly House													
Common Jezebel	*Delias eucharis*					1	1	0	2	10	10	0	20
Common Leopard	*Phalanta phalanta*					1	1	0	2	10	10	0	20
Common Mime	*Papilio clytia*					1	1	0	2	10	10	0	20
Common Mormon	*Papilio polytes*					1	1	0	2	10	10	0	20
Common Pierrot	*Castalius rosimon*					1	1	0	2	10	10	0	20
Common Rose	*Pachliopta aristolochiae*					1	1	0	2	10	10	0	20
Common Sailor	*Neptis hylas*					1	1	0	2	10	10	0	20
Common Wanderer	*Pareronia valeria*					1	1	0	2	10	10	0	20
Crimson Tip	*Colotis danae*					1	1	0	2	10	10	0	20
Giant Redeve	*Gangara thyrsis*					1	1	0	2	10	10	0	20
Grass Yellow	*Eurema hecabe*					1	1	0	2	10	10	0	20
Indian Skipper	*Spialia galba*					1	1	0	2	10	10	0	20
Lime Butterfly	*Papilio demoleus*					1	1	0	2	10	10	0	20
Malabar Tree Nymph	*Idea malabarica*					1	1	0	2	10	10	0	20
Mottled Emmigrant	*Catopsilia pyranthe*					1	1	0	2	10	10	0	20
Pioneer	*Anaphaeus aurota*					1	1	0	2	10	10	0	20
Plain Tiger	*Danaus chrysippus*					1	1	0	2	10	10	0	20
Psyche	*Leptosia nina*					1	1	0	2	10	10	0	20
Red Pierrot	*Talicada nyseus*					1	1	0	2	10	10	0	20
Sport Sword Tail	*Graphium nomius*					1	1	0	2	10	10	0	20
Spotless Grass Yellow	*Eurema laeta*					1	1	0	2	10	10	0	20
Striped Tiger	*Danaus genutia*					1	1	0	2	10	10	0	20
Tawny Costa	*Acraea violae*					1	1	0	2	10	10	0	20
Three Spot Grass Yellow	*Eurema blanda*					1	1	0	2	10	10	0	20
White Orange Tip	*Ixias marianne*					1	1	0	2	10	10	0	20
Yellow Orange Tip	*Ixias pyrene*					1	1	0	2	10	10	0	20
Deep Time Trail													
African Lungfish	*Protopterus annectens*					0	0	6	6	0	0	6	6
Giant Indian Millipede	*Archispirostreptus sp*							20	20	0	0	20	20
Horseshoe Crab	*Limulus sp*							10	10	0	0	10	10
Indian Soft-shelled Turtle	*Nilssonia gangetica*					4	6	0	10	4	6	0	10
Cockroach	*Gromphadorhina portentosa*								50	0	0	0	50
Magpie Goose	*Anseranas semipalmata)*					2	4	0	6	2	4	0	6
Insectarium													
Blue Ornamental Tarantula	*Poecilotheria metallica*							4	4	0	0	4	4
Desert Locust	*Schistocerca gregaria*							10	10	0	0	10	10
Giant Forest Scorpion	*Heterometrus swammerdami*							4	4	0	0	4	4

The highlighted species will be free ranging and share common enclosures.

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Biopark													
Insectarium													
Gray's Leaf Insect	*Phyllium bioculatum*							10	10	0	0	10	10
Indian Black Scorpion	*Heterometrus bengalensis*							4	4	0	0	4	4
Indian Jumping Spider	*Olios milleti*							4	4	0	0	4	4
Indian Tarantula	*Poecilotheria regalis*							4	4	0	0	4	4
Indian Red Scorpion	*Hottentotta tamulus*							4	4	0	0	4	4
Indian Stick Insect	*Carausius morosus*							10	10	0	0	10	10
Jewelled Flower Mantis	*Creobroter gemmatus*							10	10	0	0	10	10
Migratory Locust	*Locusta migratoria*							10	10	0	0	10	10
Painted Grasshopper	*Poekilocerus pictus*							10	10	0	0	10	10
Salem Tarantula	*Poecilotheria formosa*							4	4	0	0	4	4
Slate-red Tree Spider	*Poecilotheria rufilata*							4	4	0	0	4	4
Striped Yellow Grasshopper	*Traulia azureipennis*							10	10	0	0	10	10
Violin Mantis	*Gongylus gongylodes*							10	10	0	0	10	10
Wessel's Tiger Ornamental Tarantula	*Poecilotheria tigrinawesseli*							4	4	0	0	4	4
Mammal - Carnivore													
Ruddy Mongoose	*Herpestes smithii.*					2	2	0	4	2	2	0	4
Jungle cat	*Felis chaus*					1	2	0	3	1	2	0	3
Indian Palm Civet	*Paradoxurus hermaphroditus*	2	2	3	7	2	2	0	4	0	0	-3	-3
Small Indian Civet	*Vivericula indica*					2	2	0	4	2	2	0	4
Rusty spotted cat	*Prionailurus rubiginosus.*					2	2	0	4	2	2	0	4
Golden Jackal	*Canis aureus.*	1	1	0	2	2	2	0	4	1	1	0	2
Indian fox	*Vulpes bengalensis.*	2	2	0	4	2	2	0	4	0	0	0	0
Mammal - Primate													
Lion-Tailed Macaque	*Macaca silenus*					2	3	0	5	2	3	0	5
Bonnet Macaque	*Macaca radiata*					2	3	0	5	2	3	0	5
Rhesus Macaque	*Macaca mulatta*					2	3	0	5	2	3	0	5
Cotton top tamarin	*Saguinus oedipus*					2	3	0	5	2	3	0	5
Squirrel monkey	*Saimiri sp.*					2	3	0	5	2	3	0	5
Golden Lion Tamarin	*Leontopithecus rosalia*					2	3	0	5	2	3	0	5
Mousetown													
Bandicoot Rat	*Bandicota bengalensis*					2	3	0	5	2	3	0	5
Black-naped Hare	*Lepus nigricollis*					1	3	0	4	1	3	0	4
Himalayan Pika	*Ochotona himalayana*					1	3	0	4	1	3	0	4
Indian Bush Rat	*Golunda ellioti*					2	3	0	5	2	3	0	5
Indian Gerbil	*Tatera indica*					2	3	0	5	2	3	0	5
Indian Giant Squirrel	*Ratufa indica*					1	1	0	2	1	1	0	2

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Biopark													
Mousetown													
Lesser Bamboo Rat	*Cannomys badius*					2	3	0	5	2	3	0	5
Little Indian field mouse	*Mus booduga*					2	3	0	5	2	3	0	5
Long-tailed tree mouse	*Vandeluria oleracea*					2	3	0	5	2	3	0	5
Palm Squirrel	*Funambulus palmarum*					2	3	0	5	2	3	0	5
Sand coloured Metad	*Millardia gleadowi*					2	3	0	5	2	3	0	5
Short-tailed mole rat	*Nesokia indica*					2	3	0	5	2	3	0	5
Spiny Mouse	*Acomys sp*					2	3	0	5	2	3	0	5
White-bellied rat	*Niviventer niviventer*					2	3	0	5	2	3	0	5
Indian Porcupine	*Hystrix indica*					2	3	0	5	2	3	0	5
Reptiles and Amphibians													
Black-spectacled Toad	*Duttaphrynus melanosticus*							6	6	0	0	6	6
Checkered Keelback	*Xenochrophis piscator*							10	10	0	0	10	10
Common Indian Tree Frog	*Polypedates maculatus*							6	6	0	0	6	6
Indian Flapshell turtle	*Lessemys punctata*							6	6	0	0	6	6
Indian Bullfrog	*Rana tigrina*							6	6	0	0	6	6
Indian Chameleon	*Chameleo zeylonicus*							4	4	0	0	4	4
Indian Cobra	*Naja naja*							6	6	0	0	6	6
King Cobra	*Ophiophagus hannah*							3	3	0	0	3	3
Indian Monitor Lizard	*Varanus bengalensis*							4	4	0	0	4	4
Indian Rat Snake	*Ptyas mucosa*							8	8	0	0	8	8
Common Cat Snake	*Boiga trigonata*							4	4	0	0	4	4
Sand Boa	*Eryx conicus*							4	4	0	0	4	4
Earth Boa	*Eryx johnii*							4	4	0	0	4	4
Russell's Viper	*Daboia russelli*							4	4	0	0	4	4
Common Krait	*Bungarus ceruleus*							4	4	0	0	4	4
Banded Krait	*Bungarus fasciatus*							4	4	0	0	4	4
Bamboo Pit Viper	*Trimeresurus gramineus*							4	4	0	0	4	4
Trinket Snake	*Coelognathus Helena*							8	8	0	0	8	8
Indian Soft-shelled Turtle	*Nilssonia leithii*							10	10	0	0	10	10
Indian Spiny-tailed Lizard	*Saara hardwickii*							4	4	0	0	4	4
Indian Starred Tortoise	*Geochelone elegans*							10	10	0	0	10	10
Marsh Crocodile	*Crocodylus palustris*							10	10	0	0	10	10
Ornate Narrow-mouthed Frog	*Microhyla ornata*							6	6	0	0	6	6
Reticulated Python	*Python reticulatus*	3	3	0	6			6	6	-3	-3	6	0
Saw-scaled Viper	*Echis carinatus*							10	10	0	0	10	10
Cricket frog	*Fegervarya limnocharis*							6	6	0	0	6	6
Green Anaconda	*Eunectes murinus*							4	4	0	0	4	4

The highlighted species will be free ranging and share common enclosures.

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Biopark													
Reptiles and Amphibians													
Yellow Anaconda	*Eunectes notaeus*							4	4	0	0	4	4
Aldabra Tortoise	*Aldabrachelys gigantea*							4	4	0	0	4	4
Emerald Tree Boa	*Corallus caninus*							4	4	0	0	4	4
Ball Python	*Python regius*							4	4	0	0	4	4
Gondwana Park													
Africa													
Pygmy hippo	*Choeropsis liberiensis*					1	2	0	3	1	2	0	3
Egyptian Goose	*Alopochen aegyptiacus*					2	2	0	4	2	2	0	4
Grey Crowned Crane	*Balearica regulorum*					2	2	0	4	2	2	0	4
Hamerkop	*Scopus umbretta*					1	1	0	2	1	1	0	2
Lesser flamingo	*Phoeniconaias minor*					5	5	0	10	5	5	0	10
Red and Yellow Barbet	*Trachyphonus erythrocephalus*					2	2	0	4	2	2	0	4
Sacred Ibis	*Threskiornis aethiopicus*					4	4	0	8	4	4	0	8
Saddle billed stork	*Ephippiorhynchus senegalensis*					1	1	0	2	1	1	0	2
South African Shelduck	*Tadorna cana*					2	2	0	4	2	2	0	4
Vulturine Guineafowl	*Acryllium vulturinum*					2	2	0	4	2	2	0	4
Yellow billed hornbill	*Tockus leucomelas*					2	2	0	4	2	2	0	4
Yellow Bishop	*Euplectes capensis*					4	4	0	8	4	4	0	8
Black and White Colobus monkey	*Colobus angolensis*					2	3	0	5	2	3	0	5
Antarctica													
Humbolt Penguin	*Spheniscus humboldti*					5	5	0	10	5	5	0	10
Australia													
Goodfellow's Tree Kangaroo	*Dendrolagus goodfellowi*					1	1	0	2	1	1	0	2
Red-necked Wallaby	*Macropus rufogriseus*					2	2	0	4	2	2	0	4
Cardinal Lory	*Chalcopsitta cardinalis*					5	5	0	10	5	5	0	10
Rainbow Lorikeet	*Trichoglossus haematodus*					5	5	0	10	5	5	0	10
Southern Crowned Pigeon	*Goura scheepmakeri*					2	2	0	4	2	2	0	4
Wattled Bush Turkey	*Aepypodius arfakianus*					2	2	0	4	2	2	0	4
India													
Rufous-necked Hornbill	*Aceros nipalensis*					1	1	0	2	1	1	0	2
Pied hornbill	*Anthracoceros albirostris*					1	1	0	2	1	1	0	2
Mouse Deer	*Moschiola indica*					2	2	0	4	2	2	0	4
Bar-headed Goose	*Anser indicus*					2	2	0	4	2	2	0	4
Black Pond Terrapin	*Melanochelys trijuga*					3	5	0	8	3	5	0	8
Black-headed Ibis	*Threskiornis melanocephalus*					2	2	0	4	2	2	0	4
Blue Peafowl	*Pavo cristatus*					3	3	0	6	3	3	0	6

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Gondwana Park													
India													
Blue-throated Barbet	*Psilopogon asiaticus*					2	2	0	4	2	2	0	4
Cattle Egret	*Bubulcus ibis*					3	3	0	6	3	3	0	6
Comb Duck	*Sarkidiornis sylvicola*					2	2	0	4	2	2	0	4
Common Coot	*Fulica atra*					3	3	0	6	3	3	0	6
Common Hill Myna	*Gracula religiosa*					2	2	0	4	2	2	0	4
Flapshell Turtle	*Lissemys punctata*					3	5	0	8	3	5	0	8
Gargney	*Spatula querquedula*					3	3	0	6	3	3	0	6
Greater Cormorant	*Phalacrocorax carbo*					2	2	0	4	2	2	0	4
Greater Coucal	*Centropus sinensis*					2	2	0	4	2	2	0	4
Greylag Goose	*Anser anser*					2	2	0	4	2	2	0	4
Indian Cormorant	*Phalacrocorax fuscicollis*					2	2	0	4	2	2	0	4
Indian Grey Heron	*Ardea cinerea*					2	2	0	4	2	2	0	4
Indian Roof Terrapin	*Pangshura tecta*					3	5	0	8	3	5	0	8
Indian Tent Terrapin	*Pangshura tentoria*					3	5	0	8	3	5	0	8
Lady Amherst Pheasant	*Chrysolophus amherstiae*					2	2	0	4	2	2	0	4
Lesser Whistling Teal	*Dendrocygna javanica*					2	2	0	4	2	2	0	4
Little Egret	*Egretta garzetta*					3	3	0	6	3	3	0	6
Night Heron	*Nycticorax nycticorax*					3	3	0	6	3	3	0	6
Painted Stork	*Mycteria leucocephala*					3	3	0	6	3	3	0	6
Pond Heron	*Ardeola grayii*					3	3	0	6	3	3	0	6
Purple Heron	*Ardea purpurea*					1	1	0	2	1	1	0	2
Red-crested Pochard	*Netta rufina*					3	3	0	6	3	3	0	6
Reeves Pheasant	*Syrmaticus reevesi*					2	2	0	4	2	2	0	4
Rose-ringed Parakeet	*Psittacula krameri*					4	4	0	8	4	4	0	8
Sarus Crane	*Grus antigone*					2	2	0	4	2	2	0	4
Spoonbill White	*Platalea leucorodia*					2	2	0	4	2	2	0	4
Spot billed (Grey) Pelican	*Pelecanus philippensis*					2	2	0	4	2	2	0	4
Dalmatian Pelican	*Pelecanus crispus*					2	2	0	4	2	2	0	4
Great white (Rosy) pelican	*Pelecanus onocrotalus*					2	2	0	4	2	2	0	4
Spot-billed Duck	*Anas poecilorhyncha*					2	2	0	4	2	2	0	4
White Stork	*Ciconia ciconia*					1	1	0	2	1	1	0	2
Woolly-necked Stork	*Ciconia episcopus*					1	1	0	2	1	1	0	2
South American													
Cotton Top Tamarin	*Saguinus oedipus*					1	1	0	2	1	1	0	2
Blue and Yellow Tanager	*Thraupis bonariensis*					3	3	0	6	3	3	0	6
Blue Gold macaws	*Ara ararauna*					3	3	0	6	3	3	0	6
Grey-winged Trumpeter	*Psophia crepitans*					2	2	0	4	2	2	0	4

The highlighted species will be free ranging and share common enclosures.

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Gondwana Park													
South American													
Ocellated turkey	*Meleagris ocellata*					2	2	0	4	2	2	0	4
Red-capped Cardinal	*Paroaria gularis*					3	3	0	6	3	3	0	6
Roseate Spoonbill	*Platalea ajaja*					3	3	0	6	3	3	0	6
Scarlet Ibis	*Eudocimus ruber*					3	3	0	6	3	3	0	6
Scarlet Macaw	*Ara macao*					3	3	0	6	3	3	0	6
Toco Toucan	*Ramphastos toco*					2	2	0	4	2	2	0	4
Two-toed Sloth	*Choloepus didactylus*					1	1	0	2	1	1	0	2
Black Spider Monkey	*Ateles paniscus*					1	2	0	3	1	2	0	3
Squirrel monkey	*Saimiri boliviensis*					3	3	0	6	3	3	0	6
Night Safari													
Forest (Tram)													
Ankole Cattle	*Bos taurus*					2	3	0	5	2	3	0	5
Barasingha	*Rucervus duvaucelii*					2	4	0	6	2	4	0	6
Chital	*Axis axis*	5	6	4	15	4	8	0	12	-1	2	-4	-3
Sambar	*Rusa unicolor*	5	6	1	10	3	5	0	8	-2	-1	-1	-2
Sloth Bear	*Melursus ursinus*	3	3	0	6	1	3	0	4	-2	0	0	-2
Brow-Antlered Deer	*Cervus eldii eldii*	4	5	1	10	2	3	0	5	-2	-2	-1	-5
Hog deer	*Axis porcinus*					2	4	0	6	2	4	0	6
Bengal Tiger (White)	*Panthera tigris tigris*					1	1	0	2	1	1	0	2
Indian Gaur	*Bos gaurus*					1	3	0	4	1	3	0	4
Grassland (Tram)													
Blue Wildebeeste	*Connochaetes taurinus*					3	5	0	8	3	5	0	8
Impala	*Aepyceros melampus*					4	8	0	12	4	8	0	12
Nyala	*Tragelaphus angasii*					2	4	0	6	2	4	0	6
Ostrich	*Struthio camelus*					3	3	0	6	3	3	0	6
Indian Rhinoceros	*Rhinoceros unicornis*					1	1	0	2	1	1	0	2
Dhole	*Cuon alpinus*					2	3	0	5	2	3	0	5
Water Buffalo	*Bubalus arnee*					2	3	0	5	2	3	0	5
Gharial	*Gavialis gangeticus*							10	10	0	0	10	10
Striped Hyena	*Hyaena hyaena*					1	1	0	2	1	1	0	2
Burchell's Zebra	*Equus quagga burchellii*					1	4	0	5	1	4	0	5
Giraffe	*Giraffa camelopardalis*					2	2	0	4	2	2	0	4
Indian Lion	*Pathera leo persica*					2	3	0	5	2	3	0	5
Blackbuck	*Antilope cervicapra*	8	10	4	22	4	8	0	12	-4	-2	-4	-10
Chinkara	*Gazella bennettii*					2	4	0	6	2	4	0	6
Nilgai	*Boselaphus tragocamelus*	8	7	12	27	2	3	0	5	-6	-4	-12	-22
Spotted Hyena	*Crocuta crocuta*					1	1	0	2	1	1	0	2

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Night Safari													
Mountain and Desert (Tram)													
Indian Wild ass	*Equus hemionus khur*					1	5	0	6	1	5	0	6
Indian Wolf	*Canis lupus pallipes*					2	2	0	4	2	2	0	4
Mainland Serow	*Naemorhaedus sumatraensis*					2	3	0	5	2	3	0	5
Night Safari Walking Trail													
Indian Pangolin	*Manis crassicaudata*					1	1	0	2	1	1	0	2
Caracal	*Carcal caracal*					1	1	0	2	1	1	0	2
Brown Fish Owl	*Ketupa zeylonensis*							2	2	0	0	2	2
Slender Loris	*Loris lydekkerianus*					1	2	0	3	1	2	0	3
Large Indian Civet	*Viverra zibetha*					1	1	0	2	1	1	0	2
Golden Cat	*Catopuma temminckii*					1	1	0	2	1	1	0	2
Indian Crested Porcupine	*Hystrix indica*					1	3	0	4	1	3	0	4
Chowsingha	*Tetracerus quadricornis*					1	3	0	4	1	3	0	4
Desert Fox	*Vulpes vulpes pusilla*					1	1	0	2	1	1	0	2
Smooth Otter	*Lutrogale perspicillata*					1	1	0	2	1	1	0	2
Giant Flying Squirrel	*Petaurista philippensis*					2	2	0	4	2	2	0	4
Short-nosed Fruit Bat	*Cynopterus sphinx*					3	7	0	10	3	7	0	10
Leopard	*Panthera pardus*	2	4	3	9	2	2	0	4	0	-2	-3	-5
Leopard (Black)	*Panthera pardus*					1	1	0	2	1	1	0	2
Hog Badger	*Arctonyx collaris*					1	1	0	2	1	1	0	2
Eurasian Eagle Owl	*Bubo bubo*							2	2	0	0	2	2
Fishing Cat	*Prionailurus viverrinus*					1	1	0	2	1	1	0	2
Indian Mouse Deer	*Moschiola indica*					2	2	0	4	2	2	0	4
Trail of the Senses													
Animal Sounds													
Red Jungle Fowl	*Gallus gallus*	2	2	0	4	2	2	0	4	0	0	0	0
Five-striped Palm Squirrel	*Funabulus pennati*					1	3	0	4	1	3	0	4
Greater Coucal	*Centropus sinensis*					2	2	0	4	2	2	0	4
Lar Gibbon/Hoolock Gibbon	*Hylobates lar*					2	2	0	4	2	2	0	4
Sage Leafhopper	*Eupteryx melissae*							50	50	0	0	50	50
Grey Cricket	*Acheta domesticus*							50	50	0	0	50	50
Indian Bullfrog	*Rana tigrina*							10	10	0	0	10	10
Brown headed Barbet	*Psilopogon zeylanicus*					2	2	0	4	2	2	0	4
Bright Sunlight, Trees													
Russell's Viper	*Daboia russelli*							4	4	0	0	4	4
Common Trinket Snake	*Coelognathus helena*							4	4	0	0	4	4
Blue Peafowl	*Pavo cristatus*					2	3	0	5	2	3	0	5
Rose-breasted Parakeet	*Psittacula alexandri*					3	3	0	6	3	3	0	6

The highlighted species will be free ranging and share common enclosures.

Species Name	Scientific Name	Present Stock				Proposed Collection				Animals to be Acquired/ Removed			
		M	F	U	T	M	F	U	T	M	F	U	T
Trail of the Senses													
Bright Sunlight, Trees													
Grey-headed Parakeet	*Psittacula finschii*					3	3	0	6	3	3	0	6
Fairy Bluebird	*Irena puella*							6	6	0	0	6	6
Dark Cave													
Naked Mole Rat	*Heterocephalus glaber*					3	1	8	12	3	1	8	12
Painted Bat	*Kervivoula picta*							10	10	0	0	10	10
Banded Knifefish	*Gymnotus carapo*							10	10	0	0	10	10
Indian False Vampire Bat	*Megaderma lyra*							10	10	0	0	10	10
Freshwater Bivalve	*Lamellidens marginalis*							30	30	0	0	30	30
Giant River Prawn	*Macrobrachium rosenbergii*							50	50	0	0	50	50
Herbs and Spices													
Indian Catfish	*Plotosus canius*							8	8	0	0	8	8
Indian Earwig	*Forficula auricularia*							50	50	0	0	50	50
Indian Rat Snake	*Ptyas mucosa*							4	4	0	0	4	4
Bombardier beetle	*Brachinus sp*							50	50	0	0	50	50
Cucurbit Stink Bug	*Coridius janus*							50	50	0	0	50	50
Giant Indian Millipede	*Archispirostreptus sp*							50	50	0	0	50	50
Striped Skunk	*Mephitis mephitis*					1	2	0	3	1	2	0	3
Indian Palm Civet	*Paradoxurus hermaphroditus*					1	1	0	2	1	1	0	2
Introductory Area													
Indian Bullfrog	*Rana tigrina*							4	4	0	0	4	4
Rose-breasted Parakeet	*Psittacula alexandri*					3	3	0	6	3	3	0	6
Giant Indian Millipede	*Archispirostreptus sp*							100	100	0	0	100	100
Giant African Land Snail	*Achatina fulica*							50	50	0	0	50	50
Indian Rat Snake	*Ptyas mucosa*							4	4	0	0	4	4
Indian Rock Pigeon	*Columba livia*							6	6	0	0	6	6
Water Body													
Indian Bullfrog	*Rana tigrina*							4	4	0	0	4	4
Indian frog	*Philautus akroparallagi*							8	8	0	0	8	8
Indian Soft-shelled Turtle	*Nilssonia gangetica*							10	10	0	0	10	10

4.3. Description of layout plan of the BTGIZP

The BTGIZP and Rescue Centre, Gorewada is a new zoo situated on Nagpur – Katol highway and is about 10 Km from the Zero milestone of Nagpur city. This zoo has been proposed to be developed on modern concept of zoo management. It is anticipated to be of International Standards. An area of 1914 Ha presents wood land vegetation and a number of herbs and shrubs.

To prepare the master layout plan, various surveys such as field survey, contour survey, traffic survey, potential visitor's survey, etc. were carried out. On the basis these surveys, the proposed Master Layout Plan have been finalized. The layout plan has been drawn on scale appropriate to contour interval of 2m. On the basis of these surveys, the Master Layout Plan and details have been developed.

The Master Layout Plan includes approach road to Indian Zoo, African Zoo, Gondwana Park, Bio-park and Deep Time Trail, Night Safari, Parking Area, Tribal Trail, Entrance Plazas, offices, roads paths, interpretation centre, animal enclosures, water bodies, veterinary hospital, rescue centre, water works, and power station.

The Master Layout Plan includes approach road to Indian Zoo, African Zoo, Gondwana Park, Bio-park and Deep Time Trail, Night Safari, Parking Area, Tribal Trail, Entrance Plazas, offices, roads paths, interpretation centre, animal enclosures, water bodies, veterinary hospital, rescue centre, water works, and power station.

4.3.1.Overview of the BTGIZP Zones

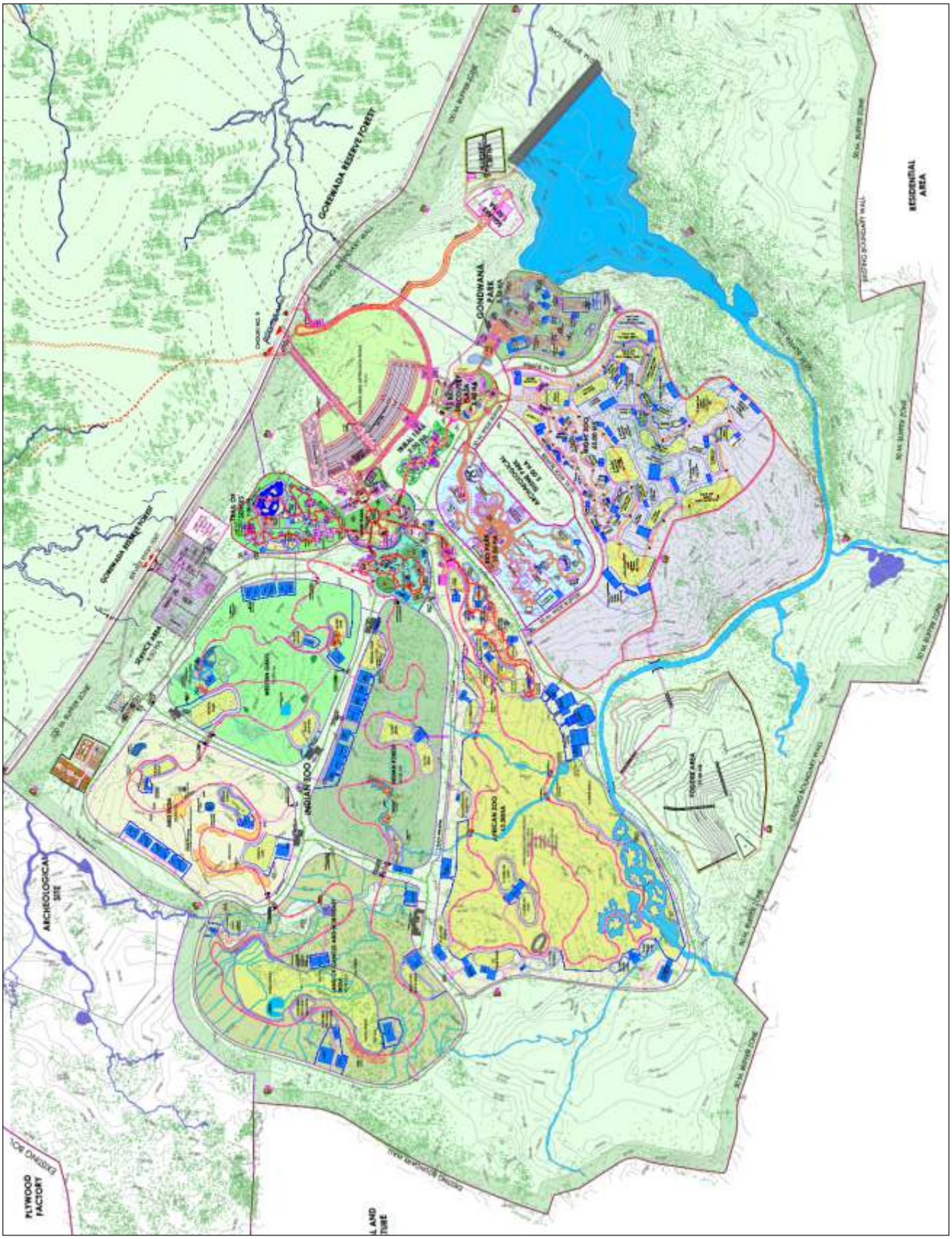
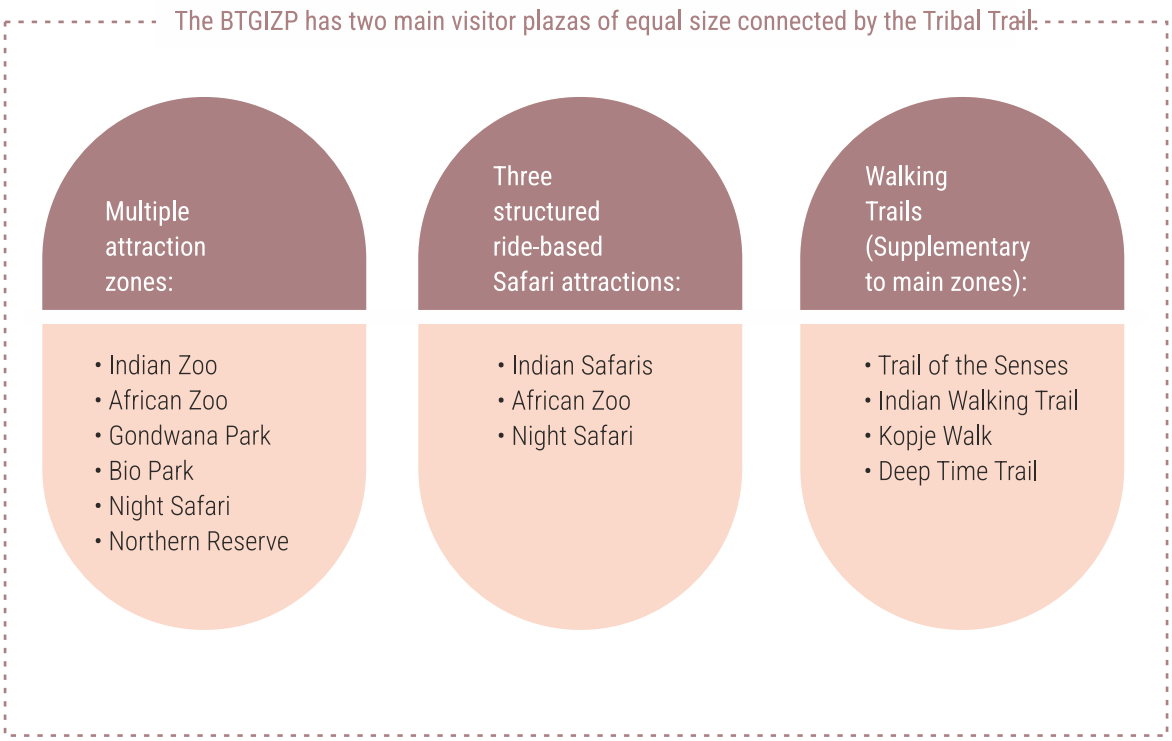


Fig. 56: BTGIZP, Master Layout Plan V3.0. (Feb'23)



4.3.2. Entry Plaza & Parking

The Entrance Plaza is the first impact face value of project. As the project is about establishing an international standard zoo and safari park, it should have all facilities, infrastructure and amenities planned and designed up to the international standards. Entrance plaza had been proposed to be developed as Bio Discovery Plaza where educative and informative interaction can be made by visitors.

All the activities (pick-up, drop-off, parking, information centre, ticketing, etc.) shall be located near the entrance plaza so as to reduce the approach distance for visitors and making their journey comfortable. Studying the visitor circulation, various activities are proposed and located on site to complement each other. Separate entry and exit gates with security system are designed. Separate parking areas for buses, 4-wheelers and 2-wheelers are planned with appropriate pick-up and drop-off points in a way to avoid intersection points and minimize the traffic congestion at junctions.

Adequate parking space has been provided for keeping in view the peak load of vehicles as per survey feedback. After going through the ticketing and security check, visitor enters into large, landscaped area assisted with education and interpretation centres, cafeteria, rest rooms, etc. From the entrance plaza, routes have been diverted to various activities.

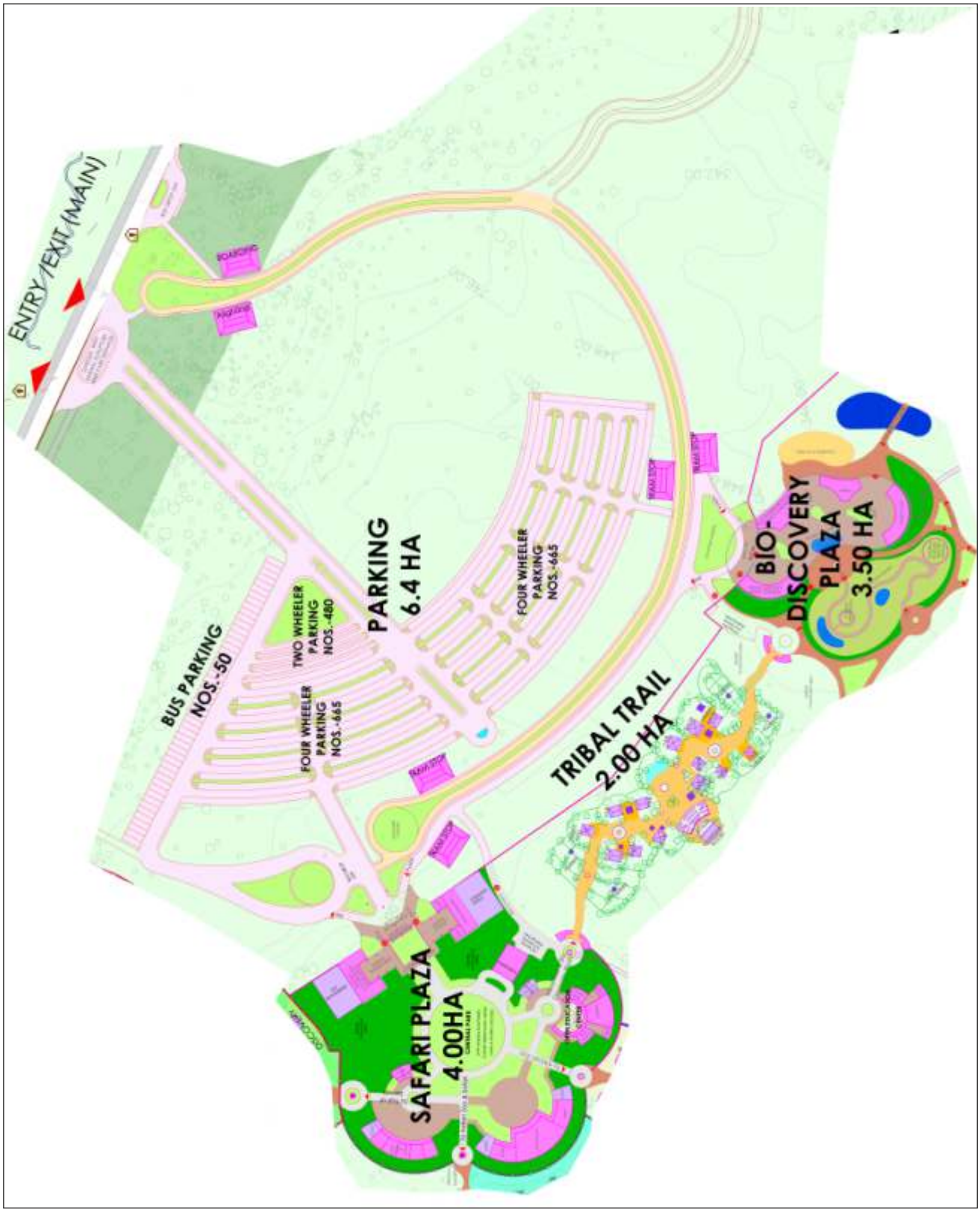


Fig. 57 : Entry Plaza Layout - Revised (Feb'23)

4.4. Indian Zoo

The Indian Zoo consists of the Indian Safaris and the Indian Walking Trail.

The Indian Safaris were initially developed as Phase 1 according to the following:

- Indian Safari
    - Leopard Safari - 25 Ha
    - Tiger Safari - 25 Ha
    - Sloth Bear Safari - 25 Ha
    - Herbivore Composite Safari
      (Sambhar, Cheetal, Gaur, Black Buck etc.) - 40 Ha
    - Indian Walking Trail - 2 Ha

Under the Wild India Zone, Indian Safari is complete and is open to public. This is cluster of 4 drive-through enclosures based on the theme of Central Indian Forest landscape.

The safaris would be explored by specially designed vehicles. Details of this phase have been discussed in detail in chapter 2 of this document.

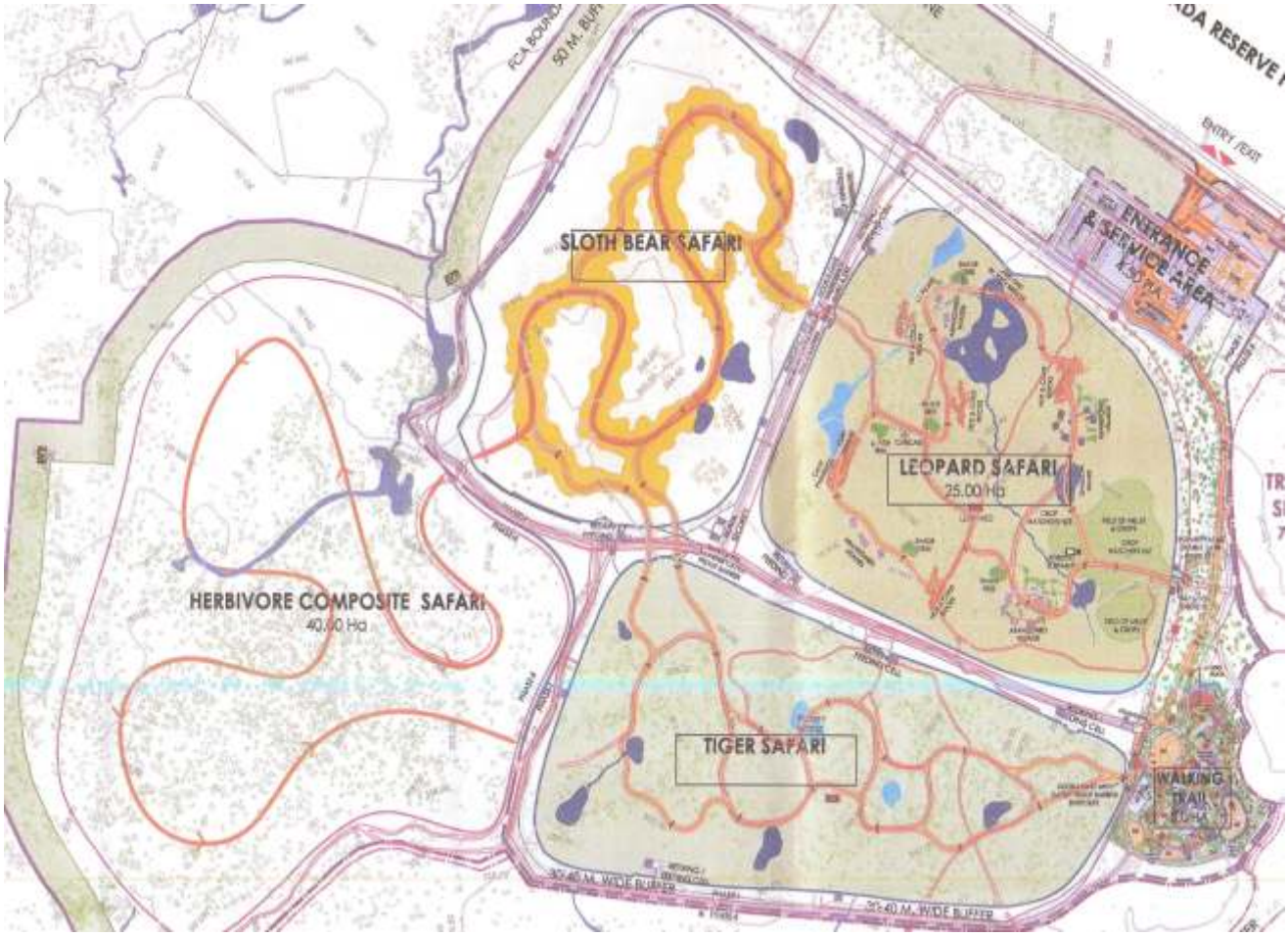


Fig. 58: Current Layout of the Indian Safaris

4.4.1. Storyline of the Indian Zoo

The Storyline is a drive into Gondwana National Park, a mythical National Park set in Central India which contains three different habitat types: grassland; desert and forest. The visitors are told that during their journey they might be lucky enough to view the indigenous animals of these different habitats.

Gonds ruled Gondwana (now in eastern Madhya Pradesh and western Odisha) between the 13th and 19th centuries AD. and built a number of forts, palaces, temples, tanks and lakes during the Gonds dynasty. (The name of the ancient continent of Gondwanaland is derived from Gondwana, because some of the earliest rock formations of this continent were first investigated in part of the region, in modern Odisha). The Gondwana kingdom survived until the late 16th century. The Maratha power swept into Gondwana in the 1740s. The Marathas overthrew the Gond Rajas and seized most of their territory, while some Gond zamindaris (estates) survived until recently.

Pre-show: The History of Gondwanaland

While waiting to board their vehicle (initially for the Leopard Safari at the Temporary Entrance and the subsequently for the Indian Drive-Through Experience at the Indian Plaza) the history of the region and its geology, fauna and flora it is explained through a flat TV screen and accompanying artefacts and architecture, set in and around the Tram shelter, which is designed to resemble a modern-day Gond village.

4.4.2. The India Entry Plaza: Gond Village

The visitors enter through ticketing turn-styles into a courtyard: The India Entry Plaza which is in the form of a modern Gond Village. The Gond Village is a colourful and vibrant place which has a cluster of Gond village structures formed to resemble a village setting.

All the structures are functional such as: an information centre; toilets; snack kiosks selling handheld street food (no plastics or potential rubbish); retail stores selling Gond paintings and other artefacts; displays of Gond farming and village life artefacts; a small theatre (for a short standing show on Gond village life and man/animal conflicts); tram alighting and boarding shelters; a temple and some functional administrative/maintenance structures. Simple crops such as millet and village domestic animals are corralled here. The Gond tribal architecture is simple, with Gond art on some of the walls of the structures which are colourful and vibrant.

4.4.3. Indian Walking Trail

India is a land of diverse fauna. However, due to a burgeoning human population leading to habitat fragmentation and loss, many of the biodiversity hotspots on the subcontinent are becoming more and more remote and inaccessible to the average layperson.

As a consequence, BTGIZP offer an opportunity to showcase biodiversity in a readily attainable manner. From this perspective, the species selection criteria on the Indian walking trail reflects the intent to demonstrate the range and array of this diversity in microcosm.

The Indian Safaris basically displays only large animals like Tiger, Leopard, Sloth Bear and large herbivores. However, some of the smaller animals of Indian wildlife are to be displayed in traditional zoo set up where animals will be displayed in moated or enclosed enclosure. The species designated on the trail are ones that the average visitor is highly unlikely to see in real life due to their occurrence in distant habitats or else for the reason of their very secretive nature in the wild. Such difficult to get to creatures include conservation-dependent species such as the Rufous-necked Hornbill, Indian Desert Monitor Lizard and Nilgiri Langur; Secretive and rarely-seen species include the Small-clawed Otter and Leopard.

Fig. 59 : Approved Layout of the Indian Walking Trail

The exhibits will follow several educational themes ranging from the conservation status of each species, through to its cultural significant in both ancient and modern Indian society, and also giving simple, easily understood messages about each species biology and factoids relating to its mode of existence. The display methods incorporated follow CZA guidelines for design.

These smaller faunas will complement the larger species then on exhibit in the safari sections of the facility, and both will contribute to the exhibit of the array of Indian biodiversity. The viewing structures along the Trail are designed to follow the Gond Village architectural theme.

The Desert Monitor lizard and the Indian Rock Python are the first animals to be encountered. reptiles are the first exhibits in a building as another village building with more interpretive displays. The otter is next with the path ramping down to view them underwater (from this point on all exhibits with viewing structures have a bypass path which allows service vehicles in the form of electric carts to reach all exhibits).

At this point (on reaching the Nilgiri Langur) visitors can take a short cut to the tram stop or continue past the langurs. A footbridge crosses a stream cascading down the small hill on the right. The langur is fully moated. The giant squirrel, hornbill, aviary and leopard cat follow in a circuit around the hill. The Leopard exhibit has two viewing shelters separated by the Indian mongoose. The two leopard views due to their spacing, different angle to the cage and with the mongoose between, will seem like two separate exhibits. Within the large viewing leopard viewing structures there is a display of Human leopard conflict. The leopard is the last exhibit which allows people to easily revisit it after taking the Indian Safari ride.

Tribal Trail

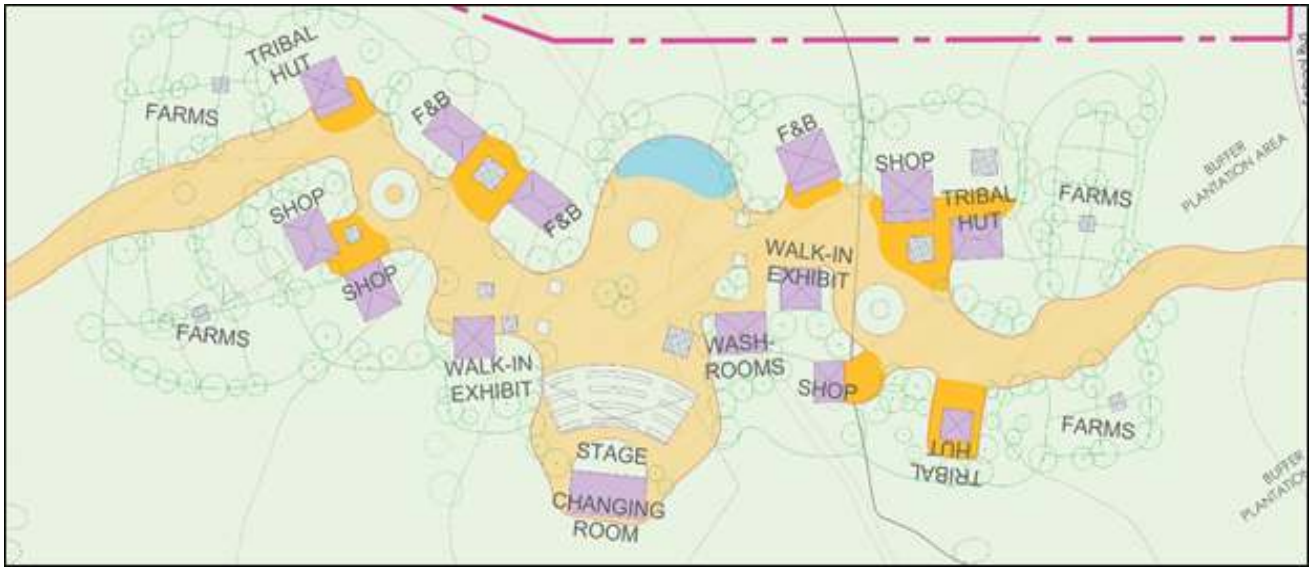


Fig. 60 : Diagram of Tribal Trail Concept

The Tribal Trail will be developed in Phase 2 and will eventually link the Safari Plaza with the Biodiversity Plaza (which will be developed in Phase 3). The Trail is akin to a City Walk or Main Street in theme park parlance, connecting the two parts of the park and their respective attractions with an interesting, ethnic and outdoor anthropological museum, with replications of regional ethnic structures, especially from Gond culture, with retail selling local and ethnic artefacts, made and sold by villagers. However, the tribal trail maybe integrated into the plazas as the concept theming is more integrated into the rest of the complex.

The Gond tribal people of India are inadvertently known worldwide, for it is their culture that is embedded in and is the source of the name for 'Gondwanaland' - the huge landmass that once comprised, what has since broken up to become: South America, Africa, Antarctica, Australia, and India.

It was rock formations found in the Gondwana region, near Orissa to the east of Maharashtra, that finally confirmed the geological narrative telling of the tectonic plate bearing the continent of India that jammed into Eurasia to form the Indian subcontinent. Hence, geologists bestowed the Gond name on the entire ancient super-continent of Gondwanaland.

A portion of two Gond villages - representing the tribal traditions of the Abujh Maria and the Maria - will be recreated on this walking trail, which will emanate from the Entry Plaza. Architectural styles will faithfully reproduce typical Gond vernacular architecture, including houses and other shelters and built structures designed for ceremonial and other purposes. Demonstrated and displayed, will be the arts and crafts of the Gond people, as well as traditional musical instruments, weapons, tools and implements for farming. To the greatest extent possible, the Gond culture should be displayed and interpreted here as a living culture.

Fig. 61 : Santal Village

Displays will demonstrate the exceptional sophistication of Gond crafts, and reveal to urbanised visitors the diverse components of a lifestyle that is far more in harmony with nature than the materialism typical of capitalism. The Gond lifestyle will be depicted as true to the actual interdependency of humans with the natural world, a relationship that unfortunately, is increasingly becoming obscured in the modern world.

4.4.4. Redevelopment of Indian Safaris

It is proposed that all existing Indian Safaris are to be redeveloped following similar planning principles as the African Zoo's Safari. The rationale for the redevelopment is because the carnivores which are presently accommodated in the large drive-through safaris are not very visible, because of their low numbers (because of their semi-solitary nature) and the size of the enclosure. To add to this is the vegetation which needs to be regularly cut, which otherwise added to the difficulty of viewing. conceals them more.

The existing enclosure perimeter fencing will be retained, appropriate herbivores introduced to roam in the enclosure and smaller enclosures be developed for various species of carnivores, which will be separated from the herbivores by a moat to contain them, and a horizontal or sunken fence, which will prevent the herbivores from accidentally falling into the carnivore moats.

The new thematic displays mix predators and herbivores in the existing large drive-through enclosure, a more natural visual combination when visiting a national park, although the herbivores are completely safe from the predators. Carnivores will be occupying much less area as compared to present situation, Hence maintaining the vegetation manually will be much easier. Fodder feeding stations and permanent water holes will need to be added.

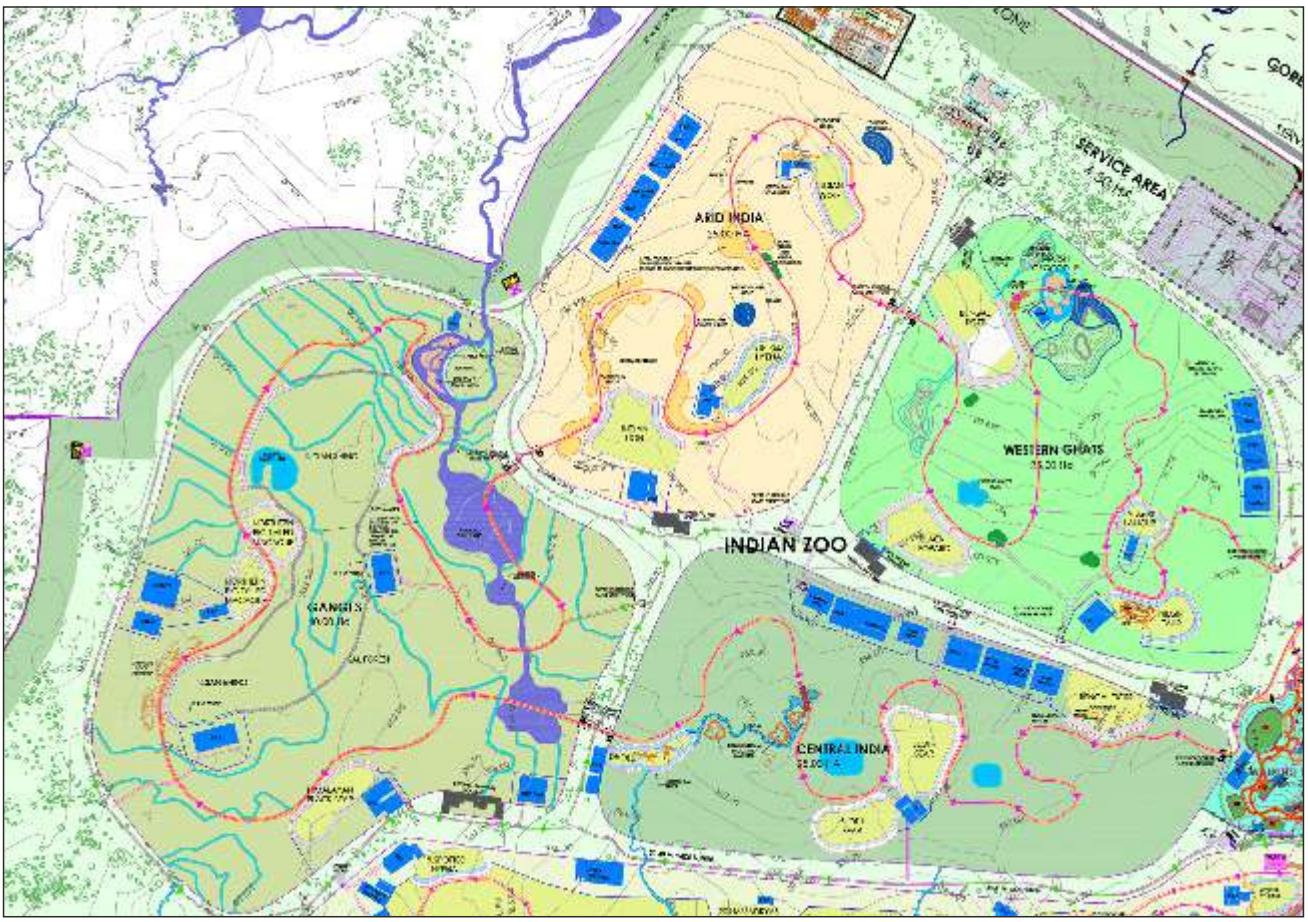


Fig. 62 : New Indian Zoo Layout

Thus, we have Proposed four new zoo geographic thematic displays as follows:

1. Leopard Safari:
   To be converted to the **Western Ghats**
2. Sloth Bear Safari:
   To be Converted into **Arid India**
3. Herbivore Composite Safari:
   To be Converted into **Land of the Ganges and Northeast India**
4. Tiger Safari:
   To be Converted into the **Central Indian**

4.4.4.1. Western Ghats

The 25 Ha Western Ghats Safari will be planted to give the appearance of a fairly forested area, resembling the lushness of the Western Ghats. One area of the safari will be raised to resemble a hillside where the enclosures of the Nilghri tahr and the black leopard will be located. The ungulates will occupy the flatter ground, with floating enclosures for the tiger and Nilgiri langur, the marsh crocodiles being in water moated enclosure with a large pool and land area.

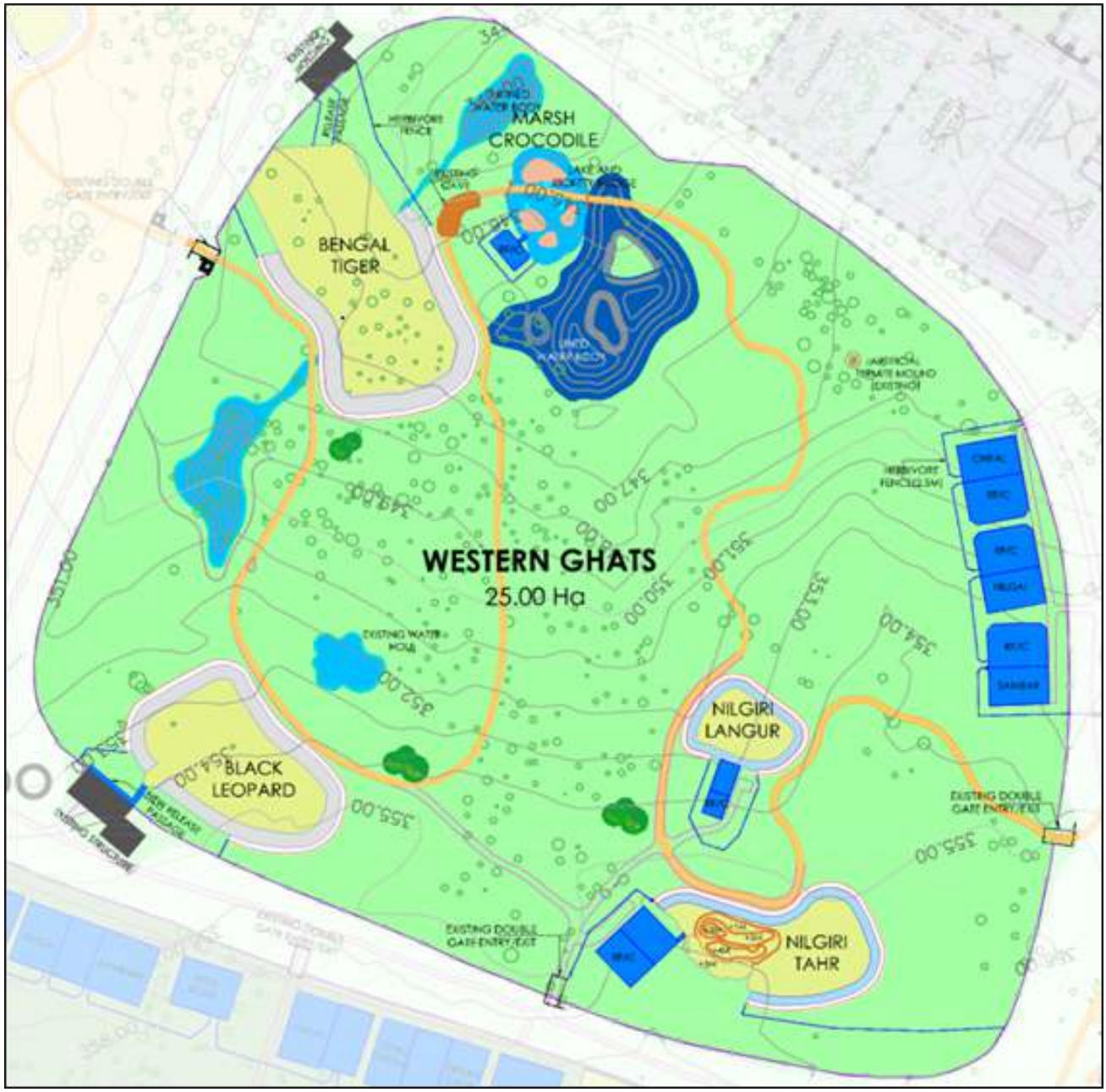


Fig. 63 : Western Ghats Safari

Fig. 64 : Western Ghats Habitat Example

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Leopard (Black)	*Panthera pardus*				2500	2000	500
Bengal Tiger	*Panthera tigris tigris*	3	1.2	3	5000	4000	1000
Nilgiri Langur	*Trachypithecus johnii*	5	2.3	8	1100	1000	100
Nilgiri Tahr	*Nilgiritragus hylocrius*	5	2.3	12	3500	3000	500
Chital	*Axis axis*	10	2.8	25	250000		6000
Barking Deer	*Muntiacus muntjack*	10	5.5	20			
Indian Gaur	*Bos gaurus*	3	1,2	8			
Sambar	*Rusa unicolor*	10	2.8	20			
Marsh Crocodile	*Crocodylus palustris*	5	2,3	8	1200	1000	200

The highlighted species will be free ranging together in the area

4.4.4.2. Arid India

The 25 Ha Arid Indian will be landscaped to have less tree cover, more sand and give the appearance of some of India the more arid regions in Rajasthan and Gujarat. Several different arid grassland zones could be developed, instead of having a single species mix over the entire Safari. There could be low height grass zones and taller grass areas. It should be noted that in the summer heat of up to 46°C all the grass will be brown.

Arid India is the first of the two Indian drive-through exhibits where the herbivores are free ranging and the carnivores are contained in moated. The lions, hyaenas and wolves will be contained by dry moats and have appropriate night shelters. The following species will be displayed:

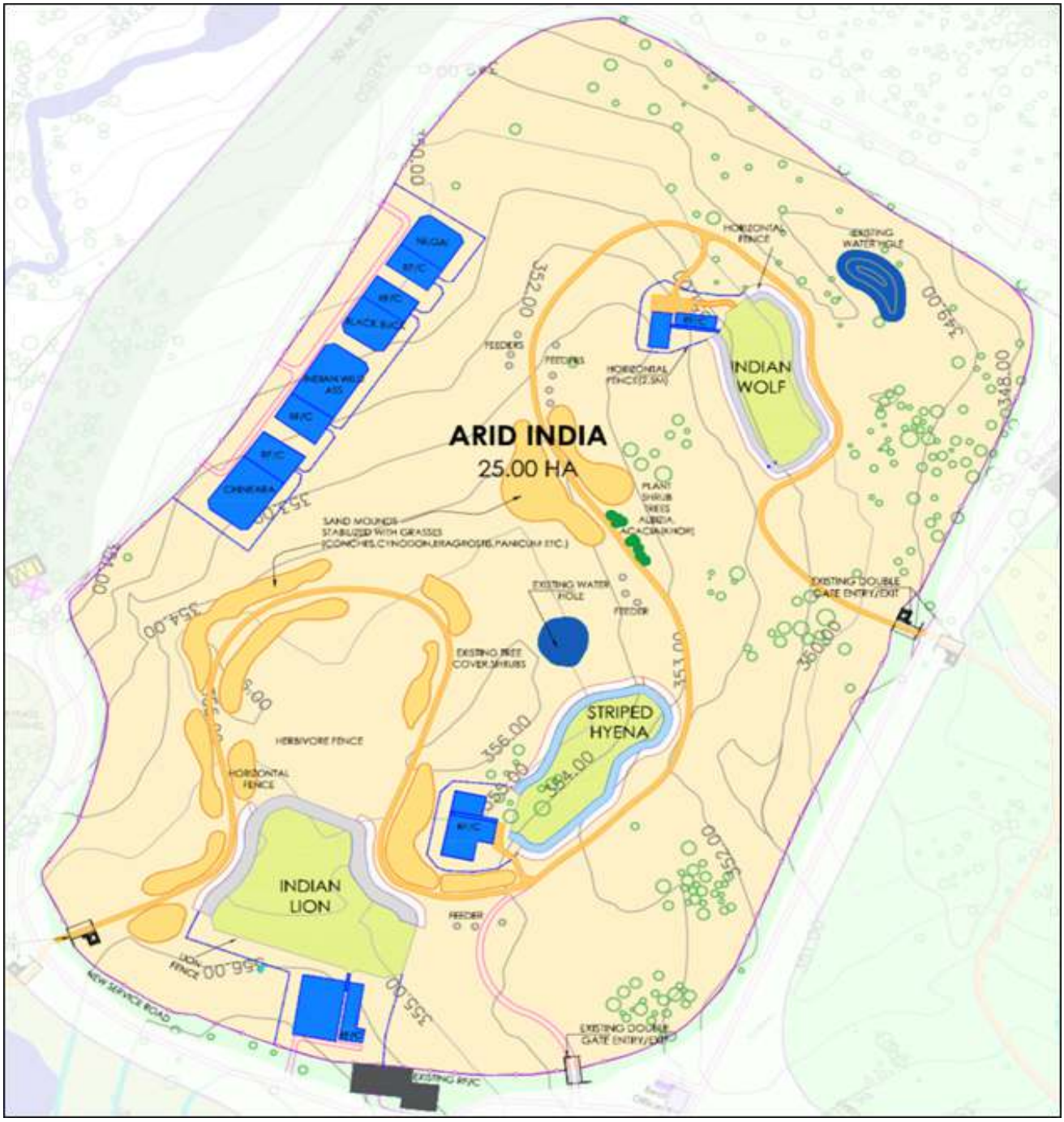


Fig. 65 : Arid India Safari

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Asiatic lion	*Panthera leo persica*	4	1.3	6		4000	1000
Chinkara	*Gazella bennetii*	4	4.8	20			
Blackbuck	*Antilope cervicapra*	12	4.8	20	250000		6000
Indian Wild Ass	*Equus hemionus khur*	8	3.5	15			
Nilgai	*Boselaphus tragocamelus*	5	2.3	8			
Striped Hyena	*Hyaena hyaena*	5	2.3	8		2500	200
Wolf	*Canis lupus pallipes*	4	1.3	4		2500	200

Species in colour will be free ranging together in the area

A typical example of an Indian desert environment is a large open sandy space, with short trees and scrubby plants in loose belts or scattered individually. However, for practical reasons it is not going to be possible to reproduce this exactly, primarily due to the large amount of sand required. To give a greater sense of desert without having to import vast quantities of sand we can create a dry sandy and rocky belt of varying width - 5m to 20m - on both sides of the road.

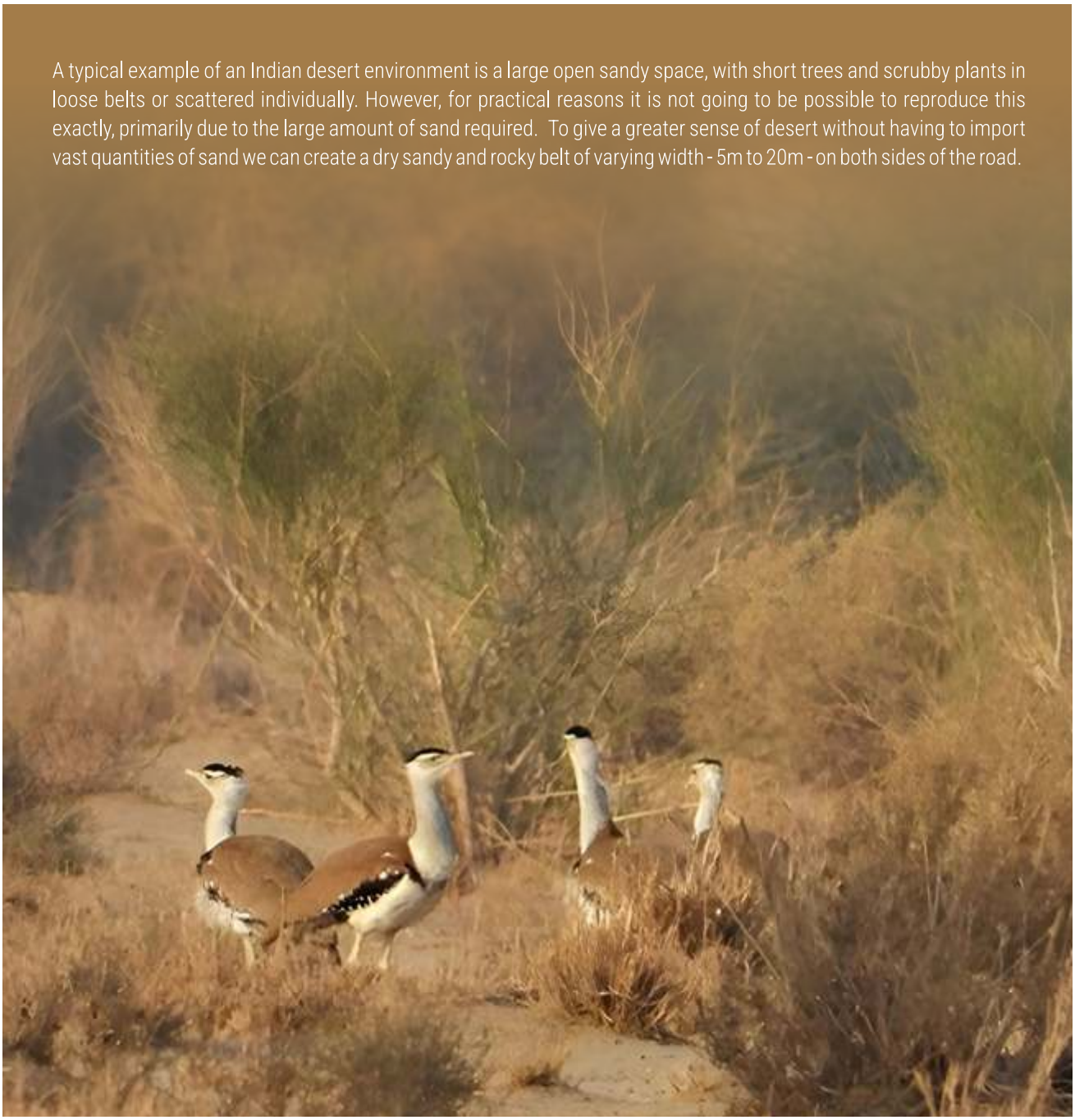


Fig. 66: Sample Arid Indian Habitat

4.4.4.3. Land of the Ganges and Northeast India

The former 40 Ha Herbivore Composite Safari will be converted into the Land of the Ganges and Northeast India, giving a more zoogeographic thematic to the animal displays.

As the name suggests, the enclosure is divided into two habitats, the flood plains of the Ganges and Brahmaputra rivers and the dearth of moist vegetation dwellers found there such as Indian rhinoceros, barasingha and water buffalo. And the more hilly dwellers like the serow and Himalayan black bear.

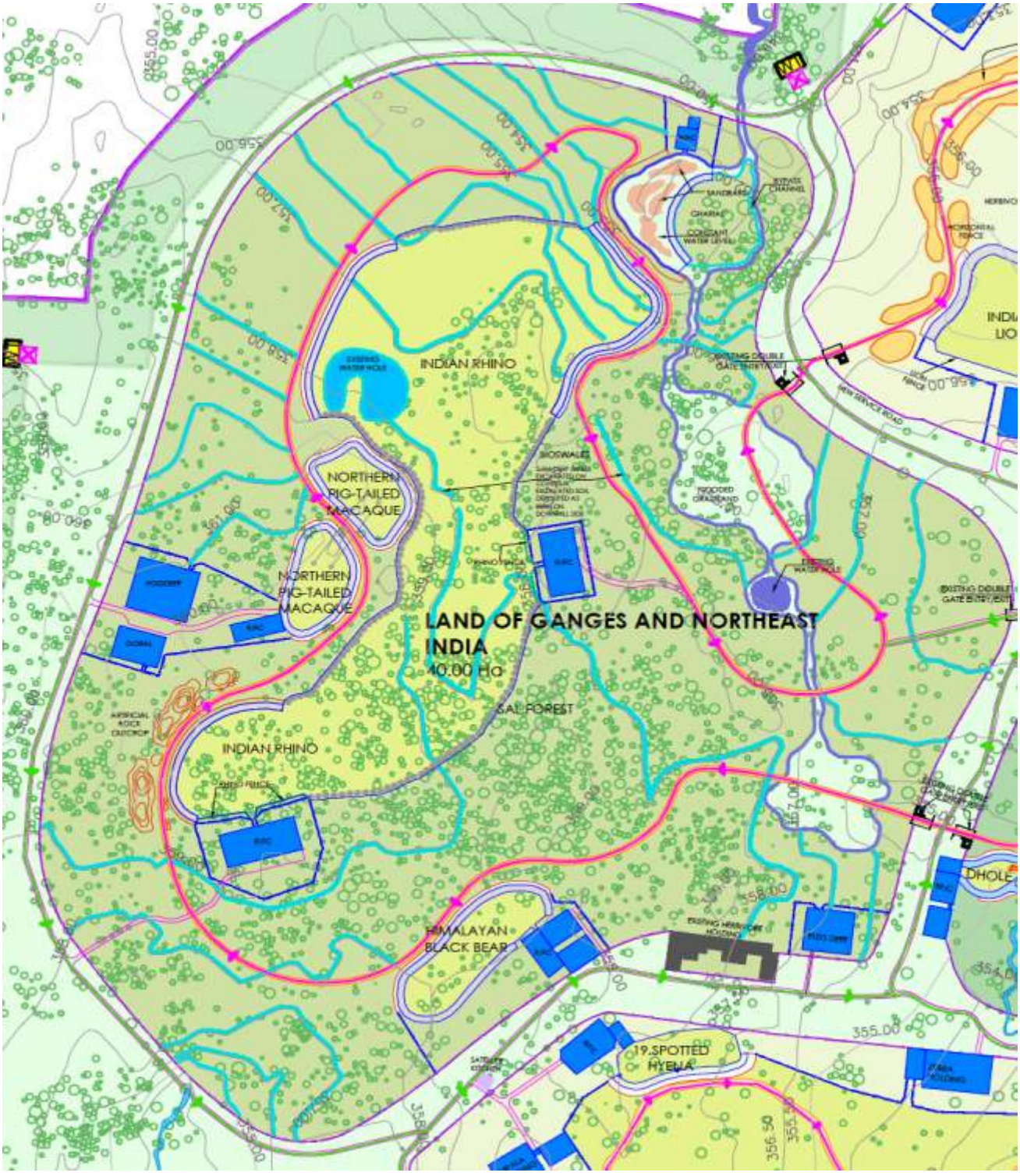


Fig. 67: Ganges and Northeast India Safari

The Indian rhinoceros will have a large enclosure which is partially moated but also partly permeable to the deer like basasingha, sangai and hog deer but the bollards of which does not allow the rhinoceros to range freely in the whole safari. The enclosure and night shelters of the black bear and the night shelters of the goral will be located in the place so they will naturally associate, albeit not physically).

Close to the Indian rhinoceros enclosure, in a body of water the gharial will be displayed in a water moated enclosure, which has area of deep water for mating, a haul out beach and a separate sand beach for breeding.

The landscaping of this drive-through will be a shallow water course lined by irrigated riparian vegetation which passes by some higher ground with taller trees on which the black bears and goral are located.

Fig. 68 : Sample Land of the Ganges and Northeast India Habitat

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Northern Pig-tailed Macaque	*Macaca leonina*	5	2:3	10		2500	200
Himalayan Black Bear	*Ursus thibetanus laniger*	2	1:1	2		3000	500
Indian Rhinoceros	*Rhinoceros unicornis*	4	2:2	6		10000 (Bollard Barrier)	1000
Barasingha	*Rucervus duvaucelii*	5	2:3	8	250000		6500
Goral	*Naemorhedus goral*	4	1:3	8			
Hog deer	*Axis porcinus*	12	4:8	20			
Manipur Brow antlered deer	*Rucervus eldii*	10	4:6	20			
Water Buffalo	*Bubalus arnee*	5	2:3	10			
Gharial	*Gavialis gangeticus*	5	2:3	8	1200	1000	200

The highlighted species will be free ranging together in the area

4.4.4.4. Central India

There are over 14 main types of forest in India, varying across the country from the Himalayan Mountain forests in the north to a dry forest in the southeast.

Forest in the Nagpur area is more Tropical Thorn Forest which is very open, with scattered trees and groups of trees and grassland. Simulating the indigenous forest type makes the most sense as it simply requires transplanting and adding some water.

In the Central India the Bengal tiger will be displayed in a moated enclosure as will the dhole and sloth bear. A range of herbivores will range freely such as chital, Indian Gaur, Barasingha, Chowsingha, wild boar, and sambar.

Fig. 69 : Example of Indian Forest Habitats

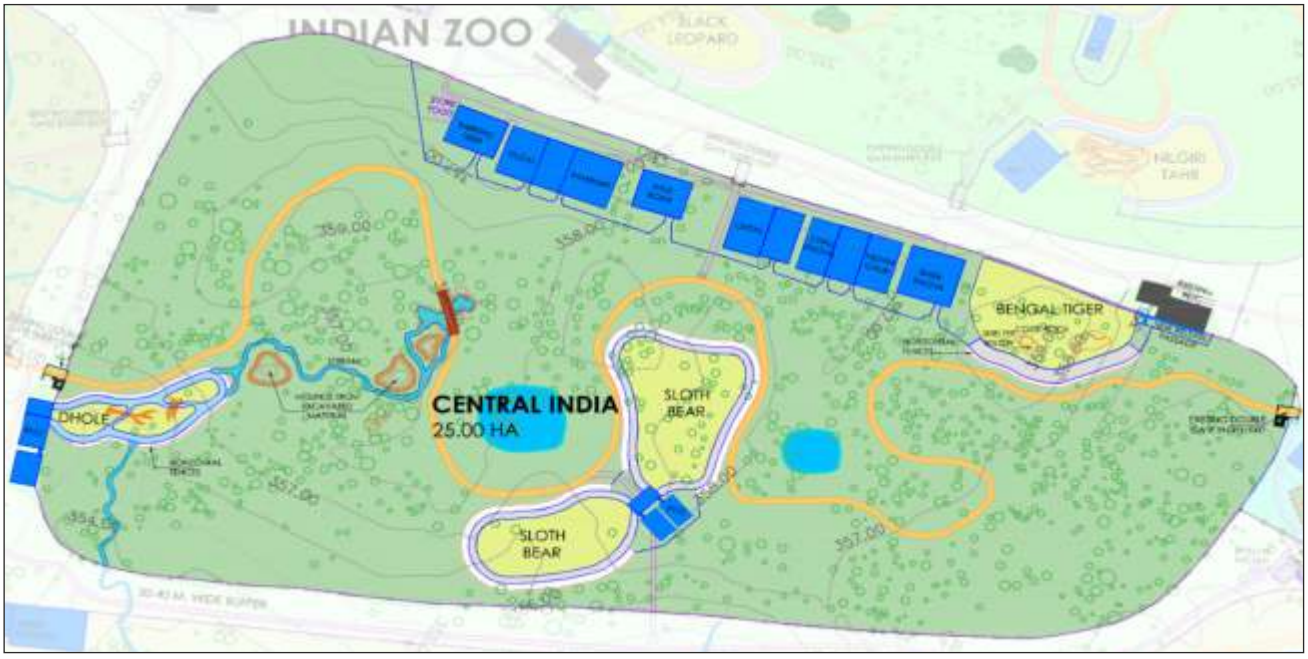


Fig. 70 : Indian Forest Safari

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Bengal Tiger	*Panthera tigris tigris*						
Chital	*Axis axis*				250000		6000
Chowsingha	*Tetracerus quadricornis*	6	2.4	10			
Indian Gaur	*Bos gaurus*						
Barasingha (Hard Ground)	*Rucervus duvaucelii*						
Barking Deer	*Muntiacuc muntjack*	12	4.8	20			
Sambar	*Rusa unicolor*						
Wild Boar	*Sus scrofa*						
Sloth Bear	*Melursus ursinus*	2	1.1	2		2500	200
Dhole	*Cuon alpinus*	2	1.1	2		3000	500

The highlighted species will be free range together in the area.

Certain sections will have a low undergrowth, while other sections will have long grass in a mixed species forest. In addition, there will be large open areas of grassland between the forests to allow visitors to view the free roaming hoofed stock.

This would provide a balanced view of what an Indian forest environment is for visitors to have an authentic experience.

However, for this enclosure the intent is to create a denser forest in parts, with different and varying characteristics; more of what is imagined as a typical forest.

In this concept, there are blocks of forest that the visitor drives through, then exiting into open grassland before either driving back into dense forest, or with forest on side of the road and grassland on the other.

The blocks of woodland are located to close off long views, so you can never see far ahead to the next attraction, which then appears as a surprise as the tram rounds a corner or comes out of dense woodland.

4.5. African Zoo

The African Zoo of 63.3 Ha will exhibit animals of African origin. It has 2 main components: the African Safari, which is a themed as Savannah Bushveld, around which visitors will take a ride in a vehicle (no walking is allowed) and a Kopje walking trail. We have carefully selected 28 species of African animals for display. All these animals will be sourced from surplus of Indian Zoo as well as foreign zoos.

A total of 17 species will be displayed in the African Safari, where 9 species of herbivores will be free ranging in the whole Savanna area. The white rhinoceros will be confined in an 1 Ha area using permeable bollards barriers to allow antelope to pass in and out. Eight species (carnivores, primates and pigs) will be confined in moated, "floating" display enclosures and bollard barriers.

The Kopje Trail is a walking trial will be exhibiting 11 species of smaller African animals. A kopje is a South African term for small, weathered rock hill which protrudes out from the African veldt. This trail offers visitors on foot a chance to view smaller animals for a much longer period of time, than viewing from the tram.

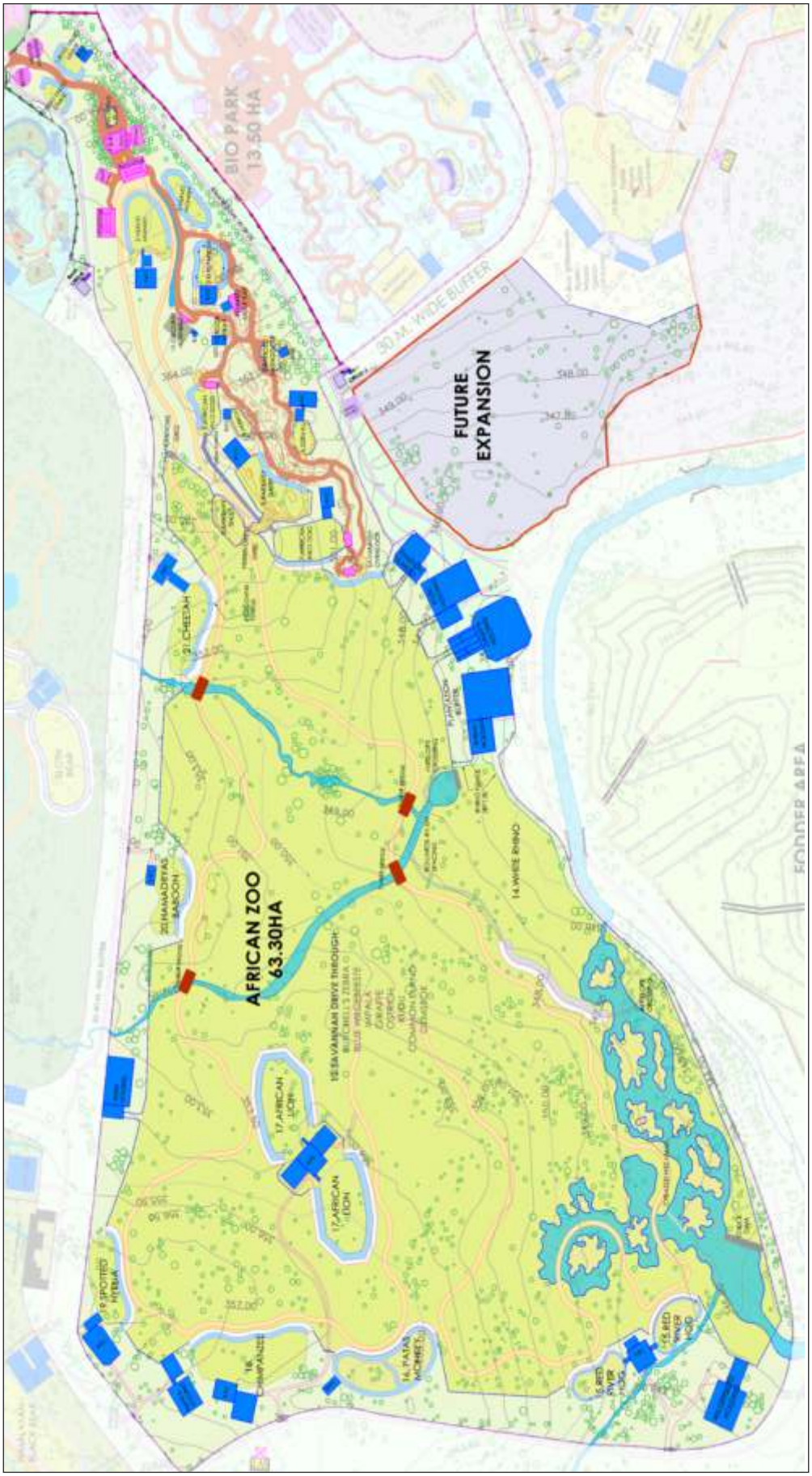


Fig. 71 : Revised African Zone Layout - V2.0. (Feb'23)

4.5.1. Species/Exhibit Rationale

The intent in this exhibit is to contrast African megafauna typically encountered in two broad African backgrounds; Savannah Bushveld and Granitic Hillock (Kopje) to promote for the visitor the sense of an immersion experience of Africa. Once again as per CZA requirements of a thematic approach to exhibits, the over-riding theme is of course," Africa", with the subthemes of the two quite different landscape types.

4.5.2. Habitats/Zones

Two principal components make up the African Zoo, viz: the drive-through Savannah Bushveld, Mountain and "Kopje" (pronounced "cop-pee") Walk. The Savanna Bushveld comprises a tram ride, whereas the Kopje walk is a walked trail. The first exhibit encountered by the visitor is a very large open Hamadryades Baboon enclosure situated at the tram station allowing visitor to sensorial engage with these large primates whilst waiting for or boarding the tram. Departing from the tram plaza, the visitor moves out into the Bushveld Savanna. This is similar to the Indian grassland experience insofar as the principal vegetation type is open grassland interspersed with "flat top" Acacia trees.

Such typically African tree-shapes do not occur within the local Gorewada area and will require pre-existing and transplanted mature local trees to be pruned and manipulated into the appropriate shape. Shadow structures and mature shade trees will be required for the animals.

The Kopje Trail will run off from the main tram hub and is a walking trail of approximately 1.5 km in length around a large artificial rock assembly, constructed to resemble the massive granite batholith hillocks (called kopjes = hillocks) that abound the savannah areas of south-central Africa, although one enclosure in particular, for North African Barbary Sheep will contain very similar large and prominent artificial rock assemblies that will closely resemble the cliff faces and heights of the Atlas Mountains in Morocco, North Africa. Once again, although the animals that inhabit these habitats in the wild are tough and enduring of environmental extremes, they will nonetheless require adequate shelter from the sun and rain. The Barbary Sheep enclosure can be seen from both the Kopje walk and the tram ride.

4.5.3. Key Species

The key species that will be encountered are as follows:

1. Savanna Bushveld: Cheetah, African Lion, African Wild Dog, Spotted Hyena and plains game including Giraffe, Zebra, Kudu, Eland, Wildebeest, Impala, Gemsbok, Ostrich, Ankole cattle and White Rhinoceros: and other African species from more forested areas are Chimpanzee, Baboons, Patas Monkey and Red River Hog.
2. Kopje Walk: Vervet Monkey, Serval, Rock Hyrax, Klipspringer, Ground Hornbill, Barbary Sheep, Banded Mongooses, Meerkats, Naked Mole Rat and Ring Tailed lemur.

4.5.4. Key Exhibit Methodology

Following the same approach adopted for Indian Zoo, the intent is to create the illusion of wild spaces inhabited by free-ranging animals, all line-of-sight sight impediments – such as fences - are to be minimized as far as is practicably possible. The hoofed stock – Giraffe, zebra and antelope – will be free-ranged within each zone as stipulated above. There will be no barrier between the trams and these animals.

Within each zone, there will be "island" exhibits containing the carnivores, chimpanzees, baboons, monkeys and hogs. There is a physical barrier between the trams and animals. These barriers will be of two types: at the front where the trams drive past, will be open (dry) moats which, using landscaped levels, will not be obvious to the visitor and afford a clear line-of-sight view into the enclosures.

The rear barriers will be chain-link fences with electric "hot" wires. These will need to conceal with vegetation to decrease their visual impact. To increase the potential impact of immersive experience, a number of these "islands exhibits" will incorporate exhibits on either side of the tram roads to double down the sensation of being surrounded by primates or red river hogs. The Savanna zone also includes two separate lion enclosures to ensure that lions are seen by the tram riders and to increase their photographic options.

A concealed fence barrier will separate the herbivorous from species in the "island" enclosures, thus preventing the herbivores from accidently falling into the moats. This will offer selected view of herbivores and other species like lion and hyena together in the same vicinity.

There are two types of barriers that can be used to prevent any mishap with the herbivores, a sunken vertical fence and a horizontal fence. Both are meant to be invisible to the tram viewer. Sunken fences do impact the water channels and are also practical in rocky areas.

Horizontal fences are more practical in rocky terrain and do not impact the water table. Vegetation can be grown through the horizontal fence to disguise it completely from view.

Fig. 72 : Example: Horizontal Herbivore Fence

The rhinoceros enclosure uses both dry moats and bollards (vertical pipes sunk and cemented into the ground at intervals of 1m) to prevent the rhinoceros from leaving but allowing the slimmer antelopes to move freely in and out of the rhinoceros enclosure.

The Kopje walking trail will incorporate the same "walk by" enclosure types, although the principal barriers will be glass panes and glass walls rather than moats. Naked mole rats will also be on exhibit along the trail, and these will require entry into covered, dimly lit grottos within the artificial rock assemblages to view these animals in glass-fronted terraria.

4.5.5. Kop-je Walk

The Kopje Walk displays a range of smaller African animals which do not display well from a moving tram, viewed at some distance. The Kopje Walk allows visitors to slowly walk around and view a range of species, some like the klipspringer and rock hyrax, which are associated with kopjes. Vervet monkeys are a common medium sized monkey which will be viewed from the tram stop for visitors awaiting a tram ride. Small animals like the highly social banded mongoose and meerkats are crowd favorites because of their activity. Naked mole rats will be displayed in Perspex tunnels which simulate a subterranean matrix of tunnels. And Barbary sheep will have to opportunity to leap over the heads of the tram visitors from one part of their enclosure to the other.

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Exhibit (SQM)	Holding Yard (SQM)
Banded Mongoose	*Mungos mungo*	6	2:4	20	300	80
Barbary Sheep	*Ammotragus lervia*	6	2:4	10	8000	500
Klipspringer	*Oreotragus oreotragus*	5	2:3	8	1000	200
Meerkat	*Suricata suricatta*	6	2:4	12	300	80
Naked Mole Rat	*Heterercephalus glauberi*	12	2:1:9	30	20	N/A
Ring Tailed Lemur	*Lemur catta*	6	2:4	15	500	80
Rock Hyrax	*Procavia capensis*	5	2:3	15	500	100
Serval	*Leptailurus serval*	2	1:1	4	500	100
Southern Ground Hornbill	*Bucorvus leadbeateri*	2	1:1	4	500	80
Vervet Monkey	*Chlorocebus pygerythrus*	5	2:3	10	1000	200
African wild dog	*Lycaon pictus*	2	3	0	5	2305

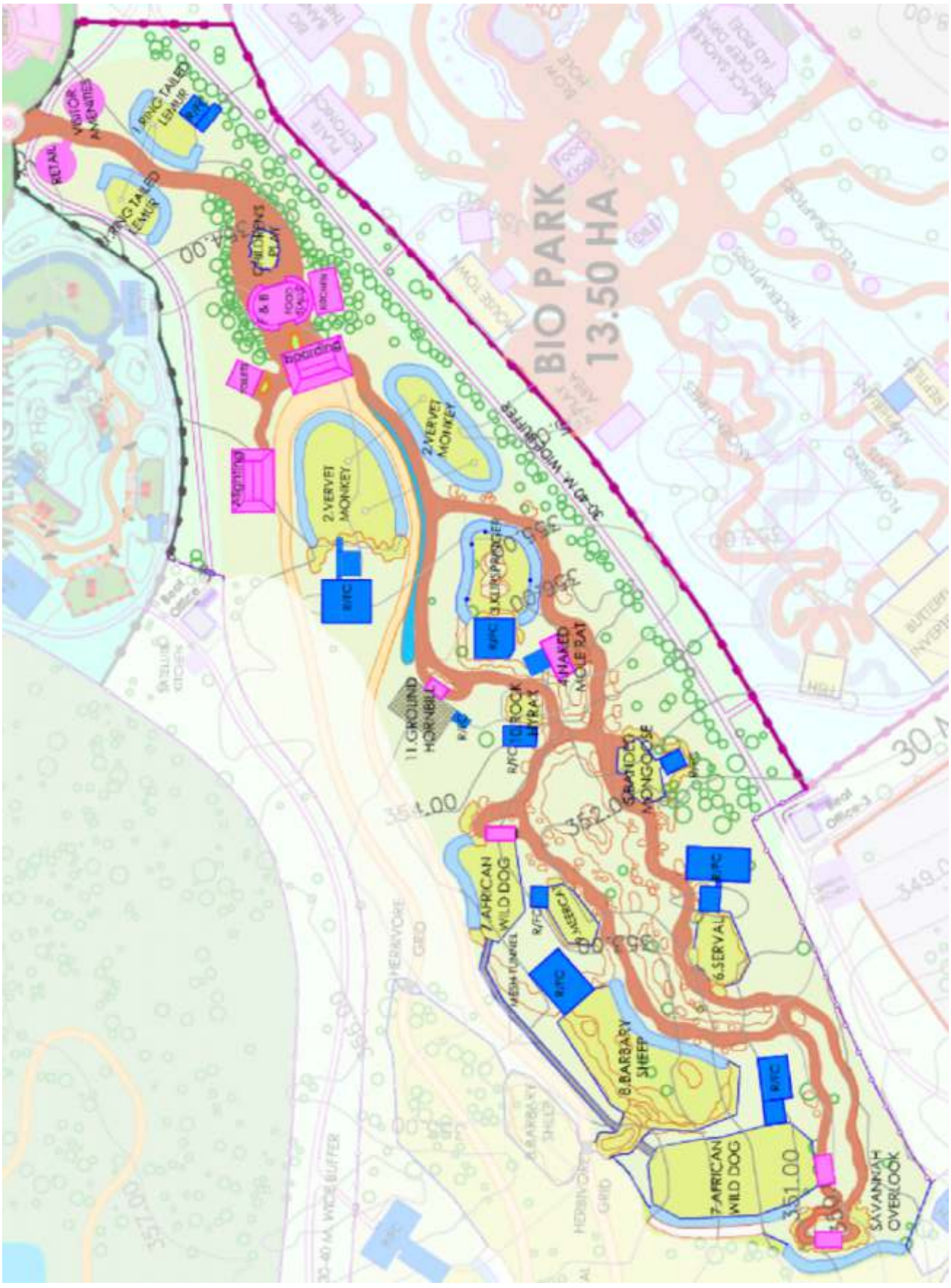
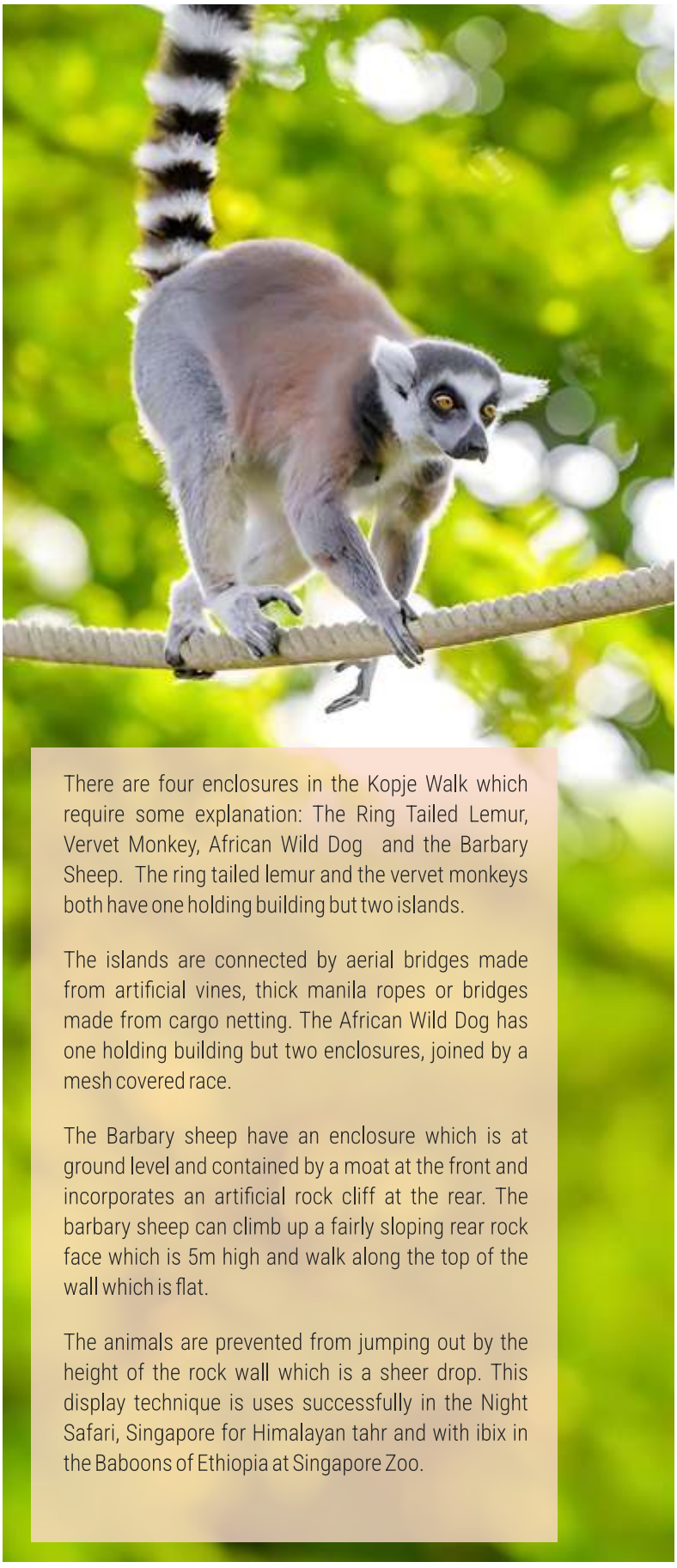


Fig.73 : Kopje Walk



There are four enclosures in the Kopje Walk which require some explanation: The Ring Tailed Lemur, Vervet Monkey, African Wild Dog and the Barbary Sheep. The ring tailed lemur and the vervet monkeys both have one holding building but two islands.

The islands are connected by aerial bridges made from artificial vines, thick manila ropes or bridges made from cargo netting. The African Wild Dog has one holding building but two enclosures, joined by a mesh covered race.

The Barbary sheep have an enclosure which is at ground level and contained by a moat at the front and incorporates an artificial rock cliff at the rear. The barbary sheep can climb up a fairly sloping rear rock face which is 5m high and walk along the top of the wall which is flat.

The animals are prevented from jumping out by the height of the rock wall which is a sheer drop. This display technique is uses successfully in the Night Safari, Singapore for Himalayan tahr and with ibix in the Baboons of Ethiopia at Singapore Zoo.

Fig. 74 : Ring tailed lemur on rope bridge.

Fig. 75 : A banded langur on overhead bridge made from rope and cargo nets.

Fig. 76 : 5m rock outcrop is too high for the tahr to jump to ground.

Fig. 77: Ibex on top of a wall which they can climb up and walk around.

The Barbary sheep can jump across to gap of 3m to the second raised 'island' of rock on the other side of the tram road. Please see illustration below:

Fig. 78 : Model of the Barbary Sheep enclosure illustrating the flat area on top of the rock walls of the enclosure

4.5.6. African Savanna

Visitors take a vehicle into a drive-through savanna which houses a variety of antelopes, giraffe and ostrich which occupies much of the safari.

Along the journey, on the periphery of the safari, visitors encounter a variety of animals in moated enclosures, such as lions, hyena and chimpanzees. Barriers and holding buildings will be as per CZA guidelines. and enclosure designs are made in consistence with CZA guidelines.

The overall effect is to immerse the visitors in a savanna experience, where they see both predator and prey simultaneously. To reduce stress on the herbivores and to prevent them accidentally falling into a moat of a carnivore enclosure, they will be separated by a sunken herbivore proof fencing or a horizontal fence which will prevent such an occurrence.

The antelope, giraffe and ostrich will be contained in the safari with cattle grids at the entrance and exit. The white rhinoceros will be contained in a large enclosure which is permeable in sections (with the use of bollards) to allow antelopes to pass freely in and out but contain the rhinoceros.

Difference in terrain and vegetated undulations will create a sense of adventure and vastness and allow herbivores to hide from predators if they so wish. The species to be acquired and displayed for the African Safari are as follows:

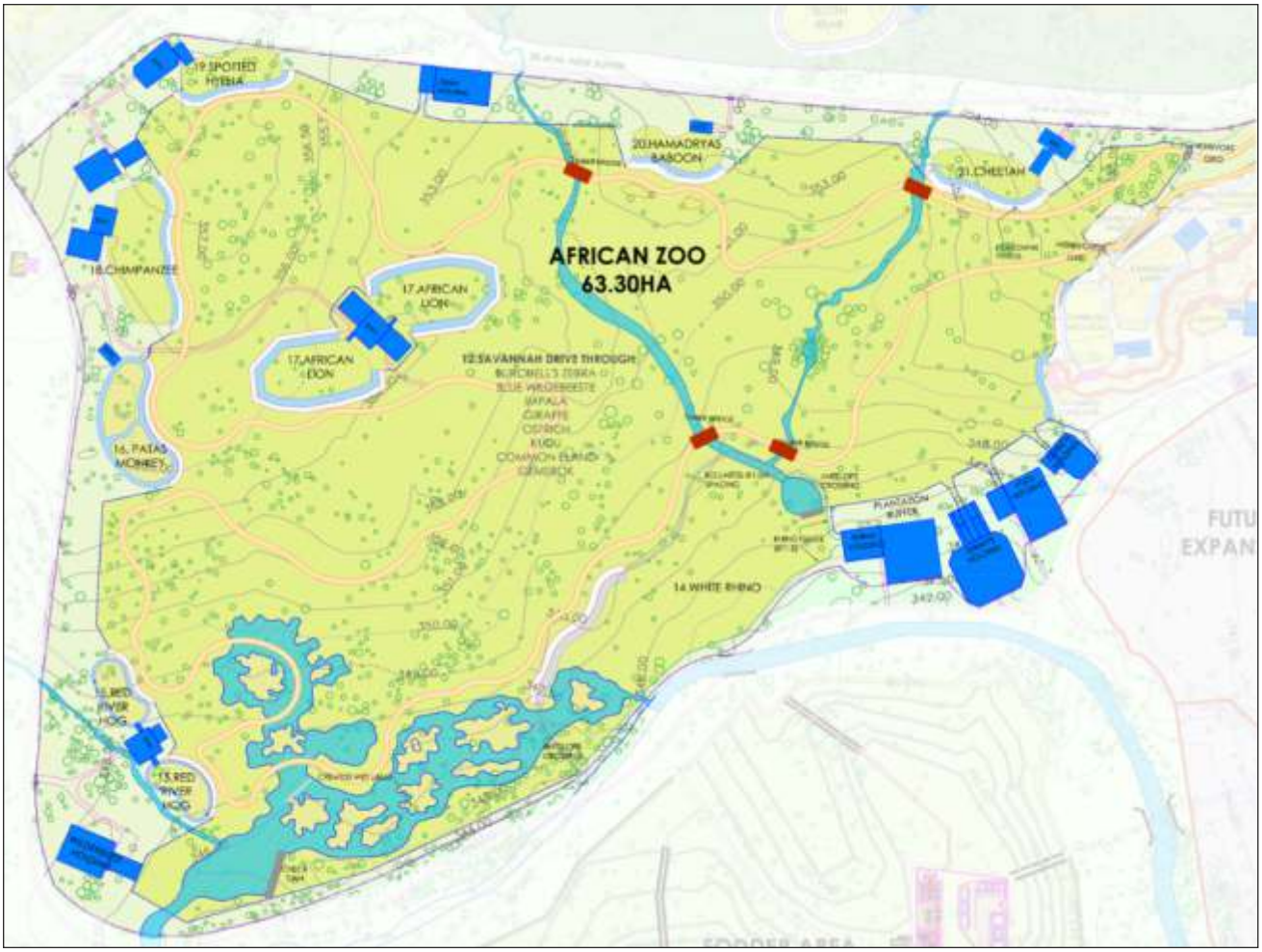


Fig. 79 : African Zoo - Savanna Safari

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
African Lion	*Panthera leo*	3	1.2	6		3000	500
African Wild Dog	*Lycaon pictus*	5	2.3	10		2500	1000
Giraffe	*Giraffa camelopardalis*	4	2.2	8	300000		8000
White Rhinoceros	*Ceratotherium simum*	4	1.3	6		10000 bollarded	2000
Kudu	*Tragelaphus strepsiceros*	6	2.4	8			
Common Eland	*Taurotragus oryx*	6	2.4	10			
Blue Wildebeeste	*Connochaetes taurinus*	8	3.5	12			
Burchell's Zebra	*Equus quagga burchellii*	5	1.4	10			
Impala	*Aepyceros melampus*	8	3.5	20			
Gemsbok	*Oryx gazella*	6	2.4	16			
Ostrich	*Struthio camelus*	6	3.3	10			
Cheetah	*Acinonyx jubatus*	2	1.1	4		2500	200
Chimpanzee	*Pan troglodytes*	4	2.2	8		5000	500
Hamadryas Baboon	*Papio hamadryas*	6	2.3	20		2000	500
Patas Monkey	*Erythrocebus patas*	5	2.3	8		1000	100
Red River Hog	*Potamochoerus porcus*	5	2.3	12		1500	100
Spotted Hyena	*Crocuta crocuta*	4	2.2	6		2500	200

The highlighted species fill denoted a shared enclosure with other.

4.5.7. Landscaping

African Zoo layout has been planned to highlight beauty of savanna grassland in a drive through safari exhibit. The landscape will match a typical Savanna where a mixed woodland grassland ecosystem characterized widely spaced trees that does not close the canopy.

The area designated for African Safari, has poor quality soil with gentle slopes. This has naturally resulted in bushy and grassland vegetation. Acacia catechu is dominant tree species at designated site which gives and advantage for the theme. To match with African landscape, the safari enclosure will be planted with tall growing Acacia spp.

The area designated for African safari has two natural water streams. These are seasonal streams that usually dry up after monsoon. This area will be treated for watershed development, and efforts shall be made to make perennial availability of water in these streams. Additional lined waterbodies shall be created for drinking water availability.

Fig. 80 : African Zoo - Savanna Safari

4.5.8. Kopje Walk Concept

The Kopje walk is a walking trail within the African Zoo. This walking trail will have moated and closed enclosure to display animal diversity of Kopjes of the Serengeti. Serengeti is a vast plain of grassland, woods and swamps, that stretches from north-western Tanzania into south-western Kenya. The plains are home to approximately 70 large mammal and some 500 avifauna species, including the largest terrestrial mammal migration in the world.

An inselberg is an isolated rock hill, ridge, or small mountain that rises abruptly from a gently sloping or virtually level surrounding plain. In southern and south-central Africa, a similar formation of granite is known as a koppie, an Afrikaans word ("little head") from the Dutch word kopje. Outcrops of granite that stick out like rocky islands in a sea of grass are called kopjes.

Many species of plants that cannot grow on the savanna are found only on the kopjes. In turn, a unique habitat is developed that is home to a wide variety of animals—insects, reptiles, birds, and mammals.

Kopjes were formed when the soft volcanic rock and ash that covers Serengeti were eroded away to expose the extremely old metamorphic rock below. Standing majestically around plains of savannah with vegetation dominated by bushes and grass. These beautiful metamorphic rocks consist of very hard granite capable of resisting erosion from rain and harsh tropical winds. Aside from providing a scenic contrast to the surrounding grasslands, kopjes provide habitat for many creatures because of the presence of a variety of plants, caves for dwelling, water, and a vantage point for Serengeti's many predators. Kopjes are refuges for life in the Serengeti. The Kopje walk is themed to exhibit diversity of kop-je habitat. Showcases the list of animals to be exhibited in Kopje Walk

Fig. 81 : Kopje in African Savanna

The weathered, cracked and rounded surface harbours insects, birds, lizards and snakes, to mammals such as shrews and mice. The elevated rocks are perfect places to warm up in the morning or evening sun and provide an ideal viewpoint for animals to survey the plains for food.

One kopje found much publicity for providing inspiration for some of the scenes in the movie "The Lion King". The kopje was thus named Simba Kopje. This Simba Kop-je will be created artificially in Lion enclosure as part of the enclosure theme.

The Kopjes will be created out of hand carved and coloured gunnite (shotcrete). Strategically located artificial rocks made in zoo will be fitted with copper pipes carrying cold or hot water can be used as environmental enrichment.

An inselberg is an isolated rock hill, ridge, or small mountain that rises abruptly from a gently sloping or virtually level surrounding plain. In southern and south-central Africa, a similar formation of granite is known as a koppie, an Afrikaans word ("little head") from the Dutch word kopje. Outcrops of granite that stick out like rocky islands in a sea of grass are called kopjes.

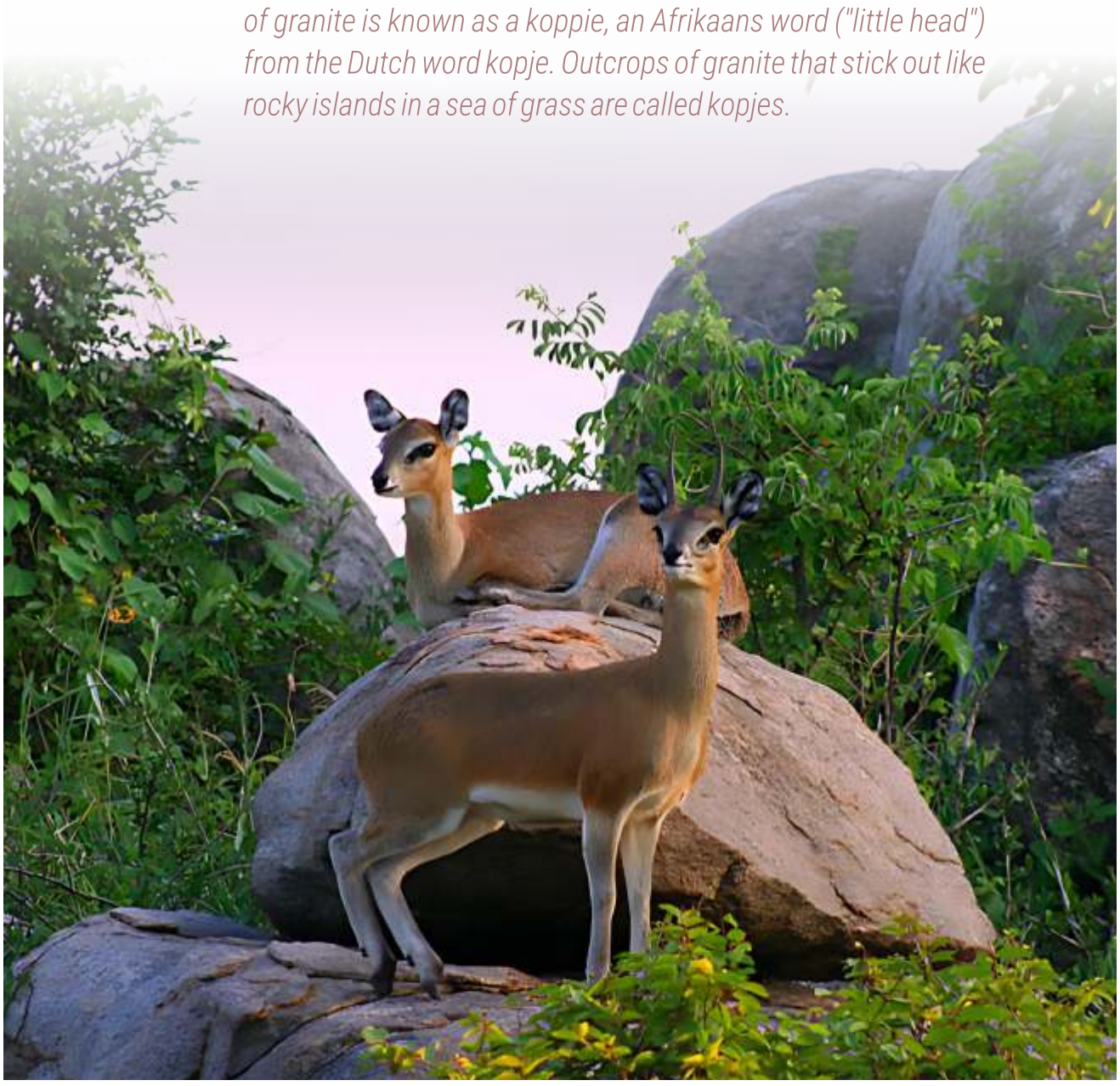


Fig. 82 : Klipspringer in a Kopje themed habitat

4.6. Gondwana Park

In the initial Master Layout Plan there was a Bird Park of 10.5 Ha planned to display a variety of Indian species of birds. Due to challenges faced in the acquisition of a variety of Indian birds, it was decided to change the concept of this park and take the central theme as Gondwana.

4.6.1. Storyline of Gondwana Park

The Gondwana Park concept is of the single continent Pangea which broke into Laurasia and Gondwana and the tectonic plate theory: the movement of five continents masses of Gondwana which separated into: South America, Africa, India (and Madagascar), Australia and Antarctica.

To add credence to the storyline, Gondwana is a region of India named after the Gond people, located within the larger region of eastern Maharashtra. Gondwanaland, Earth's earliest continent, was named after Gondwana because the planet's earliest rock formations were first investigated here.

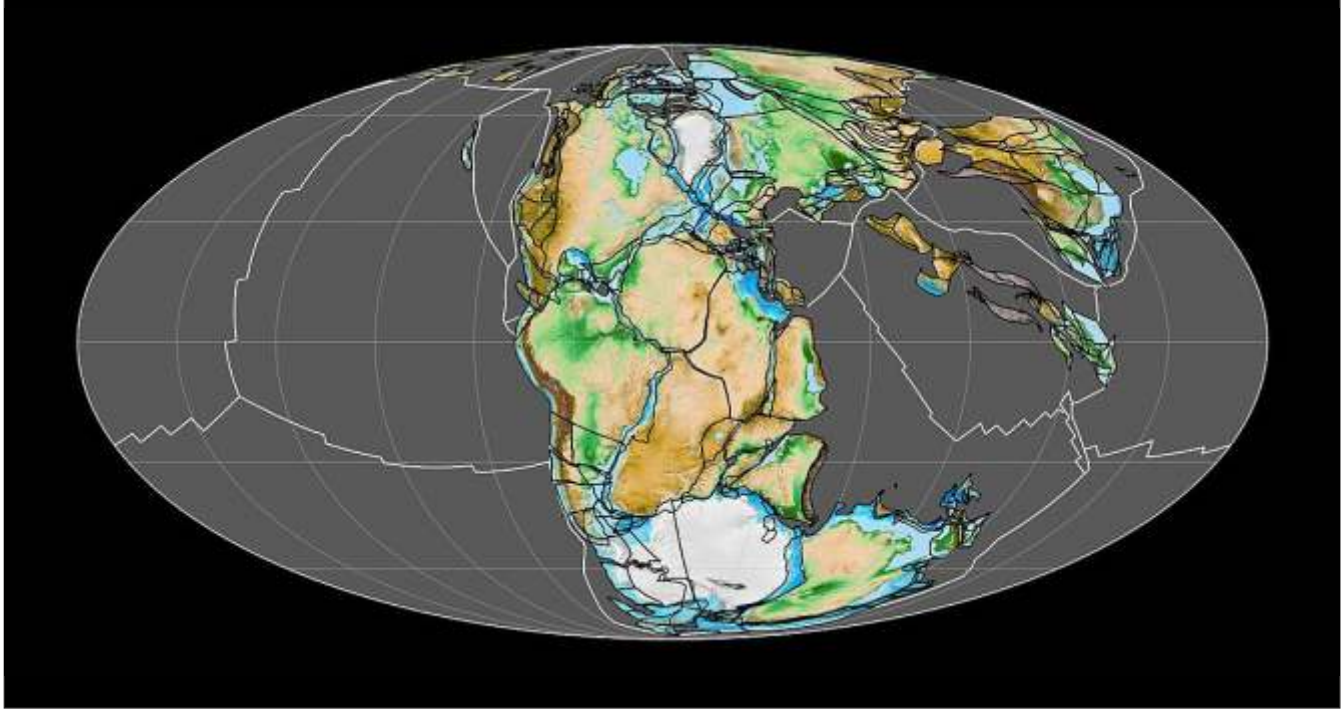


Fig. 83 : Pangea Landmass

4.6.2. Species & Exhibit Rationale

The concept of the Gondwana Park is to explain the concept of the tectonic plate movement and the way Gondwana eventually drifted apart, especially that India eventually sutured into Eurasia and created the Himalayas.

After visiting an interpretation centre and watching a presentation on the continental drift over the past 150 million years ago (mya), the visitors will then visit five zones, each representing one of the five continents with some striking examples of the animals (and plants) of each continent.

Thus, the Indian subcontinent will be represented by the pied and wreathed hornbill in standalone aviaries at the entrance and a walking aviary with a mixed species of birds with an emphasis on water birds, as these are the easiest to acquire.

Fig. 84: Gondwana Park Layout

4.6.3. Interpretation Centre, Gondwana Park

200 mya there was only one land mass on Earth, called Pangea. About the same time, during the Triassic period, Dinosaurs emerged and evolved on Pangea. About 150 mya, Tectonic Plate activity broke the Pangea mass into two pieces, forming two super-continents: Laurasia and Gondwana.

Fig. 85: Movement of landmass - 1. North America | 2. Eurasia | 3. South America | 4. Africa | 5. India | 6. Antarctica | 7. Australia

Gondwana then gradually fragmented into the five land masses of South America, Africa, India, Antarctica and Australia. Through the Continental Drift process, South America moved up to join North America, while Africa and India moved to join Eurasia.

Some 65 mya, during its migration past Africa towards Eurasia, India passed over the Réunion Hotspot (presently off the coast of Africa - at the Réunion Islands) which has been active for over 65 million years. This caused the creation of the huge Deccan Super Volcano which erupted for 300,000 years, releasing 2,000 cubic kilometres (km^3) of magma laid down as basalt, covering 1.5 million square kilometres (km^2). This material, two km thick in places, formed the Deccan Traps.

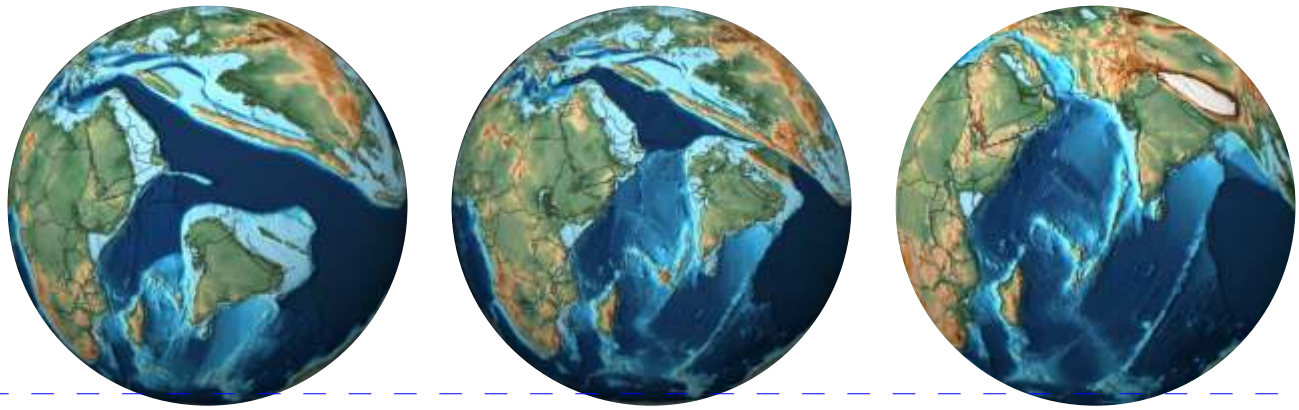


Fig. 86: Subcontinet movement: India 65mya > India 50mya > Indian 30mya

It is postulated that the eruption of the Deccan Super Volcano was stimulated by a series of asteroids that hit Earth in Mexico, the Ukraine, the North Sea and off Mumbai some 65 mya, starting a chain reaction of earthquakes and volcanic activity.

The Shiva crater off Mumbai is the largest testimony to this activity, measuring 600 km long and 400 km wide. These two events led to global climate change and caused a mass extinction of 75% of existing animal species including the Dinosaurs. This marked the end of the Cretaceous and the beginning of the Tertiary period and created the so-called 'K-T Boundary', a thin grey line laid into the rock across the Earth, denoting this single catastrophic event in Earth's history.

Fig. 87: The Deccan Traps

An other interesting geological event took place about 500,000 years ago in the Buldhana district, Maharashtra when a meteorite struck creating the 1sq km Lonar Lake. This is the only known hyper velocity impact crater in basaltic rock anywhere on Earth.

Fig. 88: Lonar Lake

Fig. 89: The Himalayas from Pokhara, Nepal

Gond - Abujh Maria, India

Further Tectonic Plate Activity 45 mya caused the Indian subcontinent to collide with Eurasia, suturing itself to Eurasia about 20 mya and continuing to penetrate 2,500 km inland into Eurasia. These massive tectonic plate movements created the 5,000-metre high Plateau of Tibet and the 7,000m high Himalayas, the tallest and youngest mountain chain in the world.

The Gond tribal people of India are inadvertently known worldwide, for it is their culture that is embedded in and is the source of the name for 'Gondwanaland' - the huge landmass that once comprised what has since broken up to become Africa, Antarctica, Australia, and India.

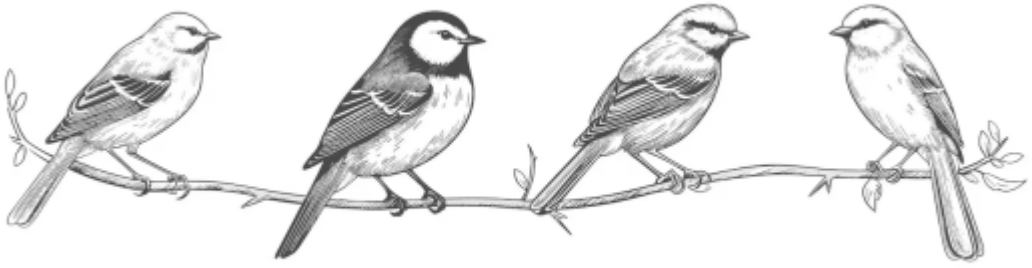
It was rock formations found in the Gondwana region, near Orissa to the east of Maharashtra, that finally confirmed the geological narrative, telling of the tectonic plate bearing the continent of India that jammed into Eurasia to form the Indian subcontinent. Hence, geologists bestowed the Gond name on the entire ancient super-continent of Gondwanaland.

4.6.4. Indian Subcontinent

The Indian Subcontinent will be represented by two hornbills and a major walk-in aviary with 36 species of Indian birds, most of which will be sourced from Indian zoos. A few Indian species which are difficult to acquire locally will be acquired from foreign zoos. These would be such species as the Pied and Wreathed hornbills and the Asian Koel and Coppersmith Barbet.

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Oriental Pied hornbill	*Anthracoceros albirostris*	2	1.1	3		300	
Wreathed Hornbill	*Rhyticeros undulatus*	2	1.1	3		300	
Blue peafowl	*Pavo cristatus*	6	3.3	10	10000		500
Coppersmith Barbet	*Psilopogon haemacephalus*	4	2.2	6			
Hill Mynah	*Gracula religiosa*	4	2.2	8			
Nicobar Pigeon	*Caloenas nicobarica*	4	2.2	10			
Pied Mynah	*Gracupica contra*	4	2.2	8			
Red billed Blue Magpie	*Urocissa erythrorhyncha*	4	2.2	6			

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Rose-ringed Parakeet	*Psittacula krameri*	8	4.4	16			
Grey Jungle Fowl	*Gallus sonneratii*	6	3.3	16			
Bar-headed Goose	*Anser indicus*	4	2,2	10			
Black Pond Terrapin	*Melanochelys trijuga*	8	3,5	15			
Black-headed Ibis	*Threskiornis melanocephalus*	4	2,2	10			
Cattle Egret	*Bubulcus ibis*	6	3,3	20			
Comb Duck	*Sarkidiornis sylvicola*	4	2,2	10			
Common Coot	*Fulica atra*	6	3,3	10			
Flapshell Turtle	*Lissemys punctata*	8	3,5	15			
Gargney	*Spatula querquedula*	6	3,3	10			
Greater Cormorant	*Phalacrocorax carbo*	4	2,2	8			
Greylag Goose	*Anser anser*	4	2,2	10			
Indian Cormorant	*Phalacrocorax fuscicollis*	4	2,2	8			
Indian Grey Heron	*Ardea cinerea*	4	2,2	6			
Indian Roof Terrapin	*Pangshura tecta*	8	3,5	15			
Indian Tent Terrapin	*Pangshura tentoria*	8	3,5	15			
Lesser Whistling Teal	*Dendrocygna javanica*	4	2,2	10			
Little Egret	*Egretta garzetta*	6	3,3	10			
Mugger Crocodile	*Crocodylus palustris*	5	2,3	8			
Night Heron	*Nycticorax nycticorax*	6	3,3	20			
Painted Stork	*Mycteria leucocephala*	6	3,3	10			
Pond Heron	*Ardeola grayii*	6	3,3	20			
Purple Heron	*Ardea purpurea*	2	1,1	4			
Red-crested Pochard	*Netta rufina*	6	3,3	10			
Sarus Crane	*Grus antigone*	4	2,2	8			
Spoonbill White	*Platalea leucorodia*	4	2,2	10			
Spot billed Pelican	*Pelecanus philippensis*	4	2,2	10			
Spot-billed Duck	*Anas poecilorhyncha*	4	2,2	10			
White Stork	*Ciconia ciconia*	2	1,1	8			
Wooly-necked Stork	*Ciconia episcopus*	2	1,1	8			



4.6.5. African Continent

This will be represented by two iconic species of mammals, the black and white colobus monkey which is displayed on an island and the pygmy hippopotamus viewed under water in an acrylic fronted tank. A walk-in aviary displays a range of African birds.

Fig. 90: Black and White Colobus monkey

Pygmy hippopotamus viewed underwater

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Pygmy hippo	*Choeropsis liberiensis*	3	1.2	5		1500	500
Black and White Colobus monkey	*Colobus angolensis*	5	2.3	8		1000	200
Red and Yellow Barbet	*Trachyphonus erythrocephalus*	4	2.2	8	4000		
Egyptian Goose	*Alopochen aegyptiacus*	4	2.2	10			
Grey Crowned Crane	*Balearica regulorum*	4	2.2	6			
Hamerkop	*Scopus umbretta*	2	1.1	4			
Lesser flamingo	*Phoeniconaias minor*	10	5.5	20			
Sacred Ibis	*Threskiornis aethiopicus*	8	4.4	16			
Saddle billed stork	*Ephippiorhynchus senegalensis*	2	1.1	4			
South African Shelduck	*Tadorna cana*	4	2.2	10			
Vulturine Guineafowl	*Acryllium vulturinum*	4	2.2	10			
Yellow billed hornbill	*Tockus leucomelas*	4	2.2	6			
Yellow Bishop	*Euplectes capensis*	8	4.4	16			

4.6.6. South America Continent

South America is represented by a flight aviary that displays one of the most exciting birds, the macaws. Both Blue gold and Scarlet macaws will be displayed and the walk-in aviary which is designed to maximize on their potential to fly, which they can do very well.

A rock cliff will offer them mineral supplements and nesting places. Other compatible South American birds will be on display.

Fig. 91 : Blue gold and Scarlet macaws on a mudbank

Fig. 92 : Blue gold and Scarlet macaws in flight

Displayed on islands outside the aviary will be groups of spider monkeys and squirrel monkeys and a family group of cotton top tamarins.

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Cotton Top Tamarin	*Saguinus oedipus*	2	1.1	6		50	10
Black Spider Monkey	*Ateles paniscus*	3	1.2	5		500	80
Squirrel monkey	*Saimiri boliviensis*	6	3.3	10		300	50
Blue Gold macaws	*Ara ararauna*	6	3.3	16	4000		
Grey-winged Trumpeter	*Psophia crepitans*	4	2.2	6			
Blue and Yellow Tanager	*Thraupis bonariensis*	6	3.3	10			
Ocellated turkey	*Meleagris ocellata*	4	2.2	8			
Red-capped Cardinal	*Paroaria gularis*	6	3.3	8			
Roseate Spoonbill	*Platalea ajaja*	6	3.3	12			
Scarlet Ibis	*Eudocimus ruber*	6	3.3	16			
Scarlet Macaw	*Ara macao*	6	3.3	16			
Toco Toucan	*Ramphastos toco*	4	2.2	8			
Two-toed Sloth	*Choloepus didactylus*	2	1.1	4			

Fig. 93 : Rainbow Lorikeet bathing in a artificial rock bird bath

4.6.7. Australian Continent

Australia will be represented by a 2,500sqm walk-in aviary which will display two species of the colourful and noisy lorikeets and bush turkeys and crowned pigeons will occupy the ground space. Offering some exhibition of marsupials will be a tree kangaroo and is this wallaby exhibit.

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Goodfellow's Tree Kangaroo	*Dendrolagus goodfellowi*	2	1.1	4		500	100
Red-necked Wallaby	*Macropus rufogriseus*	4	2.2	8		2500	200
Cardinal Lory	*Chalcopsitta cardinalis*	10	5.5	20	2500		100
Rainbow Lorikeet	*Trichoglossus haematodus*	10	5.5	20			
Southern Crowned Pigeon	*Goura scheepmakeri*	4	2.2	6			
Wattled Bush Turkey	*Aepypodius arfakianus*	4	2.2	6			

4.6.8. Antarctica

It is very difficult to represent the Antarctic continent as it will require creating very cold conditions for polar penguins. It is felt a comprises is to display a group of African (Jackass) penguins which are sub-tropical and will require much less stringent climate control.

A range of graphics and imagery will depict the other species of penguins of the Antarctic.

The design is based on developing a translucent biodome in which the penguins will be kept at a temperature of about 19°C. This indoor enclosure will house a colony of about 20 individuals. The penguins will also be able to an outdoor enclosure which is connected by land and water to the indoor enclosure.

The penguins can move freely in and outdoors through a door with an air-curtain and a small opening which connects the indoor and outdoor pools. This will allow all the penguins to access to natural sunlight and air, especially in winter when it is not too hot.

Visitor can view the penguins on land and underwater, viewed through an acrylic viewing panel.

Fig. 94: An outdoor Humboldt penguin enclosure at Emmen Zoo, Holland

Species	Scientific Name	Numbers (Acquire)	Sex Ratio (Acquire)	Carrying Capacity	Total Exhibit Footprint (SQM)	Exhibit (SQM)	Holding Yard (SQM)
Jackass Penguin	*Spheniscus demersus*	10	5.5	20		1500	200

Fig. 95: Jackass Penguin outdoor enclosure at Jurong Bird Park, Singapore / Underwater viewing of penguins

4.7. Trail of Senses

Nature should be smelled, heard, touched, tasted and seen. The trail of senses will be a park where there will be explanatory signs explaining about these five senses. It will be designed to stimulate one's sensory responses to the environment and giving general information about the various healing herbs and the local wildlife. An amalgamation of colour and fragrance, texture and form will evoke the awareness of touch, smell, sight, sound and taste. It will also display dynamic works of art. Walking this trail will be an educational experience for the visitors.

Introduced as a smaller trail to exhibit and educate people in the role of sensory perception in humans and other animals in an entertaining manner. The Trail is subdivided into sections, each with a primary focus on one of the senses, or absence of that sense; and with smaller exhibits for the other senses. Each area will have a guide and animal mascot with a sensory perception relating to the topic. Exhibits are static and low-tech, keeping things simple. For example: a helmet that you put your head into, shows a bee's eye view; speakers that can broadcast the elephant calls made for different purposes; touching different materials in the dark to guess what they are; live animal exhibits illustrating their special properties and their function.

A grouping of enormous Bamboo announces the Entry, which leads directly into an introductory set of exhibits within a building. The trail then proceeds through a Bamboo grove (quiet zone); a Gibbon and Animal Sound Zone (sound), a Dark Cave (senses in absence of light); over a water body and into a Bright Zone with huge banks of flowering plants (colour), leading to a herb and spice garden associated with the Food & beverage outlets (taste) and finally a series of interactional exhibits summarising the trail. All along the trail will be small exhibits and a few optional fun and physical challenges, such as crossing a stream by a log (balance) or feeling your way in the dark by following a textured path.

Nature should be smelled, heard, touched, tasted and seen. The trail of senses will be a park where there will be explanatory signs explaining about these five senses.

- That we depend on water which gives us life.
- That we perceive the world around us by a combination of senses and each has its own unique function.
- That there are other senses used by animals (and plants) to perceive and engage the world.
- That denied of these senses - we are impoverished at best and incapacitated at worst.
- That our consciousness is partly defined by our combination of senses.

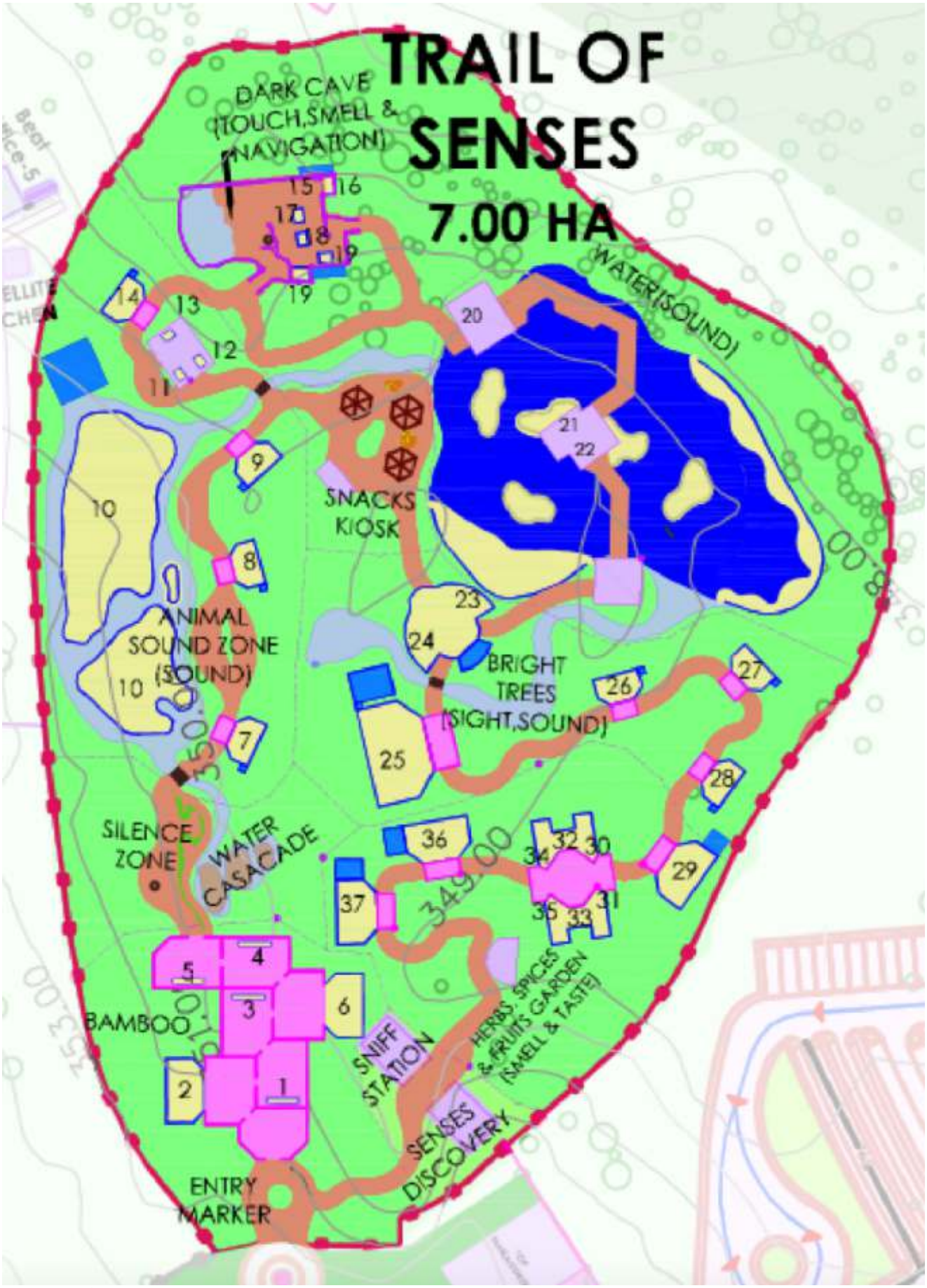


Fig. 96 : Trail of Senses Layout

4.7.1. Visitor experience in the Trail of Senses

The Pre-show Area will initially be at the Temporary Entrance, before the Cave, but will move to the Permanent Entrance Interpretation Centre. The Pre-show will consist of a dark room in which a large (4 - 5m sized) a man will be floating.

Using face mapping imagery, the man's features will respond to a commentary which talks about the various senses:

1. Sight (eyes blink)
2. Smell (nostrils dilate)
3. Sound (ears twitch)
4. Taste (tongue licks lips)
5. Touch (cheeks puff out)

Factors for Consideration

1. There needs to be an interesting story to engage visitors along the trail to avoid visitor fatigue.

2. "SENSE" is a bit abstract as the ability to sense varies from person to person. When a group of 50 visitors enter the TRAIL, we will need to bring them all to a basic common level of understanding, so that they enjoy the experiences ahead.

3. To achieve this, we can create a PRE-SHOW of about 5 mins duration which will explain the ability of human beings and other animals to sense in an a very interesting way.

4. There are many animals who have sharper and stronger senses than man, which will be used as mascots to engage the visitors to that 'particular' sense.

    - Smell - Dog
    - Sight - Eagle
    - Taste - Snake
    - Touch - Monkey
    - Sound - Bat

5. In the Pre-show area, we will have a very expressive huge face (about 4 to 5 meters in height) which will talk to people (by the technique of face mapping). It will be explained in a very humorous way how eyes, ears, tongue, nose and other sensory organs work.

6. Then we enter the actual trail area, which has been divided into 5 zones related to the five senses, e.g. sight, smell, sound, touch and taste

7. At each zone we will create a small shaded area where with holographic presentation, the mascot will appear and will share interesting information about other animal senses.

8. The holographic display will make sure that it is unobtrusive and merges completely in the natural surroundings.

9. We will need small technical areas to house server and other show control equipment at each of the zone as well as the pre-show area.

10. We can add interactive areas like permanently erected face masks of animals through which visitors can gain insight into sensory powers of other animals.

11. In the 'Taste' zone, we can have small ice cream garden or similar exhibits where visitors will be able to experience plants of various ice cream flavours. There will also be a kitchen for children's cooking classes.

12. Thus there will be the following Mascots around the Trail:

    - Animal Sound Zone (primary sense - sound: mascot - bat)
    - Dark Cave (primary sense - touch: mascot - monkey)
    - Bright Trees and Birds (primary sense - sight: mascot - eagle)
    - Herbs, Spices and Fruits (primary senses - taste and smell: mascots - snake and dog)
    - Water Body (primary sense - sound: mascot - bat)

4.7.2. Iconic Zone Marker for the Trail of Senses

A clump of Dendrocalamus giganteus also known as Giant Bamboo or Dragon Bamboo, which is the tallest of all bamboos with gigantic, large culms between 25-35 m tall and 15-30 cm in diameter. The clumps of bamboo are thick-walled (2-2.5 cm).

Fig. 97 : Examples of Dendrocalamus giganteus

4.7.3. General Narrative for the Trail of Senses

The Trail of the Senses is a self-indulgent exploration of completely sensory experiences and sensual awareness. It is divided into several sensory component areas, as follows:

1. Interpretation Centre
2. Bamboo Cave (Silence)
3. Animal Sound Zone (primary sense - sound: mascot - bat)
4. Dark Cave (primary sense - touch: mascot - monkey)
5. Bright Trees and Birds (primary sense - sight: mascot - eagle)
6. Herbs, Spices and Fruits (primary senses - taste and smell: mascots - snake and dog)
7. Water Body (primary sense - sound: mascot - bat)
8. Sense Discovery Stations

Although some components highlight certain senses more than others, each component will illustrate the senses, as and when appropriate.

4.7.3.1. Introduction and Interpretation – Area 1

The purpose of the interpretation centre is to offer the visitor an overview of the Trail of the Senses, giving examples and a background to the senses we have selected, which are mainly used by man. It highlights some of the senses used by animals such as navigation in birds, bats, fish and snakes.

The trail begins with walking into a darkened, airconditioned room with absorbent walls and ceiling, and a rubberized floor to cut down on reflected sound. (If possible, the structure is made from bamboo, which is either air-conditioned or else extremely well-ventilated structure with a tall roof).

It is an introductory area of interpretive graphics and video presentations explaining the science of sensory perception, and the many ways in which other creatures communicate using methods beyond our natural reach. It is a noisy and busy area with lots of things going on.

Fig. 98 : Conceptual Example of the Introduction Area

Fig. 99: Hologram of a Bat as the Mascot for the concepts of sound and navigation

Animal Exhibits

There will be one animal exhibit illustrating each of the senses. Some in illuminated tanks and others glass fronted enclosures which have their aviaries outdoor. Thus, there will be the following animals:

Species	Animal	Accommodation	Interpretation	Image
Sound	Indian Bullfrog	Glass Terrarium 10sqm	This is the largest frog in India and male have two lateral vocal sacs, conspicuous externally by folds of the skin on the sides of the throat. The colour of sacs is bright blue or black and it makes a loud call	
Sight	Rose-breasted Parakeet	Glass fronted Aviary 200sqm	This is a common Indian parakeet which is extremely colourful and active	

Species	Animal	Accommodation	Interpretation	Image
Smell	Indian Giant Millipede	Glass Terrarium 2sqm	Many species of millipedes emit various foul-smelling liquid secretions through microscopic holes called ozopores (the openings of "odoriferous" or "repugnatorial glands"), along the sides of their bodies as a secondary defence. Among the many irritant and toxic chemicals found in these secretions. Visitors can 'smell' the millipedes by sniffing a smell-box.	
Touch	Giant African snail	Glass Terrarium 2sqm	This giant snail can be handled by visitors, under supervision, and they can feel its smooth shell and moist mucus foot.	
Taste		Glass Terrarium 10sqm	This snake is used to illustrate the smelling/tasting forked tongues and Jacobsen's Organ in the roof of snakes' mouths. A video clip will show how the snake flicks it tongue, to taste it surroundings.	
Navigation	White Pigeon	Glass fronted Aviary 200sqm	The ability a pigeon has to return home from a strange location necessitates two sorts of information. The first, called "map sense" is their geographic location. The second, "compass sense" is the bearing they need to fly from their new location in order to reach their home. Both of these senses, however, respond to a number of different cues in different situations.	 

4.7.3.2. Bamboo Cave – Area 2

The purpose of this component is to offer a contrast from the busy Interpretation Centre, the visitor exits into the Silent Zone. The visitor walks into a bamboo forest, silent and tranquil. Only natural sounds are heard and some interpreted. A spring and stream gurgle from its source and trickles down the length of the bamboo forest, which we will follow for the course of the whole trail, as it grows larger and settles into ponds and eventually the lake. There will be no animal exhibits in this area

Just take in the quiet walk of a bamboo forest surrounding. A stream (the River of Life) trickles its way through the bamboo forest, dripping water and the sound of nothing - Zen. Bamboo enclaves with carved statues. Possibly some light, fire, incense… some quotes about being at one with nature are carved on rock and wooden plaques. It also conveys that bamboo is the new timber.

Every hour there is an artificial thunderstorm, with rain, lighting and thunder just adjacent to the visitor path, falling into a pond which is formed from the stream. The sound of falling water and the storm are the only things that break the tranquility. Reminding us of how precious water is and how we should preserve and conserve it, as it is, with the sun, what gives us Life.

Fig. 100: Conceptual look and feel for the bamboo cave

4.7.3.3. Animal Sound Zone – Area 3

This zone has silent surroundings which are now punctured with specific animal and natural sounds in both sound scaping and real animal sounds.

A forest clearing, fringed by dry deciduous trees, with a centrally placed pool fed by a stream (which continues from the Bamboo Garden), over which visitors cross on a fallen tree, if adventurous, or a bridge for the less agile. The bull frogs can be in a tank, but also populate the pool.

The insects will be in terrariums in a covered shelter (perhaps Gond in style) but also, hopefully free range, like the bull frogs. The visitor path meanders through the garden, offering views of the animal and plant exhibits.

Animal exhibits, especially the bird aviaries are nestled into alcoves in the surrounding forest. The stream forms a pool, which is the water barrier for the gibbon island.

Fig. 101: Conceptual look and feel for the animal sound zone

Animal Exhibits

Species	Accommodation	Interpretation	Image
Indigenous Cicada	Glass Terrarium 2sqm	The apparatus used by cicadas for singing is complex. The organs that produce sound are called tymbals. Tymbals are a pair of ribbed membranes at the base of the abdomen. The cicada sings by contracting the internal tymbal muscles. This causes the membranes to buckle inward, producing a distinct sound. When these muscles relax, the tymbals pop back to their original position. Scientists still don't fully understand how this apparatus produces such extreme volume.	
Grey Cricket	Glass Terrarium 2sqm	Crickets are mainly nocturnal, and are best known for the loud, persistent, chirping song of males trying to attract females. The singing species have good hearing, via the tympana (eardrums) on the tibiae of the front legs.	

Species	Accommodation	Interpretation	Image
Western Hoolock Gibbon	Water moated island 3,000sqm	A noisy (and endangered) north India primate which makes a long penetrating call.	
Coppersmith Barbet	Aviary 200sqm	Rudyard Kipling called it the Tinker Bird, as it has a monotonous tuk, tuk tuk call. It is also Indian and a very pretty bird that can live in small groups.	
Asian Koel	Aviary 200sqm	Being familiar birds with loud calls, references to them are common in folklore, myth and poetry. It is traditionally held in high regard for its song.	
Red-vented Bulbul	Aviary 200sqm	A common Indian songbird.	

Fig. 102 : Touch - Bark and lichen

4.7.3.4. Dark Cave (Touch, Smell and Navigation) – Area 4

This component is modelled on the Bhimbetka Rock Shelters, an archaeological site of 150 shelters and caves in Madhya Pradesh. At least some of the shelters were inhabited by Homo erectus more than 100,000 years ago. The rock shelters and caves provide feature prehistoric cave paintings as early as 30,000 years old and are an excellent backdrop for developing the themes of touch, smell and navigation (in the dark).

A walk-in cave, which is on grade, is entered though rock markers, off the Silent Zone. What draws the visitor to the cave entrance are the shafts of light in the otherwise dark entrance. The stream continues into the cave, beside the path.

There is the sound of running water, the slight smell of bat guano and darkness. It is exciting and not for the feeble hearted. In one corner there is a hot spring pool of clear water which bubbles up the smell of sulfur. Children can boil and egg here. There is thus an alternative bypass route - for grandmothers with claustrophobia.

Fig. 103 : Silent zone markers

Bhimbetka rocks Shelters

Fig. 104 : Conceptual look and feel for the Dark Cave - Stream in a cave

Fig. 105 : Conceptual look and feel for the Dark Cave - Inanimate exhibits

Animal Exhibits

Species	Accommodation	Interpretation	Image
Indian False Vampire Bat	200sqm aviary	To demonstrate the weird cognitive world of bats and high frequency sound.	
Naked Mole Rat	10 sqm Glass Terrarium	an animal species whose particular talent relies on touch, eg, subterranean species - Exotic	
Banded Knifefish	10 sqm Glass Aquarium	Demonstrates electrolocation. Electroreception or electroception is the biological ability to perceive natural electrical stimuli. It has been observed almost exclusively in aquatic or amphibious animals, since salt-water is a much better conductor than air	
Giant River Prawn	10 sqm Glass Aquarium	Tank with freshwater giant river prawn (Macrobrachium rosenbergii)	
And Freshwater Bivalve	As above	Tank with freshwater Bivalves Mussels (Lamellidens marginalis – fresh water pearl mussel)	

4.7.3.7. Bright Sunlight, Trees, and Birds (Sight and Sound) – Area 5

From the darkness and resonance of the cave the visitor emerges into a brightly, sunny area fringed trees. In contrast to the Silent Zone. Here colourful plants and birds dominate the area with their sights and sounds. Reptiles are used to illustrate how they perceive the world. The trees, shrubs grasses and ground cover here have colourful leaves and flowers, mainly ornamental, to offer a visual palate of colour and attract insects and birds to fed. The stream is wider now and the water moves more rapidly, cascading into a series of pools along it way. The visitor path meanders through the garden, offering views of the animal and plant exhibits.

Animal Exhibits

Species	Accommodation	Interpretation	Image
Bamboo Pit Viper	Glass Terrarium 10sqm	To illustrate infra-red sight in snakes	
Russel's Viper	10 sqm Glass Terrarium	This viper has peculiar scales around its nostril that in combination with the Jacobsen's Organ are thought to give the snake the ability to "see" infra-red.	
Rose-breasted Parakeet	Glass fronted Aviary 200sqm	Very pretty and colourful Indian Parakeets	
Grey-headed Parakeet	Glass fronted Aviary 200sqm	Very pretty and colourful Indian Parakeets	
Fairy Bluebird	Glass fronted Aviary 200sqm	Another stunning Indian species.	
Green Peafowl	Glass fronted Aviary 500sqm	Another stunning Indian species.	

Plant Exhibits

1.Nector host plants to attract butterflies, fruit trees to attract birds.
2.Colorful and strong-smelling local plants which flower.

Fig. 106: Butterfly on a Lantana

4.7.3.5. Herbs, Spices and Fruits (Taste and Smell) – Area 6

This garden focuses primarily on the senses of taste and smell. There is interpretative material and small and taste stations where they can understand the different species and their use in the traditional kitchen.

It is designed like a traditional spice, herb and medicinal plant garden. The plants laid out in more formal rows of crops, each offering the visitor a chance to view, smell and taste different plants used by man for many generations, from around the world. A flower garden also grows plants which bloom regularly, which the visitors can see, the garden ends with a kitchen, which visitors can enter and sample the smells and tastes of some of the current produce cultivated.

The garden also highlights some animal species which emit a strong odour. A shelter will house a range of glass terrariums for invertebrates and snakes, while larger exhibits of mammals will be nestled along the visitor pathway. The stream still meanders along its way, a pool into which it empties is used for irrigation of the planter beds, and children can work a hand pump to water the plants.

Animal Exhibits

Species	Accommodation	Interpretation	Image
Bombardier beetle	Glass Terrarium 2 sqm	We could do an interesting display that focuses on Arthropods use of smell – Stinkbugs defence, ants for foraging, etc. However, these would be highly technical exhibits and husbandry.	
Curcubit Stink Bug	Glass Terrarium 2 sqm		
Indian Earwig	Glass Terrarium 2 sqm		
Giant Indian Millipede	Glass Terrarium 2 sqm		
Walking Catfish	Glass fronted aquarium 10sqm	Tiny taste buds, sensory organs comprised of cells that detect the molecules that constitute flavour, are located all over the catfish's body, but are most concentrated on the four pairs of whiskers around its mouth. These whiskers, called barbells, act as antennae. Along with the thousands of buds along their body, the whiskers allow the fish to not only taste when dinner is nearby, but also home in on its exact location.	
King Rat Snake	Glass fronted Terrarium 10 sqm	If they feel threatened, kingsnakes will emit an unpleasant smell, called musk, and vibrate their tails - just like a rattlesnake	

Animal Exhibits

Species	Accommodation	Interpretation	Image
Striped Skunk	Glass fronted aviary 200sqm	which obviously use noxious scent as a defence mechanism	
Indian Palm Civet	Glass fronted aviary 200sqm	Civets produce a buttery, honey-like secretion that is scraped off their perineal glands. It is prized as a fixative in perfumes. Exploitedin perfume and coffee industry	

Plant Exhibits

Tea, coffee, spices, herbs medicinal plants, some fruit trees with strong odors - guava, chilli - a variety of the hottest chilli in the world - especially from the Nagpur area.

Botanic Name	English Name	Location	Type	Property
Citrus aurantica	Lime	Spice + Herb - Taste	Tree - small	Taste: fruit
Citrus aurantifolia	Orange	Spice + Herb - Taste	Tree - small	Taste: fruit
Citrus hystrix		Spice + Herb - Taste	Tree - small	Taste: fruit
Cinnamomum verum	Cinnamon	Spice + Herb - Taste	Tree - medium	Taste: bark
Murraya koenegii	Curry Leaf	Spice + Herb - Taste	Tree - small	Scent: Leaf
Cymbopogon citratus	Lemon Grass	Spice + Herb - Taste	Grass	Scent: Leaf
Ocimum basilicum	Basil	Spice + Herb - Taste	Low shrub/herbaceous	Taste: leaf
Cuminum cyminum	Cumin	Spice + Herb - Taste	Low shrub/herbaceous	Taste: seed
Foeniculum vulgare	Fennel	Spice + Herb - Taste	Low shrub/herbaceous	Taste: seed
Piper nigrum	Pepper	Spice + Herb - Taste	Climber	Taste: seed
Capsicum frutescens	Birds Eye Chilli	Spice + Herb - Taste	Low shrub/herbaceous	Taste: fruit
Capsicum annuum	Chili	Spice + Herb - Taste	Low shrub/herbaceous	Taste: fruit
Ferula asafoetida	Asafoetida	Spice + Herb - Taste		Scent: Leaf
Elettaria cardamomum	Cardamom	Spice + Herb - Taste	Large shrub/Herbaceous	Taste: seed
Coriandrum sativum	Coriander	Spice + Herb - Taste	Low shrub/herbaceous	Taste: seed
Pimpinella anisum	Aniseed	Spice + Herb - Taste		Taste: fruit
Stevia rebaudiana		Spice + Herb - Taste	Low shrub/herbaceous	Taste: leaf
Hibiscus esculenta	Okra	Spice + Herb - Taste	shrub/herbaceous	Taste: fruit
Saccharum officinarum	Sugar cane	Spice + Herb - Taste	Grass - clump type	Taste: stalk
Synsepalum dulcificum	Miracle fruit	Spice + Herb - Taste	Tree - small	Taste: fruit
Menta spicata	Mint	Spice + Herb - Taste	Groundcover	Taste: leaf
Piper betle	Betel vine	Spice + Herb - Taste	Climber	Taste: leaf

Taste

Taste and smell stations and kitchen, Ice cream tasting with different flavors from the spices and herbs. A kitchen where spices and herbs are being processed, to allow the visitors to experience the smells and taste of some of the hottest chilies based on the Wilbur Scoville's scale of heat.

Fig. 107: Peppers - Carolina Reaper, Naga Viper, Chocolate Habalokia

The taste of ice-cream!

4.7.3.6. Water Body (Sound) – Area 7

The stream, the water course of which we have followed through the previous areas, is now fairly wide and briskly flowing (The River of Life) often over shallow rapids and finally empties into a small lake. This is the final component of the outdoor garden area. It highlights the sense of sound.

The waterbody (about 5,000 sqm) is fringed with reedbeds, and the visitors walk along its edges on a boardwalk, sometimes with a peer into deeper water to view aquatic plantations of waterlily and lotus. Here there are waterfowl which swim freely, as with indigenous species of frogs and dragonflies. There are indigenous fish in the lake, and it is ecologically balanced.

Animal Exhibits

Species	Accommodation	Interpretation	Image
Indian frog	Glass Terrarium 2sqm	A recently described Tree Frog from the Western Ghats, bright yellow in colour, Central India has different tree frogs.	
Indian Soft-shelled Turtle	Glass fronted exhibit 10 sqm		

4.7.3.7. Sense Stations – Area 8

This component is the finale of the Trail of the Senses and endeavors to sum up some of the key take away messages from the experience and offer an interactive experience for the visitors, especially the children.

These take away messages are:

- That we depend of water which gives us life
- That we perceive the world around us by a combination of senses and each has it own unique function
- That there are other senses used by animals (and plants) to perceive and engage the world
- That denied of these senses - we are impoverished at best and incapacitated at worst.

It offers an interactive zone, under cover (probably part of the same structure as the Interpretation Centre), which is an airconditioned or else extremely well-ventilated structure with a tall roof, preferably made of bamboo).

The Sense Stations are a range of sensory rooms or boxes which are designed to test visitors' senses of: sound, sight, touch, smell, taste and navigation.

Thus, the visitor enters a room or put their hands into two boxes to smell various scents, touch objects with various textures and constituencies out of their view, taste liquids and food items which are made to look different from their normal perceptions of them.

The list is endless, a can be drawn from Science Museums around the world, the main point is to be local in its examples.

Fig. 108 : Sniff Station - Sample design

Sound
Use headphones to listen to the sounds of common animals and identify them

Sight
Look at the images generated by different animals and guess what they are perceiving.

Touch
Place their hands in a box which has a range of objects which they must identify; pine cones, rough tree bark, furry leaves, smooth river pebbles, feathers etc.
A mud foot bath which they must walk across in bare feet (with a washing facility, probably outdoors)

Smell
Given a leaf to smell and then crush and re-smell which releases the odour of the familiar plant. Walk into a series of room which have aroma-scapped with various scents, and to guess which they are, such as lavender.

Taste
Drink lime juice which has been coloured purple etc, eat a piece of sweet cake, made from garlic.

Navigation
Enter a completely dark room to walk on a narrow plank, which tests their sense of balance.

4.8. Night Zoo

Night Safari comprising of 65 Ha. would be the first of its kind of night spotting activities in India, thus attracting more tourists. The visitors will have rewarding experience to see the animals in dark. The night zoo will have animals of African continent, American continent, Asian continent and Indian sub-continent. The animals have been broadly classified as Asian & Exotic species displayed in taxonomical form.

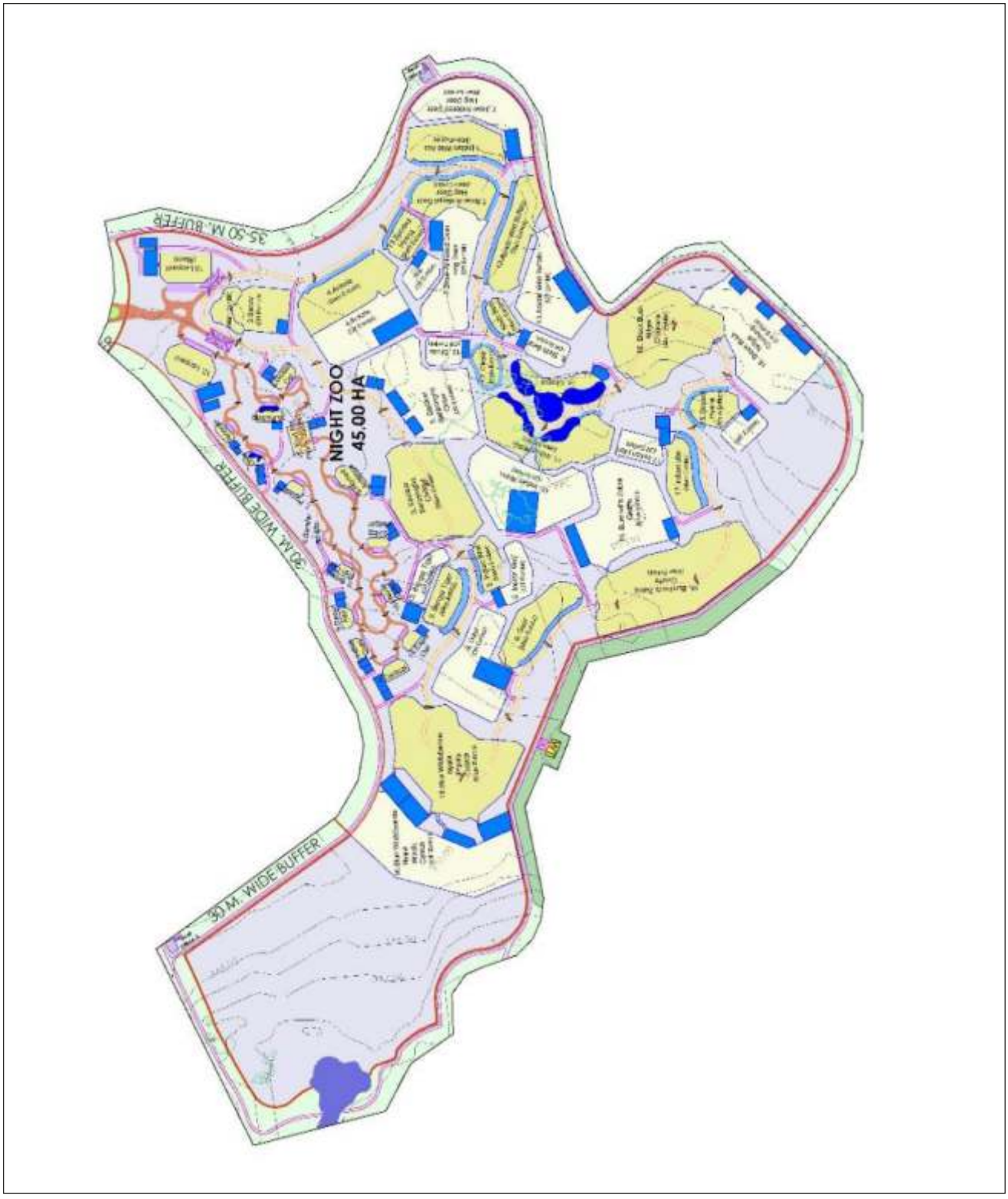


Fig. 109 : MLP the Night Zoo

The timings of the night zoo will be from dusk to 11 pm. The animals will be displayed in the naturalistic exhibit areas under the simulated moonlight. The visitors will have option to see the BTGIZP in specially designed vehicles. The journey will cover a distance of around 5.30 km.

The Night Safari will have High mast Lighting which will be Umbrella type. This will enhance the dark sky effect and reduce spill over light to the horizon which is a grave environmental concern. The luminaires used in these High masts will be Dark Sky Compliant and the light source will be LED. This type of fixtures are environmentally friendly.

The entire lighting in the exhibit area will be based on dimming in co-relation with waxing and waning of moonlight under real time clock. The lights will be programmed to shut off automatically a pre-determined time of night when the night safari closes. This will ensure the body clocks (Circadian rhythm) of the exhibits are not disturbed. Thus, leading to happier exhibits and an adventurous environment for the tourist.

A few Machans are also located at intervals to give an aerial view of the beautiful scenic locations. The total area of night safari is 65 Ha, with all activities planned in 45 Ha of land leaving sufficient area in the vicinity for future expansion.

Fig. 110 : Concept Example, Singapore Night Safari Tram Ride

Fig. 111 : Concept Example, Singapore Night Safari Walking Trail

4.9. Bio Park

The Bio-Park spans 13.50 Ha and features a diverse array of species housed in naturalistic enclosures. Visitors have the option of exploring the park either by foot or in battery-operated vehicles. A complete circuit of the park covers 3.50 kilometres. Visitors typically spend between 2 to 3 hours to fully immerse themselves in the park's offerings.

As a theme park cantered around the concept of Evolution, the Bio-Park is divided into three distinct sections, each focusing on a unique aspect of evolutionary history:

a) **Deep Time Trail :** Journey of Universe from Big bang to birth of Earth

b) **Story of Life :** Visitors explore the narrative of life's evolution, including pivotal moments such as extinction events and important life events on geological time scale

c) **Archaeological Theme Park :** The Human Evolution and key archaeological milestones in human development.

The Bio-Park offers a multifaceted experience that blends various techniques and exhibit types to create an immersive attraction that goes beyond the traditional zoo or museum format, providing visitors with a holistic understanding of evolutionary processes and our place within them.

Fig. 112 : Concept Example, Hidden Oaks Nature Centre

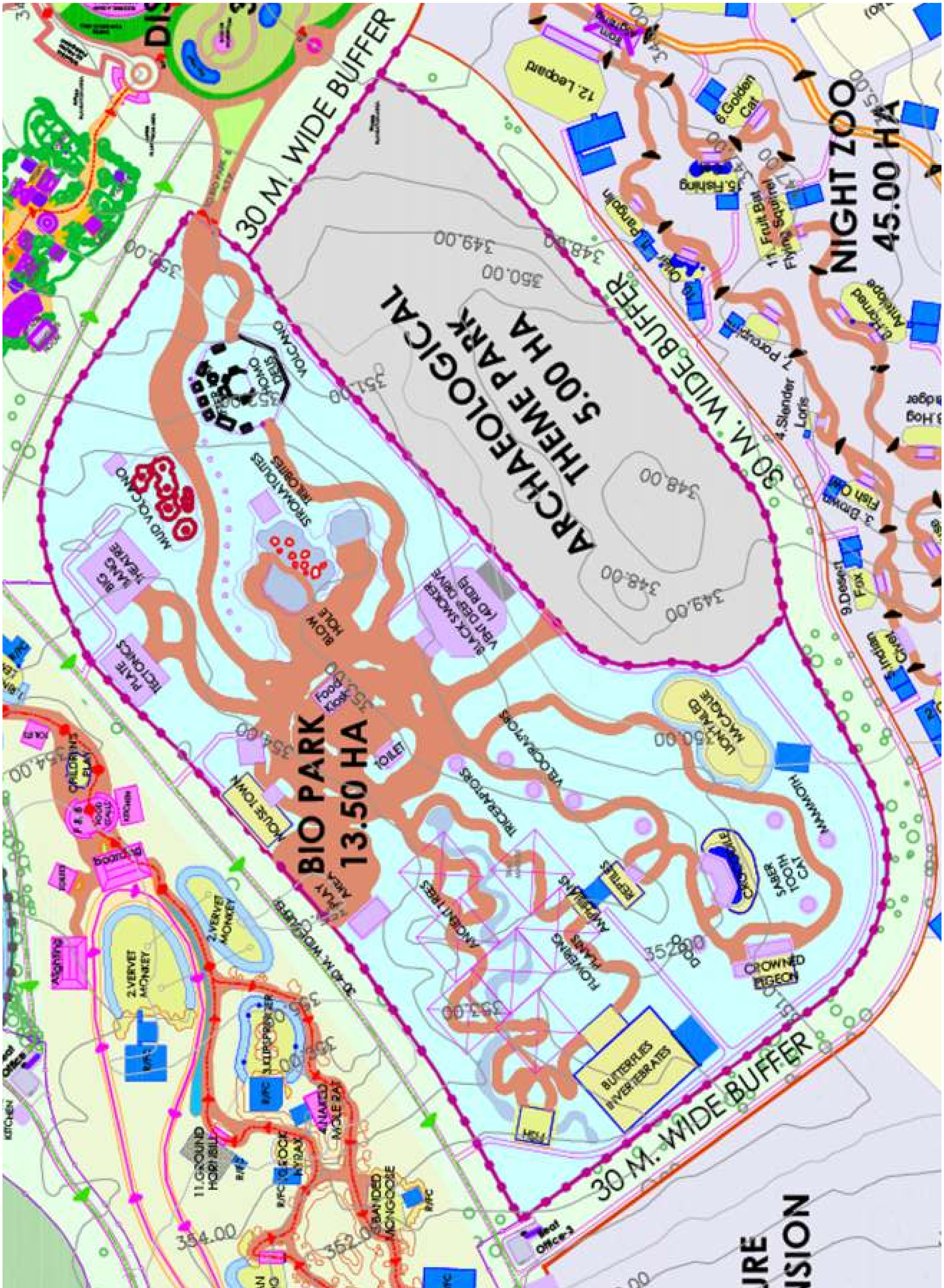

30 M. WIDE BUFFER
ARCHAEOLOGICAL THEME PARK
5.00 HA
BIO PARK
13.50 HA
NIGHT ZOO
45.00 HA
30 M. WIDE BUFFER
30 M. WIDE BUFFER
VOLCANO
MUD VOLCANO
STROMATOLITES
BLOW HOLE
BLACK SMOKER
PLATE TECTONICS
BIG BANG THEATRE
Food Kiosk
TOILET
VELOCIRAPTORS
TRICERAPTORS
MAMMOTH
SABER TOOTH CAT
CROWNED PIGEON
BUTTERFLIES INVERTEBRATES
ANCIENT TREES
FLOWERING PLANTS
REPTILES
AMPHIBIANS
LION-TAILED MACAQUE
PLAY AREA
HOUSE TOWN
12. Leopard
6.Golden Cat
15.Fishing
11. Fruit Bat, Flying Squirrel
7. Porcupine
4.Slender Loris
3. Brown Fish Owl
9.Desert Fox
2.VERVET MONKEY
2.VERVET MONKEY
3.KLIPSPRINGER
4.NAKED MOLE RAT
11.GROUND HORNBILL
BANDED MONGOOSE
349.00
350.00
348.00
348.00
349.00
351.00
352.00
353.00
354.00
354.00
362.00

Fig. 113 :

4.9.1 The Deep Time Trail

The Deep Time Trail at the Bio-Park offers visitors a captivating journey through the evolution of the universe, beginning with the explosive event known as the Big Bang and continuing through to the present day. This section features a state-of-the-art dome-shaped indoor theatre, where visitors can experience an immersive 7D audio-visual presentation.

Inside the theatre, visitors are enveloped by a stunning display of sights and sounds that transport them through the vast expanse of time and space. Through a combination of high-definition visuals, surround sound, scent effects, tactile sensations, and even dynamic motion, the Deep Time Trail provides an unparalleled sensory experience.

Fig. 114 : he story of deep time trail

As the presentation unfolds, visitors witness the cosmic drama of the universe's formation, from the initial burst of energy that ignited the Big Bang to the gradual emergence of galaxies, stars, and planets. They experience the ebb and flow of cosmic forces, the birth and death of stars, and the evolution of celestial bodies over billions of years.

The Deep Time Trail at the Bio-Park offers visitors a mesmerizing journey through the evolution of the universe, culminating in the birth of Earth and the emergence of early life forms. Following the immersive 7D audio-visual presentation that concludes with the solidification of Earth's surface after eons of tumultuous evolution, visitors transition into a physical representation of early Earth.

Upon exiting the presentation area, visitors step into an interactive exhibit depicting the primordial environment of early Earth. They encounter simulated volcanoes, sulphur ponds, and other features characteristic of our planet's formative years. This experiential space provides a tangible connection to the ancient world, allowing visitors to envision the harsh conditions that prevailed during Earth's infancy. As visitors progress through this section, they are guided through the story of early life's emergence and evolution.

Fig. 115 : Earth during the early stage of formation

4.9.2 Story of Life

The path through the Deep Time Trail leads visitors through the geological timescale, tracing the evolution of life forms from their earliest origins to the present day. Visitors explore the narrative of life's evolution, including pivotal moments such as extinction events and important life events on geological time scale.

The Story of Evolution, Mass Extinction, and Survival is a captivating section within the Bio-Park, where visitors embark on a dynamic journey through the eons, witnessing the dramatic interplay of life's evolution, mass extinctions, and the remarkable tenacity of survival.

Fig. 116 : Evaluation of life & geological time scale

Fig. 117 : A meteor impact responsible for extinction of Dinosaurs on earth.

As visitors progress through this section, they are guided through the story of early life's emergence and evolution. Visitors begin by traversing through various geological epochs, from the Cambrian Explosion to the present day. The path is adorned with life-size models, animatronics, and engaging displays showcasing the diverse array of species that have evolved over millions of years. Each zone shall have different style of vegetation reflecting the environment.

Along the way, visitors encounter pivotal moments in Earth's history marked by mass extinction events. Dramatic exhibits illustrate the challenges that led to these catastrophic occurrences, such as asteroid impacts, volcanic eruptions, and climate shifts. The impact of these events on the planet's biodiversity is poignantly conveyed.

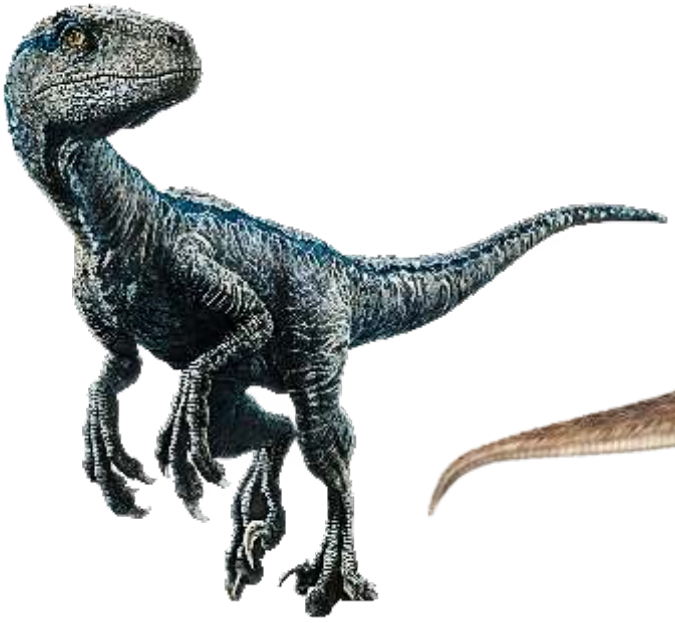


Fig. 118 : Pre historic life represented through animatronics

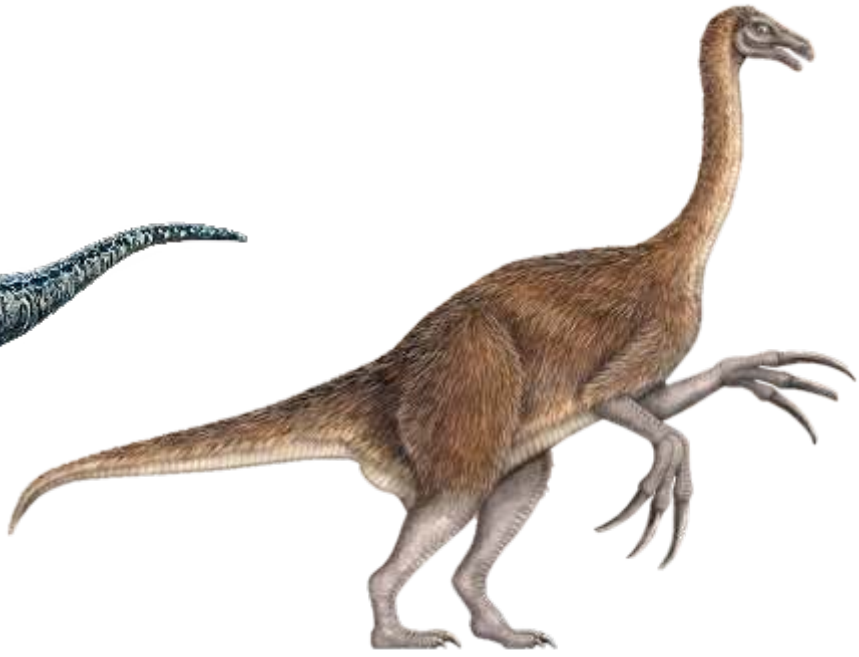


Fig. 119 : Pre historic life froms

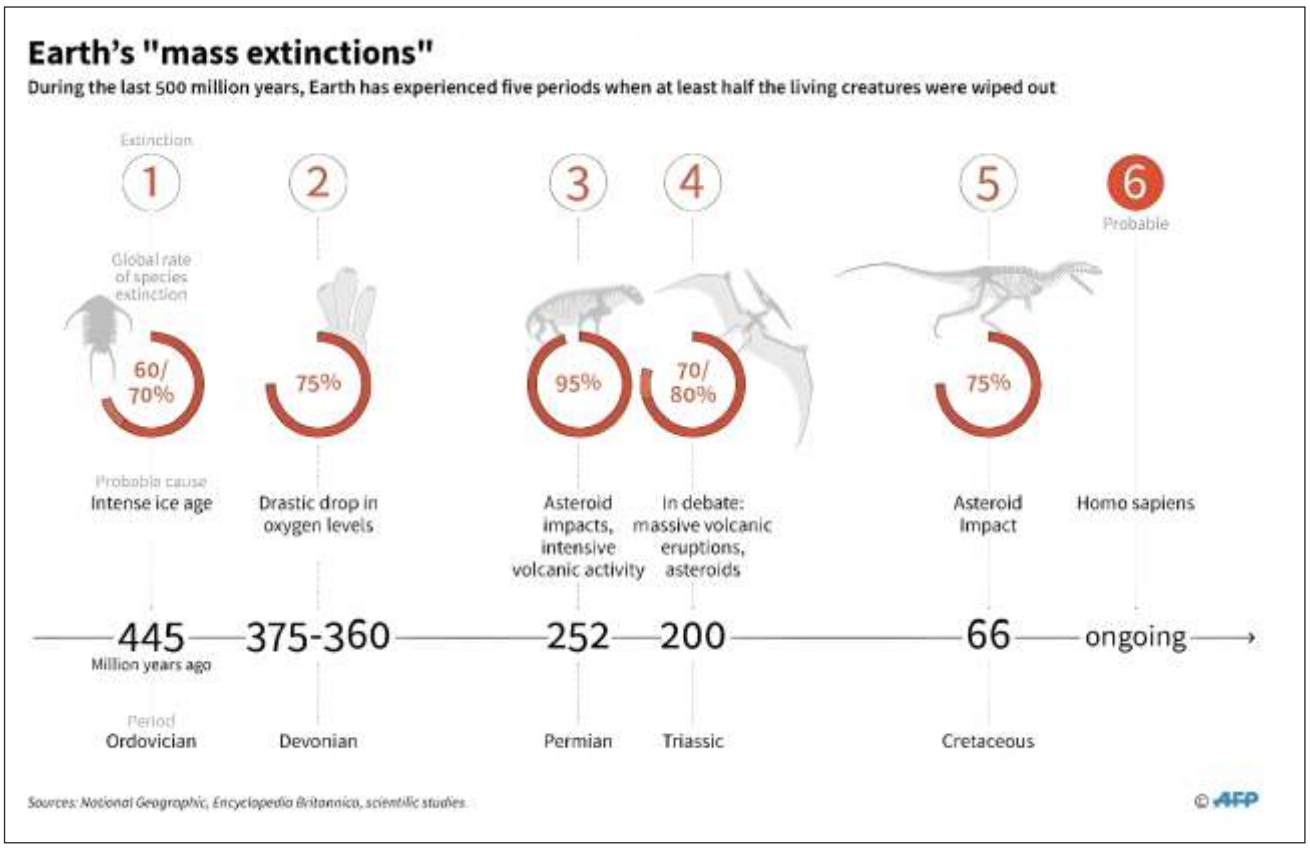


Fig. 120 : Mass extinctions of earth

The narrative unfolds to highlight the resilience of life forms in the face of adversity. Interactive displays and dioramas showcase the ingenious survival strategies adopted by species, from adaptations and behavioural changes to the emergence of new evolutionary traits.

As the path progresses, visitors encounter living fossils—species that have withstood the test of time and remain virtually unchanged. These living relics serve as a testament to the endurance and adaptability of life on Earth. Success stories of species that have thrived despite challenges further emphasize the power of adaptation.

The journey concludes by addressing the importance of conservation and the ongoing challenges faced by modern species. Visitors are encouraged to reflect on humanity's role in preserving biodiversity and ensuring the survival of the planet's diverse ecosystems. the immersive journey through the Bio-Park offers visitors a captivating and educational exploration of evolutionary history, mass extinction events, and the resilience of life on Earth, inspiring a deeper understanding and appreciation for the natural world.

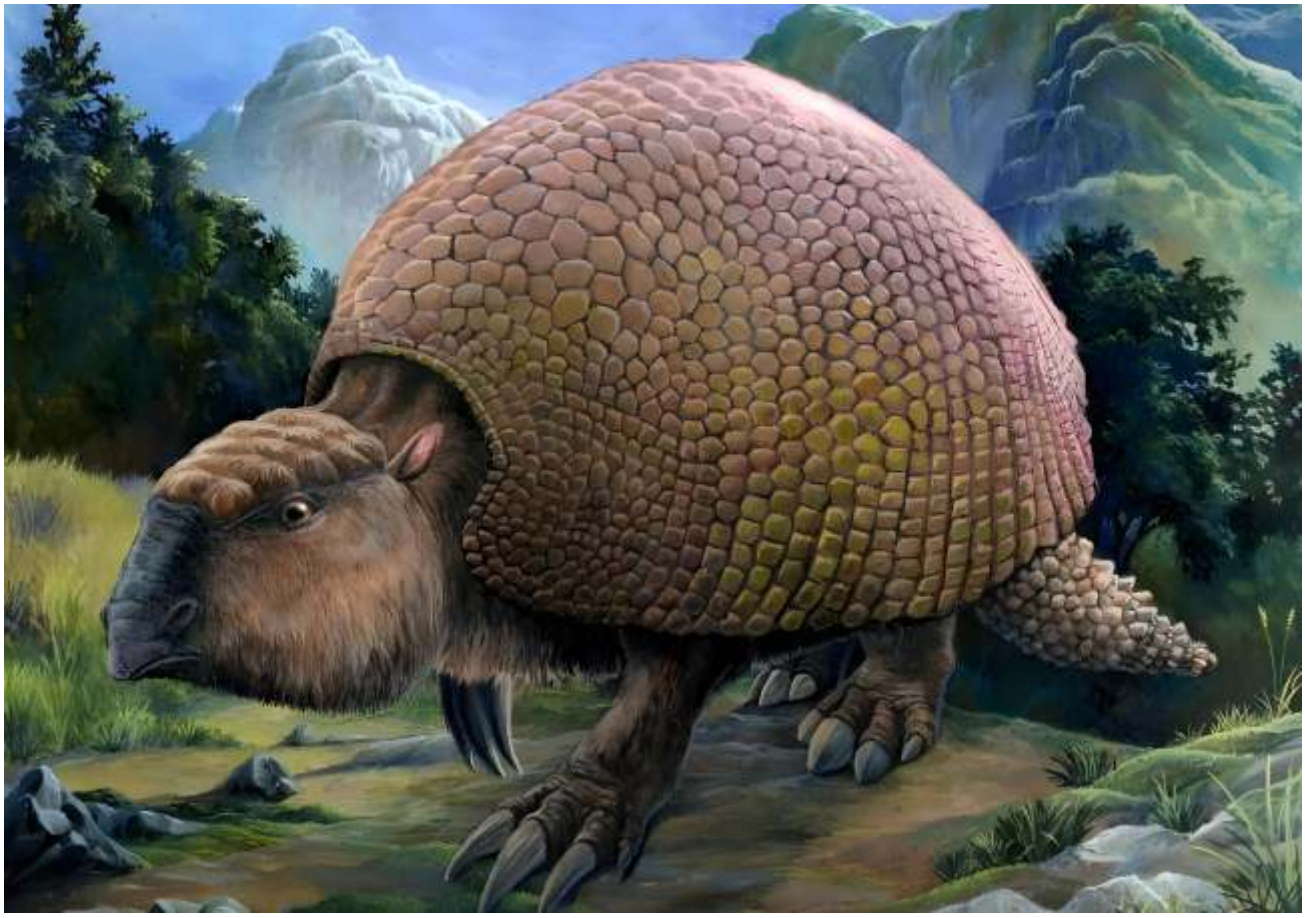


Fig. 121 : Glyptodon - the ice age giant

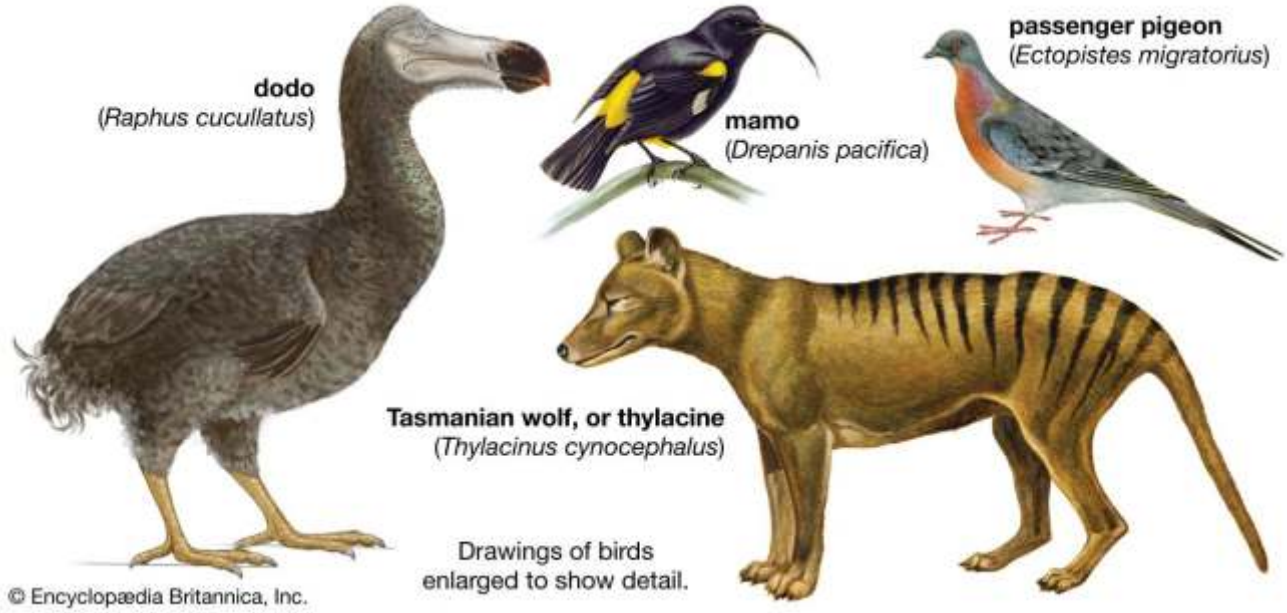


Fig. 122 : Some major extinction due to anthropogenic reasons.

4.9.3 Archaeological Theme Park

The Archaeological Theme Park within the Bio-Park is set against the backdrop of the renowned Pithesur Stone Circle, an archaeological gem located within the Gorewada Reserve Forest. This immersive park, curated in collaboration with the Deccan College of Archaeology, Pune depicts human evolution through engaging exhibits and interpretive displays and narrates the captivating story of human evolution, providing visitors with a unique and enlightening journey through the ancient history of the Gorewada Reserve Forest.

The Story of Human Evolution invite visitors on a captivating journey through the annals of time. From the emergence of our earliest ancestors to the complexities of modern humanity, this immersive experience chronicles the remarkable saga of human evolution. Humans as a species are unique in several aspects. The reasons uniqueness have unveiled through the story of evolution. Some of the important milestones in the journey are

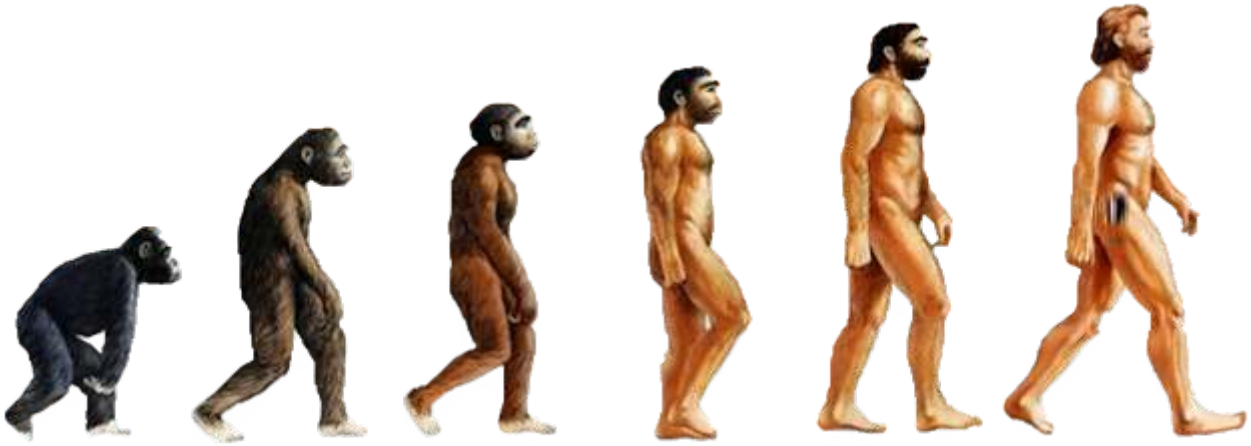


Fig. 123 : The Human evolution

1. Bipedalism: One of the earliest milestones in human evolution is the adaptation to walking upright on two legs, known as bipedalism. This transition, which likely occurred around 4-6 million years ago, enabled early hominids to free their hands for tool use and facilitated the exploration of new habitats.

2. Tool Use and Manufacture: The development of stone tools represents a crucial milestone in human evolution, dating back approximately 2.6 million years ago. The ability to create and utilize tools allowed early humans to manipulate their environment, hunt more effectively, and process food, leading to increased survival and success.

3. Expansion out of Africa: Around 1.8 million years ago, early Homo species began to migrate out of Africa into Eurasia, marking a significant milestone in human dispersal and adaptation to diverse environments. This migration facilitated the colonization of new territories and the eventual spread of Homo sapiens across the globe.

4. Cultural and Behavioural Complexity: As early humans evolved, they exhibited increasingly complex cultural and behavioural traits. This includes the development of language, social structures, symbolic art, and rituals, which fostered cooperation, communication, and cultural transmission within communities.

5. Domestication of Fire: The controlled use of fire by early humans, which likely began around 1 million years ago, revolutionized daily life, providing warmth, protection, and the ability to cook food. Fire also played a crucial role in shaping human behaviour and facilitating social interaction.

6. Transition to Agriculture: The Neolithic Revolution, starting around 10,000 years ago, marked a significant milestone in human history with the transition from hunting and gathering to settled agriculture. This shift led to the development of permanent settlements, the domestication of plants and animals, and the rise of complex societies.

7. Development of Complex Societies: Over time, human societies became increasingly complex, marked by the rise of cities, organized religion, centralized governments, and specialized labor. This period saw the emergence of civilizations such as Mesopotamia, Egypt, Indus Valley, and Mesoamerica, laying the foundations for modern human civilization.

These milestones in human evolution represent key moments of innovation, adaptation, and cultural development that have shaped the trajectory of our species' history and contributed to the diversity and complexity of human societies today.

Embarking on this enlightening voyage, visitors encounter interactive exhibits, lifelike reconstructions, and engaging narratives that bring the story of our evolution to life. Delving into the archaeological discoveries and scientific insights unearthed by researchers, visitors gain a deeper understanding of the evolutionary milestones that have shaped our species.

The journey culminates in a reflection on the interconnectedness of all life forms and the enduring quest for knowledge and understanding. Through thought-provoking displays and thoughtfully curated exhibits, visitors are inspired to contemplate their place in the intricate tapestry of human evolution and the profound legacy of our shared ancestry.

Fig. 124 : The stone age life

These milestones in human evolution represent key moments of innovation, adaptation, and cultural development that have shaped the trajectory of our species' history and contributed to the diversity and complexity of human societies today.

Fig. 125 : Early Humans

4.10. Tribal Trail

This is a non-zoological zone with no animal exhibits. This trail will showcase the life of the Gond and Madia tribe of India through the typical vernacular architecture of their houses and shelters. The tribes are known worldwide for their culture and tradition. It will serve as an attraction and a walking connection between the zoos two main areas.

The arts and crafts of the Gond people shall be displayed in this area which will exhibit the innovative use of natural materials made by them. In addition, the weapons and tools used by the tribal people for haunting and farming, traditional musical instruments, type of clothes they dress in, their culture and traditions will be demonstrated to the urbanized population. Few live activities such as their traditional dancing and music will also be held to amuse the visitors. Their lifestyle, which is in more harmony with nature, might help the modernized citizens to understand how much they have misused nature and its components which are increasingly becoming hazardous to the life on Earth.

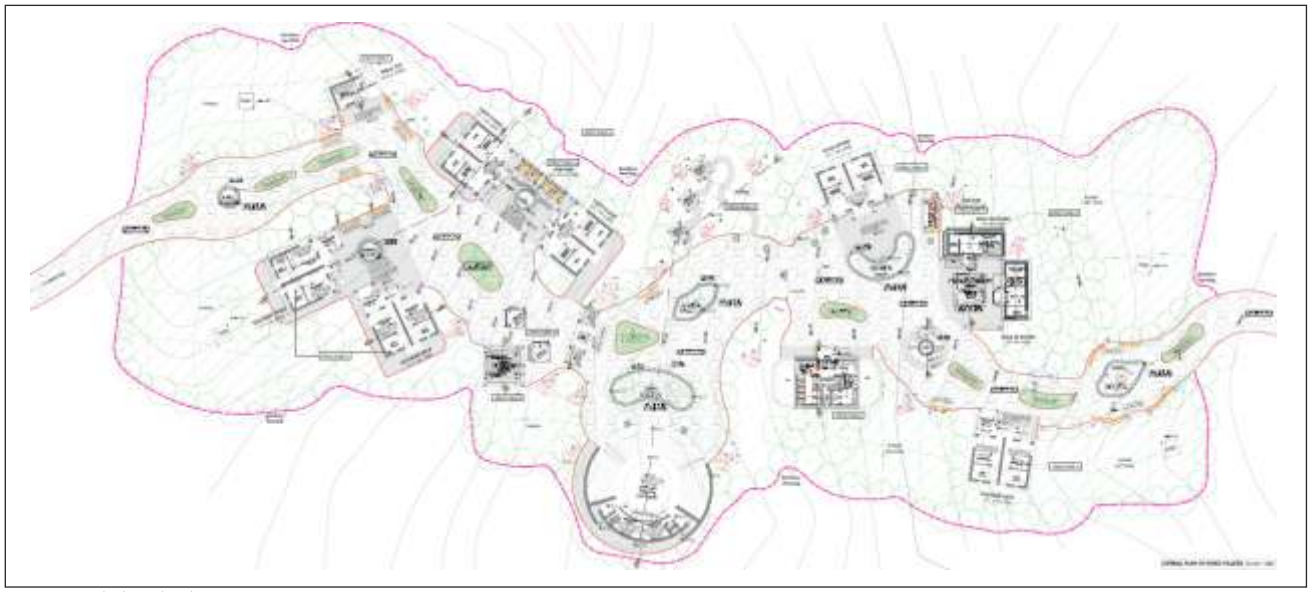


Fig. 126 : Tribal Trail Schematic Design

The arts and crafts of the Gond people shall be displayed in this area which will exhibit the innovative use of natural materials made by them. In addition, the weapons and tools used by the tribal people for hunting and farming, traditional musical instruments, type of clothes they dress in, their culture and traditions will be demonstrated to the urbanized population.

Fig. 127 : Examples of Gond People Culture : Fox and Grapes Gond Story & Baiga tribe art

4.11. The Reserve @ Gorewada

The Northern site of the zoo shall be kept as a nature reserve where visitors are able to come and experience a pristine natural environment. It will be a refuge from the complexities of living in a city, providing a place for family friendly and eco-centric activities for visitors.

Fig. 128 : Lake View at the Northern Site

Fig. 129 : Nature Trail Visitors

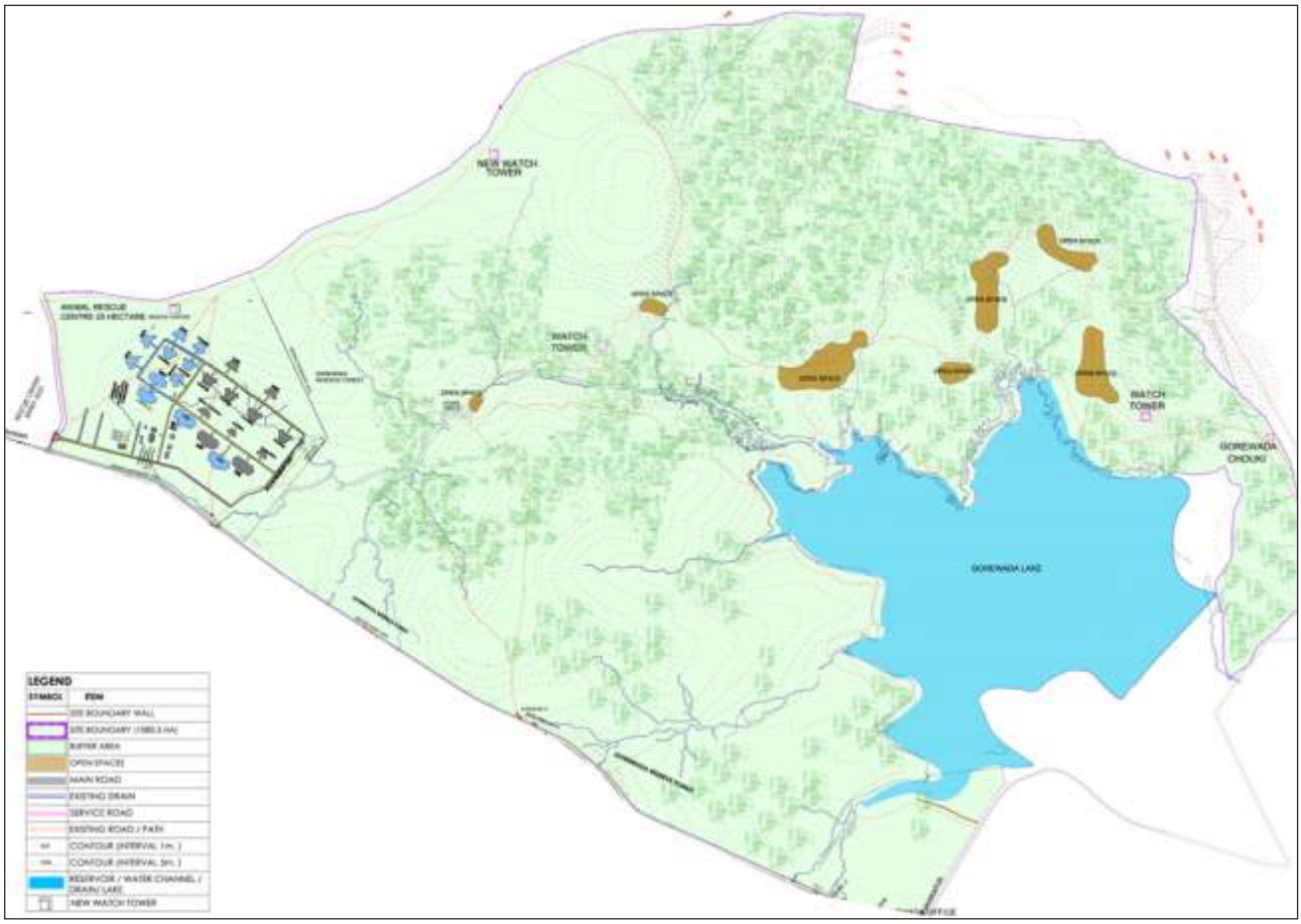


Fig. 130 : The Northern Site

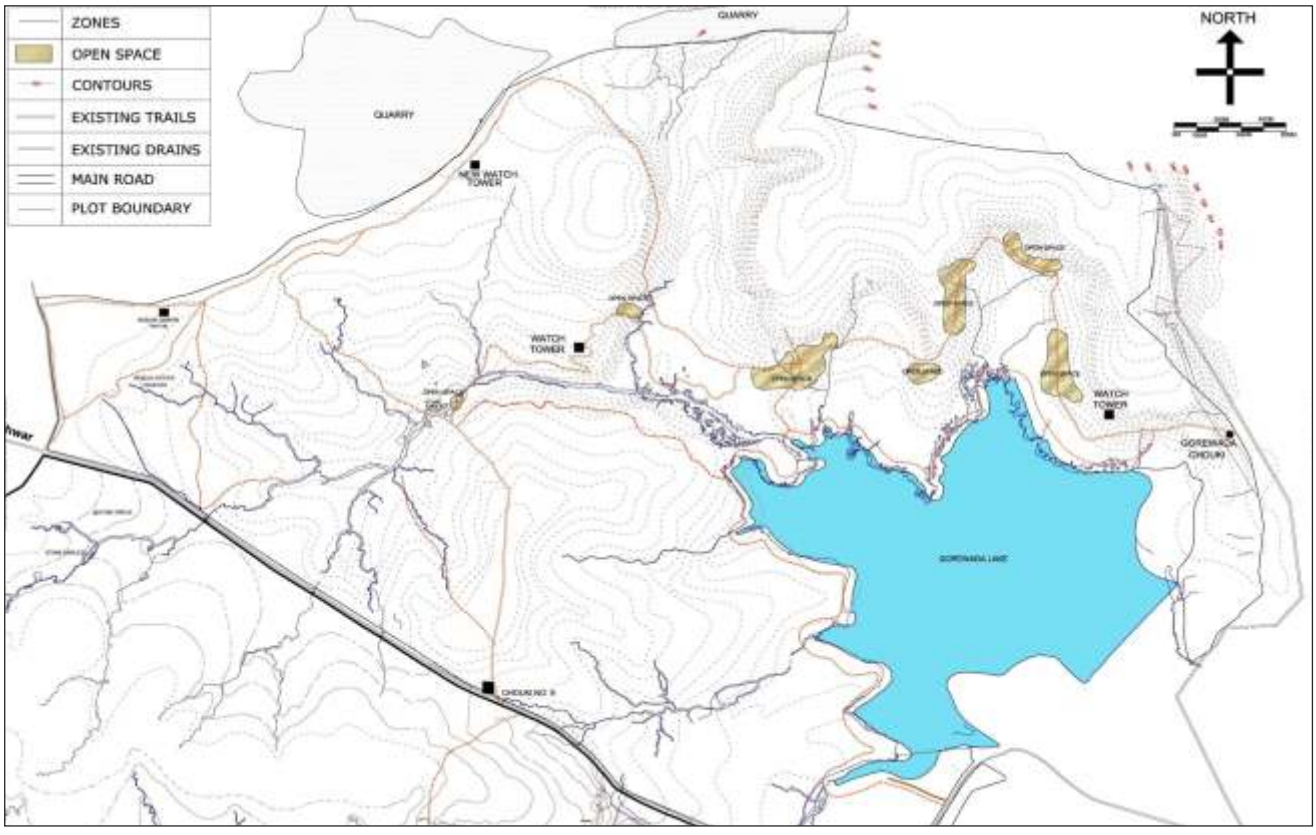


Fig. 131 : Northern Site with Existing Trails and contours

The Gorewada Reserve Forest has 1914 hectors area which is bisected by the public road passing almost through the center of forest. As the northen Side Gorewada Reselve forest is isolated from the Gorewada Zoo which is on southern side of Gorewada Forest the following activities could be developed at the northern side according to the proposed theme.

Embracing NATURE

Interactions for the visitors and nature.

Bird watching

Waterside boardwalks

Yoga in nature

Embracing HEALTH

Adventure Sports like Obstacle courses & team building games,

Rope courses and artificial rock-climbing wall,

Zip lines, Safari tours, cycling, Non-powered boating,

Sport fishing Waterfront boardwalks, Tethered hot air balloon, paramotoring, Stargazing, etc.

Embracing FAMILY

Providing an environment and activities for family to come together.

Camping

Nature educational activities

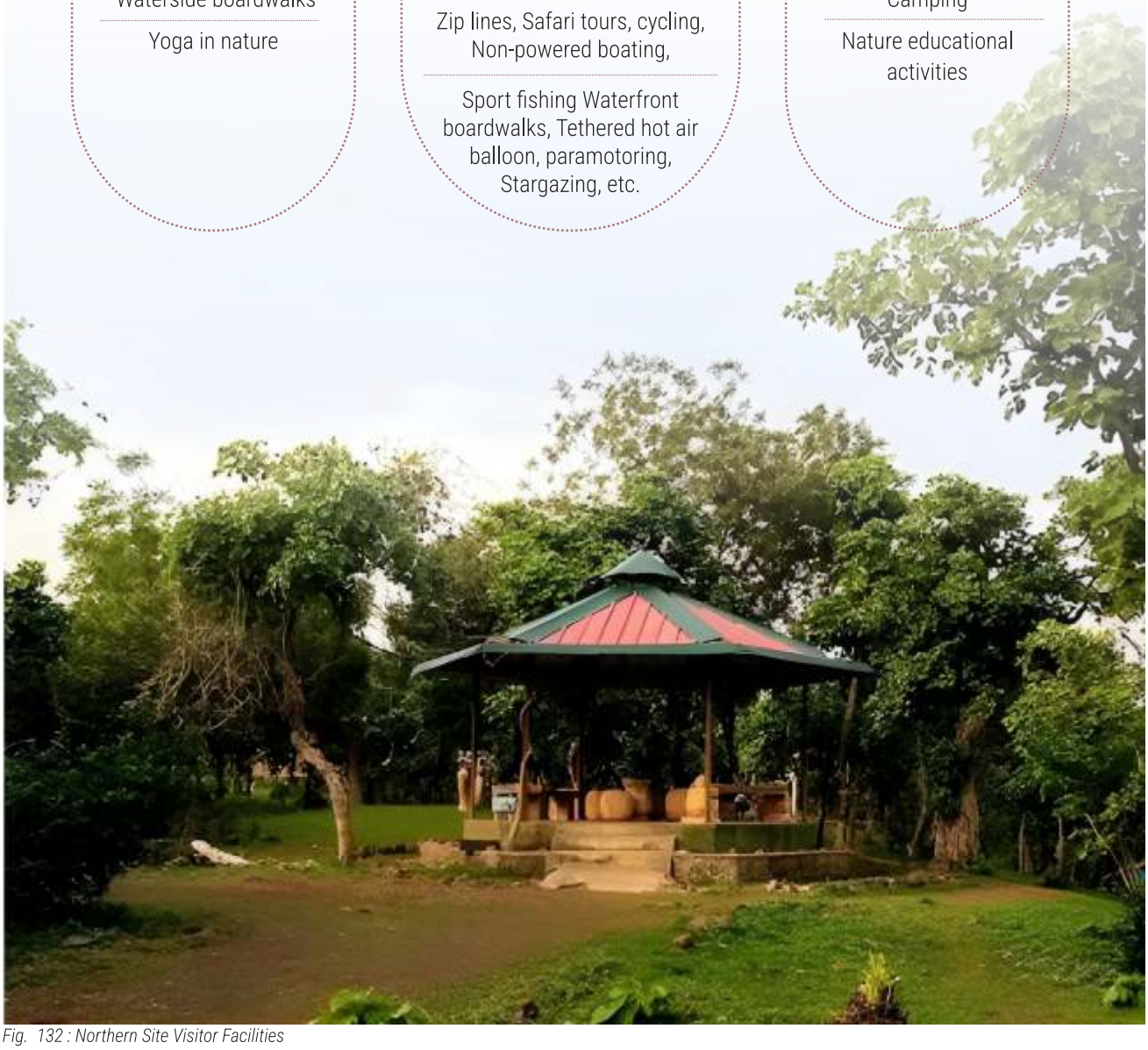


Fig. 132 : Northern Site Visitor Facilities

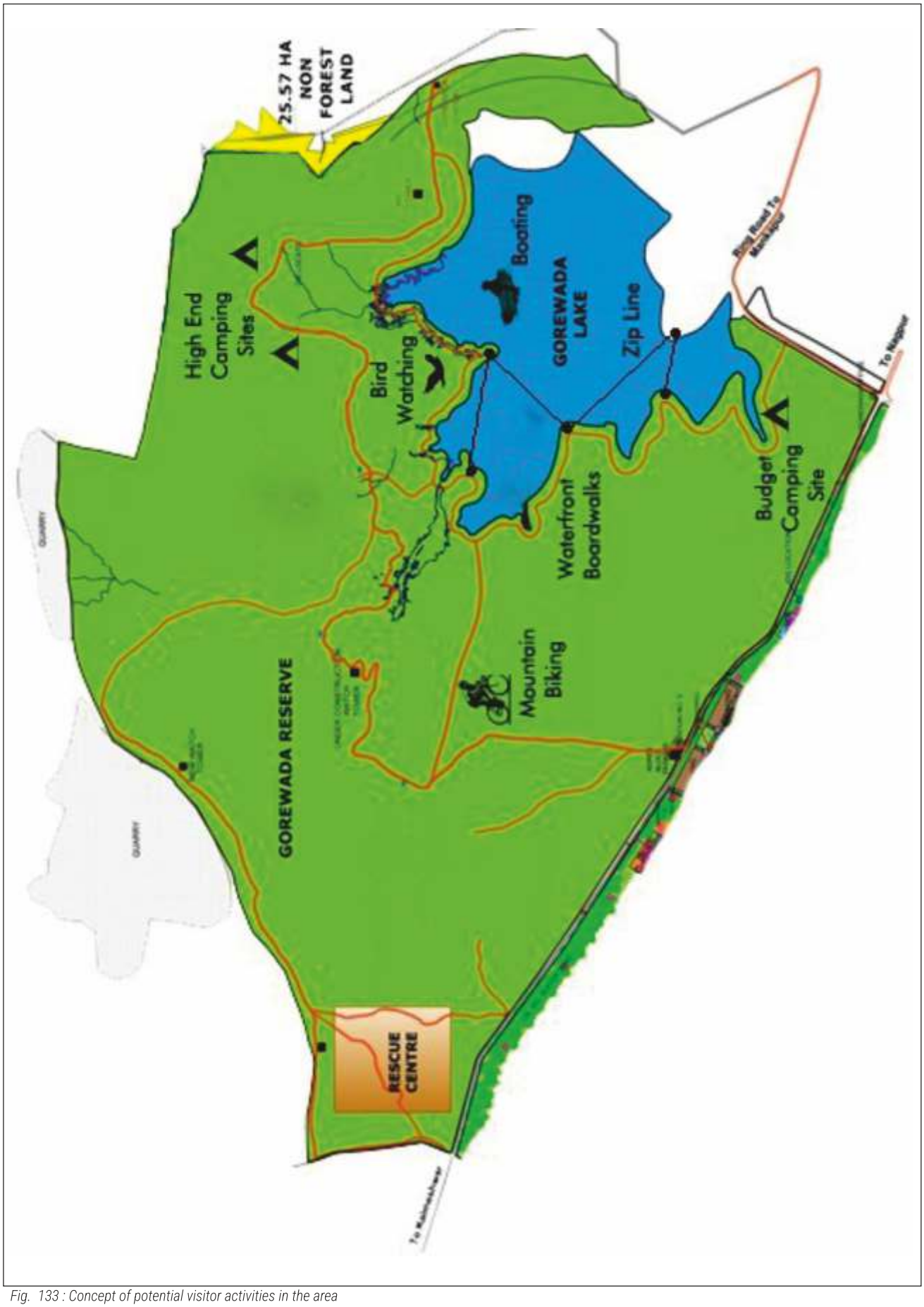


Fig. 133 : Concept of potential visitor activities in the area

4.12 Visitor Circulation

The Balasaheb Thackeray Gorewada International Zoological Park in Nagpur is designed to offer a comprehensive and enriching experience for all visitors. The proposed amenities aim to ensure visitor comfort, convenience, and engagement through a variety of facilities and attractions.

Upon arrival, visitors will enter through an Entrance plaza equipped with essential amenities such as toilet blocks and restaurants. This area will also feature amphitheatres, an interpretation and souvenir block, and a ticketing block, catering to various visitor needs and providing a welcoming start to the zoo experience. Vehicles will undergo screening at the vehicle security gateway. Visitors will then proceed to a designated drop-off area and adjacent parking facilities. From these walk-in access points, visitors will navigate through the main security screening section before being admitted to the Entrance Plaza. Once tickets are purchased, visitors can access several key attractions, each connected by shuttle services or walking paths. These attractions include: Indian Safari, Trail of senses, African Zoo, Night Zoo, Bio Park, Gondwana Park

The Entrance Plaza features two main entry points: the Safari Plaza and the Bio-Discovery Plaza, interconnected by a central Tribal Trail. Each attraction will have designated pick-up and drop-off points, ensuring smooth and efficient transportation for visitors.

To enhance visitor comfort, the zoo will provide a water point. All safari vehicles will be enclosed and air-conditioned, ensuring safety and comfort throughout the visit.

A highlight of the zoo, the Bio-Discovery Plaza will feature an underwater zoo and aquarium, spanning 5000 square meters. This area will offer a unique and immersive experience, allowing visitors to explore aquatic life in an innovative setting.

Overall, the Balasaheb Thackeray Gorewada International Zoological Park is designed to provide a seamless and enjoyable experience, combining education, entertainment, and comfort for all its visitors.

Fig. 134 : Tree hanging bird life in gorewada memories

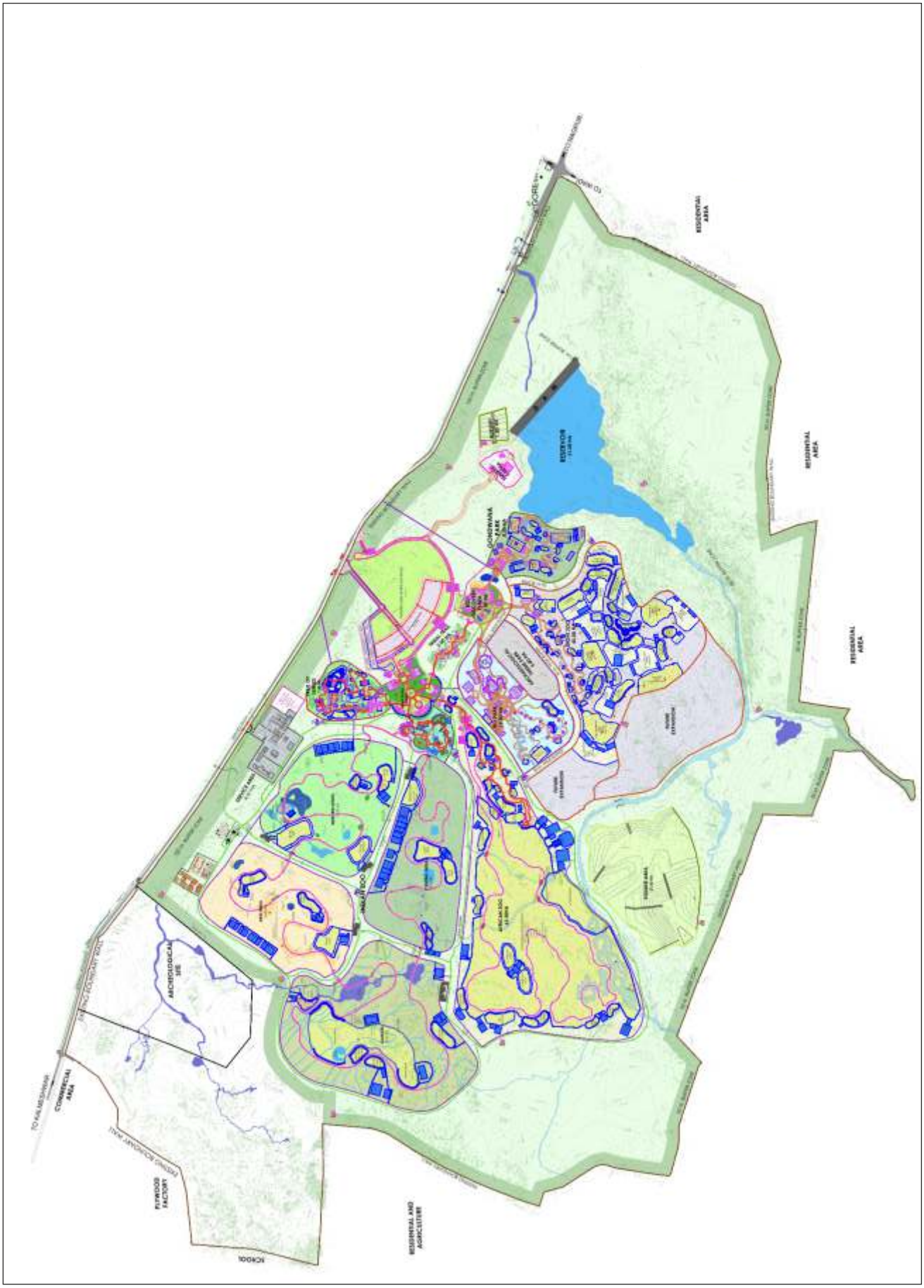


Fig. 135 : Site Circulation Plan

4.13. Services

The zoo proposes to provide services for its operation and maintenance in the following ways:

Supply of feed and essential items: - For this a service gate has been proposed from the Nagpur – Katol highway. Majority of the services will be undertaken through this gate.

Service roads parallel to main loop road but behind the enclosures have been created for unobstructed movement of service vehicle for supply of feed items to animals. The service gate and the network of service roads can be seen in the layout plan.

The layout plan of services are available for reference in Annex 5 of this report.

Solid waste disposal

The solid waste of the park will consist of following materials:

(1) Leftover Food (2) Faecal matter
(3) Fallen leaves (4) Grasses
(5) Visitors left over (6) Office waste.
(7) Plastic Bottles

It has been proposed to segregate the non-bio-degradable waste. This compacted waste will be disposed off or recycled by the authorized-out sourced agency. The bio- degradable waste will be used to make manure from and the same will be used for horticulture purpose. We have proposed to place solid waste collection bins at every retiring/ feeding cell for collection of animal waste, and commuting bins at various locations as shown in lay out.

Water management system

Water is lifeline for the human beings, animals & plants. Therefore, it is essential that sufficient water is available for animals, visitors, staff members and irrigation to gardens, plants and nursery. The yearly average rainfall at Gorewada site is about 955 mm.

The rainy days vary from 40 to 90 during monsoon (i.e. June to Oct). Often there are long dry spells also. Hence it is appropriate to have a permanent water supply source capable to provide water throughout the year, especially during non-monsoon period.

As per the Master Layout Plan, majority of activities are on southern side of Gorewada forest land. However, no water body exists in this part of the site. But the project is spread over a large area with lot of landscaped areas. It also has various amenities which will encourage need of both potable and non-potable water in large quantity.

Therefore, creating a separate permanent water source would be preferable for long term. Hence apart from few bores/ wells, it is proposed to create an independent water source on the southern side with the following objectives:

1. To cater to the needs of animals in zoo.
2. To cater to the drinking water, hygiene & sanitation needs of tourists & staff.
3. Irrigation facility for gardens, plants, plant nursery & plants to be raised on barren land / bushy forest.
4. To develop & preserve aquaculture.
5. To increase the scenic beauty of the zoo area.

The other incidental benefit of this water source will be Increased in ground water level and Reduction in deposition of sediments in Gorewada lake

This site is located on local Nalla about 0.75 km upstream of existing road bridge on Nagpur Katol state highway. After construction of Dam, this site will have large water spread area of 21 Ha at full tank level (FTL) i.e., 226.00 mt. and 5.33 Ha water spread at the end of summer.

The capacity of the constructed reservoir is 0.88 MCM at FTL (The location of under construction water body had been shown in master layout plan)

Water Requirement

The Balasaheb Thackeray Gorewada International Zoological Park is having the total area of 1914 Ha located near Nagpur-Katol road about 7 Kms away from zero mile stone of Nagpur City. This area is covered with thick woodland vegetation and various types of Herbs and shrubs.

The main parts of the Zoo are as follows:

Sr. No.	Particulars	Area in Ha	Remark
1	Indian Safari & walking Trail	120	Completed
2	Artificial Reservoir	21	Completed
3	African Zoo	63	Upcoming Components
4	Entrance Plaza, (Safari Plaza, Bio-discovery Plaza Aquarium) & Parking	15	
5	Civil Amenities area such as Office, Quarters, Gardens, parking, public waiting place, Etc.	7	
6	Gondwana Park		
7	Night Zoo	65	
8	Bio Park	30	
9	Trail of Senses	18.5	

Need of New Water Supply System:

As the existing system is not sufficient to fulfil the requirement and there is huge development in near future such as African zoo, Bio Park, Trail of Senses, Potable water requirement for staff & tourist etc. needs a separate and assured water supply system.

Requirement of Water:

As per joint decision by the Management of FDCM and MJP, it is planned to design the water supply scheme in two phases.

As per the availability of water in first Phase the water supply scheme is proposed for 1.5 milion cubic meter (MCM) annual requirements.

The area under this phase is
1) Indian safari 2) African zoo 3) Entrance Plaza

In 2nd Phase the scheme required 4.9 MCM of water. The area covered in this zone is
1) Night Zoo 2) Bio Park. 3) Gondwana Park 4) Other places

PHASE OF DEVELOPMENT	PARTICULARS			ANNUAL REQUIREMENT OF WATER IN MILLION LITRE	ANNUAL REQUIREMENT OF WATER MILLION CUBIC METER (MCM)
	A)Potable Water	Requirement in million Liter Per day	Water Supply and Distribution (MLD)		
Phase I	1. Drinking water for visitors for zoo and safari 2. Staff 3. Landscaping, Gardening, etc. 4. Restaurants, Hotel, etc.	0.812	0.812	296	0.296
	B) Non-Potable Water				
	1. Indian safari and walking trail 2. African Zoo 3. Entrance Plaza, Bird Park and Gondwana Land	0.76 3.00 2.14	0.76 1.50 1.03	278 548 378	0.278 0.548 0.378
			4.102	1500	1.5
Phase II	1.Night Zoo 2.Trail of Senses 3.Bio, Park, etc. 4.Balance requirement of phase -I	4.9	4.9	1790	1.79
Total water requirement			9MLD	3290	3.29

Existing Water Supply Arrangement: -

At present only Indian Safari and Walking Trail is developed. The water requirement of Indian Safari and Walking Trail 0.278 MCM (Million cubic meter) annually. The water requirement includes potable and non-potable water demand for Visitors, Staff, Animals and Irrigation purposes which is being fulfilled from bore-wells and sumps near these components.

The present water sources are borewell drilled in nearby area and water is pumped into the ponds. Similarly potable water requirements are also fulfilled from the bore-wells in the Existing Entrance Plaza.

There is 2 lakh Litre capacity Elevated Surface Reservoir in the Existing Entrance Plaza. The water from this ESR is distributed to various locations as required.

However, this arrangement is not sufficient to fulfill the whole demand of Indian Safari and Walking Trail Components. Looking to the future development a new surface source is developed in collaboration with Irrigation Department.

Development of New Source:

As per the master plan the majority of activities except the Night zoo are on southern side of Gorewada forest land. However, no water body exists in this part of site. Looking to the Geomorphological condition of the area it was decided to construct a permanent water source which is now at completion stage. This dam is constructed under the guidance of irrigation department.

This Dam site is located on local nallah about 0.75 km upstream of existing Road Bridge on Nagpur-Katol State Highway.

The principal feature of the Dam is as follows:

1. TBL- 330.050 m
2. HFL- 328.050 m
3. FRL- 326.250 m
4. LWL- 324.250 m
5. Live Storage- 0.8 MCM
6. Dead storage- 0.01MCM

The water availability from existing reservoir is 0.80 MCM annually. However; annual water requirement for Indian safari, Waking Trail & African Zoo is 1.5 MCM. To meet out the balance quantity of 0.7 MCM the following measures will be adopted in concerned with ground water survey and development agency of Maharashtra Government.

1. Strengthening of existing source by adopting of water conservation methods.

2. Investigation of new underground sources such as bore-well, dug-well.

3. Rainwater harvesting.

4. Reuse of waste water.

The annual water requirement for the complete project is 3.29 MCM of which 1.5 MCM is for Indian safari, Waking Trail & African Zoo.

To fulfill the extra demand of 1.79 MCM it is necessary to have a separate reservoir in the area or to increase the capacity of dam in consultation with Irrigation Department. Irrigation Department had conducted surveys for the enhancement of water storage capacity in the existing Water Reservoir.

The preliminary reports from Irrigation Department state apprise that existing can be used as balancing reservoir to fulfill the requirement increased from 0.8 million cubic meter to 2.82 MCM. However; No objection certificates from NMC, Nagpur is required for the same.

The components of the water distribution are as following:-

1. Jack well cum Intake well with overhead pump house in the water body with matching contours so that the water can be pumped to water treatment plant at any season.

2. A water reservoir has been built within zoo limits by constructing an earthen dam which has submergence area of approximately 22Ha. A sump well will be created for lifting water from this reservoir. A water treatment plant and a ESR is proposed for utilisation of this water.

3. Approach bridge of 7.0 mts width so that the water can be transmitted to the Water treatment plant and can be used as an approach for the maintenance of pumping machinery. The approach bridge will be at least 1.2 mts above the HFL.

Looking to the Geomorphological condition of the area it was decided to construct a permanent water source which is now at completion stage. This dam is constructed under the guidance of irrigation department.

4. Raw water pumping machinery probably submersible pumps with 100% standby of appropriate capacity will be installed in the Jack Well.

5. Water Treatment Plant (Unconventional Type) of 1.0 MLD capacity with 3 Underground sump of various capacities will be constructed at the point of consumption.

6. Pure water pumping machinery of required capacity will be installed to fill the RCC ESR.

7. Pure water rising main DI / HDPE to fill the RCC ESR.

8. For Phase-1; Mushroom shaped RCC ESR of Capacity 4 Lakhs litres of 15.00 Mts staging height.

9. Distribution system either of DI / HDPE pipes of various diameters as per the design.

10. Bore wells at required points. As per the report the water is fit for consumption after some primary treatment. So, the bore wells also can be dug to cater to the short of potable water.

Sewage system

The daily Sewerage generation will be 80% of the Potable water supply of 8,12,000 litres which is 6,50,000 litres (approx). The sewerage generated from the flushing of urinals and WC will be approximately 10 litres per visitor. The expected footfall on completion of the project is 10,000 visitors/ day. The sewage generated will be 1,00,000 litres per day. That means that the sewerage to be treated will be 6,50,000 + 1,00,000 = 7,50,000; say 7,50,000 LPD.

The components of the sewage system will be as below: -

1) Network of HDPE SN8 of required diameters as per the detailed design with chambers at 30 mts intervals and at turning points.

2) Decentralized STP 3 Nos at different locations each of capacity 350 Cubic Meter either of SBR, MBBR or technology of NEERI, Nagpur so as to reduce the BOD concentration to below 5.00. The treated water will have to be disinfected before using it for toilets. But the treated water that will be used for landscaping need not be disinfected.

3) Conveyance of the treated water with the help of network of HDPE SN8 Pipes.

Storm Water Network

To avoid water logging and ensure speedy flow of rain water it is essential to lay a proper network of storm water drainage with chambers at regular intervals. If the

layout is not proper the water logging will take place and it will be harmful for the animals. It is also essential to ensure uninterrupted Zoo operations throughout the year.

The components of Storm water network pipes will be as below: -

1) Network of non- pressure HDPE SN8 with chambers with proper grillage so that water only enters through the openings at 30 mts interval and at turning points.

2) Proper water filter unit before releasing water into the water body.

Electricity supply system: Lighting ideation of Gorewada Zoo

The Lighting Concept / Design Basis: The basic approach to lighting design in this project of National Importance would be as under.

- Areas like parking points would comply to IS 1944 (pt-1):1970 for group A & B roads as well IS1 944 (pt-5): 1980 for group D roads.
- Retail Spaces and other common area's (Indoor) would comply to IS 3636 (Part 1):1990 and subsequently different sections under this standard for relevant portions.
- The light sources used will have low mercury content avoiding / reducing environmental impact as per new green building norms.
- The streetlight in many places in service roads, watch towers etc. would be LED based luminaires with self-generating solar energy panel integrated to the units, thus leading to green energy usage and green lighting.
- The landscape lighting will be based on selective highlighting to create contrasts and will avoid light pollution.
- The Night Zoo will have High mast Lighting which will be Umbrella type.

This will enhance the dark sky effect and reduce spill over light to the horizon which is a grave environmental concern. The luminaires used in these High masts will be Dark Sky Compliant and the light source will be LED. This type of fixtures is environmentally friendly.

The entire lighting in the exhibit area will be based on dimming in co-relation with waxing and waning of moonlight under real time clock. The lights will be programmed to shut off automatically a pre- determined time of night when the night zoo closes.

This will ensure the body clocks (Circadian rhythm) of the exhibits are not disturbed. Thus, leading to happier exhibits and an adventurous environment for the tourist.

Power requirement of each component is tabulated as under:

S.No	Components	Grid power in Watts	Solar power in Watts	Total power in Watts	Emergency power through generator in Watts
1	GOREWADA RESERVE	0	13820	13820	0
2	INDIAN ZOO				
	Service Road 4m wide	1800		1800	1800
	A- Tiger Safari		48	48	
	Entrance Gate 2 Nos (Entry and Exit)		48	48	
	Entrance Double Gate 2 Nos (Entry &Exit) of size 20 m X 8 m				
	Animal House		5540	5540	
	Exhibit area, Holding Area, Feeding Area	180		180	180
	Equipment & Materials	2500		2500	1000
	B- Herbivore Safari				
	Entrance Double Gate 2 Nos (Entry & Exit) of size 20 m X 8 m.		48	48	
	Creation of Ponds/water bodies/water holes	345		345	
	Animal House	180		180	180
	Equipment & Materials	2500		2500	1000
	C - Leopard Safari				
	Entrance Double Gate 2 Nos (Entry & Exit) of size 20 m X 8 m		48	48	
	Animal House	180	5540	5540	
	Exhibit area, Holding Area, Feeding Area	2500		180	
	Equipment & Materials	1800		2500	180
	Signages			1800	1000
	D – Sloth Bear				
	Entrance Double Gate 2 Nos (Entry and Exit)	500	48	48	
	Beautification and Landscaping near Entrance/ Exit of safari & Break Point	50		500	500
	Sprinklers and Irrigation system			50	
	Animal House & Kraal area		2500	2500	
	E- WALKING TRAIL				
	Animal shelters	20	20	40	
	Gond Village	30	30	60	
3	AFRICAN ZOO				
	Service Road 4 m wide		2465	2465	
	Entrance Gate 2 Nos (Entry and Exit)		48	48	
	Entrance Double Gate 2 Nos (Entry & Exit) of size 20 m X 8 m.		48	48	
	Animal House		2500	2500	1000
	Entrance Double Gate 2 Nos (Entry and Exit)		48	48	
	Chain Link fencing 2.5 m high. Wire mesh size 7.5 cm X 7.5 cm X 10 g.	5220		5220	1000

S.No	Components	Grid power in Watts	Solar power in Watts	Total power in Watts	Emergency power through generator in Watts
	Beautification and Landscaping near Entrance/ Exit of safari & Break Point	500		500	500
	Sprinklers and Irrigation system	50		50	
4	GONDWANA PARK				
	Beautification and Landscaping near Entrance/ Exit	500		500	150
	Sprinklers and Irrigation system	50		50	
	Creation of Pond	500		500	
	Creation of water bodies/water holes	500		500	
	Plantation 40% Of 8 Ha	75000		75000	7500
	Exhibit Area: -It will be covered with wire mesh viewing will be through toughened glass of size 3 x 2 mtr.	12000		12000	4000
	Bird's house (200 sqm) With Brickwork & fabrication grill in Front and side	18000		18000	5000
	Providing & fitting 0.8 Ha area (4 X 2000 sq.mt. each) with net all around on a central pole of 20m height. Side walls to be covered with net supported by M S pole & other required accessories. It will have plantation, fruit and seed-bearing trees, bird houses etc.	7500		7500	1000
	Washrooms	1000		1000	1000
	Rest Area / Baby care	5310		5310	2000
	Kiosks & Sheds	10790		10790	3500
	Beautification and Landscaping	3600		3600	
5	ENTRY PLAZA (MAIN)				
	Entrance gate 2 nos 18 m wide	4800		4800	4800
	Security Posts	15400		15400	15400
	Concrete Road 0.708 Km 15 m wide	18000		18000	6000
	Plantation 30% of 15 Ha				
	Fountain / culture / hardscape	2000		2000	
	Signages / interpretive & Graphics	2250		2250	2250
	Landscape, beautification, hardscape & related activities. 15% of 15 Ha	10000		10000	
	Pedestrian pathway 3.0 m wide of granite gattu on WBM road surface	1620		1620	1620
	Pickup & Drop Point (Bus stop / Taxi Stand/Cars) with semi covered sheets	1620		1620	1620
	Entrance Plaza building (2000sqm), Information centre (1000 sqm), Ticketing	236000		236000	80000

S.No	Components	Grid power in Watts	Solar power in Watts	Total power in Watts	Emergency power through generator in Watts
	Booth (200 sqm), Rest room Wash rooms(300 sqm), Baby Care room (200 sqm), Coffee / Tea Shops (300 sqm), Cafeteria(500 sqm), Administrative Office(1000 sqm), Souvenir Shops (200 sqm), Cloak Room (200 sqm), First Aid room(100 sqm)				
	Museum/interpretation centre (1000 sqm), open air theatre (1000sqm), Signages/graphics	95100		95100	5000
	Adventure Park, Children Play Area, wash rooms	18150		18150	5000
	Safari Pickup Point (Semi covered Sheds)	900		900	900
6	BUFFER ZONE & LAND DEVELOPMENT				
	Service Road 4.0 m wide	5160		5160	5160
	Watch Tower		48	48	
7	ANIMAL CARE CENTRE				
	Veterinary hospital	53400		53400	25000
	Quarantine	17500		17500	17500
	Laboratory	14900		14900	8000
	Recuperation Area	6900		6900	6900
	Commissary	6900		6900	6900
	Admin.	106800		106800	20000
8	NIGHT ZOO				
	Visitors Road 4 m wide	2520		2520	2520
	Service Road 4 m wide	2280		2280	2280
	Entrance Gate 2 Nos double safety		24	24	
	Animal House		76950	76950	
	Exhibit area, Holding Area, Feeding Area Moats	42000		42000	42000
	Signages / interpretive & Graphics	1800		1800	1800
	BUFFER ZONE OF NIGHT ZOO				
	Service Road 4.0 m wide	2400		2400	2400
	ENTRY PLAZA NIGHT ZOO				
	Parking area development, Ground	2700		2700	2700
	Development, Divider, Kerbing stones and B.T. surface area over W.B.M.				
	Pedestrian pathway 3.0 m wide of granite gattu on WBM road Surface	450		450	450
	Pickup & Drop Point (Bus stop/Taxi Stand/ Cars) with semi covered sheets'	270		270	270

S.No	Components	Grid power in Watts	Solar power in Watts	Total power in Watts	Emergency power through generator in Watts
	Entrance Plaza building (500 sqm) and Entrance gate, Information centre (300 sqm), Ticketing Booth (150 sqm), Rest room/ Wash rooms (250 sqm), Baby Care room (200 sqm), Coffee / Teashop (200 sqm), Cafeteria (400 sqm), Administrative Office (500 sqm), Souvenir Shops (200 sqm), Cloak Room (100 sqm), First Aid room (100 sqm)	236000		236000	75000
	Children Play Area.	7200		7200	2000
	Safari Pickup Point (Semi Curved Sheds)	900		900	900
	Landscape, Beautification, Hardscape & Related activities.	12500		12500	
	BIO PARK				
	Entrance Gate 2 Nos Entry \ Exit	405		405	200
	Visitors Road 4m wide	2400		2400	2400
	Service Road 4m wide	1200		1200	1200
	Animal House	9000		9000	9000
	Exhibit area, Holding Area, Feeding Area, Moats etc.- Total area 81082 sqm	20000		20000	10000
	Fencing of exhibit area				
	Beautification and landscaping (5% of balance area i.e 50.0-8.10 = 41.90)	12500		12500	
	Rest area / Baby care / Wash rooms	5000		5000	1000
	Kiosks & sheds	9560		9560	2500
	Signages / graphics	1800		1800	1800
	Indian Zoo				
	Beautification and Plantation (60% of 10 Ha)	12500		12500	
	Signages /Audio systems	1800		1800	1800
	Rest area/wash area	8150		8150	2000
	Kiosks	10450		10450	
	TRIBAL VILLAGE TRAIL				
	Washroom\Tea coffee shop / kiosks	14000		14000	5000
	Signages	900		900	900
	10 scenes depicting various activities such as Live Village (12 to 15 Huts), Market Activity, Weapons display, Cultural Performance, Vegetation / animals display,	900		900	
	Cultivations / cattle, Fishing / Boat display				
	ARCHEOLOGICAL THEME PARK				
	Beautification and Plantation 10% of 5 Ha	12500		12500	
	Wash Room / Tea coffee shop / kiosks	14000		14000	5000

S.No	Components	Grid power in Watts	Solar power in Watts	Total power in Watts	Emergency power through generator in Watts
	Signages	900		900	900
	12 scenes depicting stages of evolution	900		900	
	WATER SUPPLY SCHEME & DISTRIBUTION:				
	Water Treatment Plant	35000		35000	
	SEWERAGE SYSTEM LINE				
	Sewage Treatment Plant	35000		35000	
	Administrative buildings	21266		212660	50000
	Service Block (Elevated Service Reservoir, Sump well &related development, Pump house, Office block)				
	Workshop	42532		42532	18000
	Pumping	19000		19000	19000
	Miscellaneous	100000		100000	10000
	GRAND TOTAL	1664582	109821	**1774403 or 1774 KW**	517560

Considering the above forecast and future requirements of the project, the total power requirement is anticipated to be approximately 2000 KW. The auxiliary power in event of power failure will be provided through Solar Power Plants or Silent Diesel Generating sets as approved by the Government of India under latest noise pollution standards.

Express feeders is also incorporated for uninterrupted power supply in the Zoo from Fetri Substation. Three DG sets at standby of 250KVA under AMF and sync panel which will automatically start and shut down based on load sensing. This will save valuable diesel as it may not be necessary to use all the DG at the same time.

4.14. Various Sections, Operational Planning and Requirements

Animal section

The importance of a zoo depends upon the quality of exhibits rather than the number of species it displays. This section is responsible for the upkeep of animals and their enclosures so that they get a hygienic and naturalistic environment in the BTGIZP. The animals will be kept in enclosures which provide them adequate space in quality and quantity and satisfy the biological needs of each individual species.

Adequate measures will be taken to ensure the safety of animals, caretakers and visitors. Each enclosure will have proper drainage of excess water and arrangements for removal of excreta and residual waste so that a high standard of sanitation and hygiene would be maintained.

Equipment & vehicle requirement

The importance of a zoo depends upon the quality of exhibits rather than the number of species it displays. This section is responsible for the upkeep of animals and their enclosures so that they get a hygienic and naturalistic environment in the zoo.

Following vehicles, equipment, and implements will be required to run this section smoothly.

1. Animal crates (carnivore, herbivore, monkey, and birds)	–	15
2. Trolley for carrying animal crates	–	2
3. Hand trolley	–	50
4. Squeeze cage (mobile)	–	2
5. Pressure pumps	–	20
6. Basket	–	100
7. Dav (meat cutter)	–	20
8. Knife	–	20
9. Broom	–	100
10. Turmeric powder	–	20 kg
11. Rubber pipe	–	1000 Meters
12. Oil and grease	–	5 kg
13. 4-wheeler	–	2
14. 2-wheeler	–	3
15. Bicycle	–	3
16. Computer	–	4
17. Furniture	–	As per requirements

Veterinary section

The Balasaheb Thackrey Gorewada International Zoological Park will have a well-equipped hospital. All modern facilities will be made available. Two full time veterinarians along with support staff will be appointed.

The hospital will have a clinic with basic facilities for treatment and dressing of animals, standard surgical instruments, diagnostic equipment and dispensary with wide range of drugs. A separate facility will be created for hand rearing baby animals. Proper drainage and ventilation will also be provided.

Veterinary Hospital facilities

- A separate operation theatre for surgery and treatment.
- An X-ray unit with dark room.
- A dispensary / pharmacy with storage facility for wide range of medicines.
- A nursery unit for hand rearing baby animals.
- A self-contained laboratory for conducting pathological tests.
- Appropriate housing for in-door patients.
- Quarantine / isolation ward.
- Housing facilities for recuperating patients.
- Offices, library, record room, toilets.
- Stores and kitchen for animals' feeds under treatment.

Fig. 136: Veterinary Hospital

Equipment & vehicle requirement

- Treatment cages: (squeeze cages)
- Laboratory equipment:
- Microscopes, Bacteriological incubator, Autoclave.
- Glassware, Chemical regents.
- Sterile surgical equipment and other instrumentation for diagnosis and treatment.
- An X-ray unit, darkroom facilities and photographic material.
- An incubator unit for baby animals.
- Equipment and instrumentation for conducting post mortems.
- Kitchen ware, mixer-cum-food processor, storage containers, special items like feeding bottles, nipples, cooking gas and stove.
- Chain-pulley equipment for hoisting animal cages.
- Room heaters, coolers etc. as per requirement.
- Medicines and miscellaneous items.
- Nets for capturing animals, Ropes and poles etc.
- Ambulance with equipment – 1
- Four-wheeler – 2
- Hospital furniture.

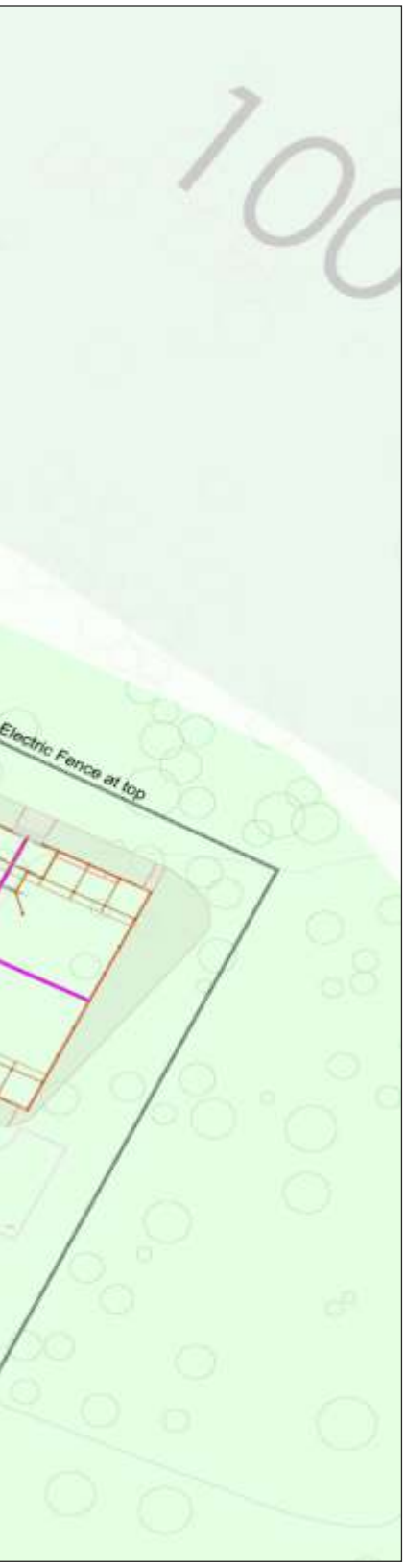
Tranquilizing equipment & drugs

S. No.	Equipment, Accessories & Drugs	Quantity
1	Rifle model 60	1
2	Blow Pipe	1
3	4 ml alum. Barrel for metal syringe	10
4	5 ml alum. Barrel for metal syringe	10
5	Rubber plunger	10
6	Needles with collar art. 3040	10
7	Stabilizer art. 3049	10
8	Art 2006 chargers for metal syringes	20
9	Art 2013 cartridge (yellow)	20
10	Cartridge (brown)	20
11	Mini inject 3 ml	5
12	Mini inject 5 ml	5
13	Woolen stabilizer art 3092	5
14	Needles art 3068	10
15	Ketamine -100	50 ml - 1 x 2
16	Xylazine – 100	50 ml - 1 x 2
17	Yohimbin hydrochloride	50 ml 1 x 2

Quarantine wards

An area of 400 SQM has been kept for quarantine wards. Each cell will have light and air exposure. Each cell will have provision for medication and temperature monitoring facilities.

Fig. 137: Quarantine Area



Post-mortem room

- A 40 SQM post mortem room is proposed near an incinerator.
- It will have natural light, drainage, wash basin with water point and platform.

Visitor amenities

The BTGIZP complex, Gorewada is likely to cater about 21 lakhs visitors annually. This will include adult, children, students, scientists, foresters, wild lifers, old, disabled and foreigners. It will be opened on all the days except Monday for the visitors.

The following amenities will be developed:

Parking

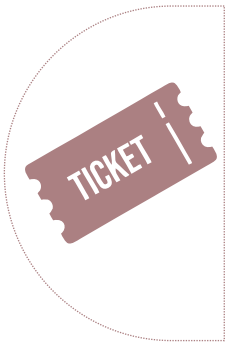
There are three parking areas as under: -

1. Parking for safari vehicles - 2 Ha.
2. Parking for four wheelers - 8 Ha.
3. Parking for buses and two wheelers - 2 Ha.

Entry gate

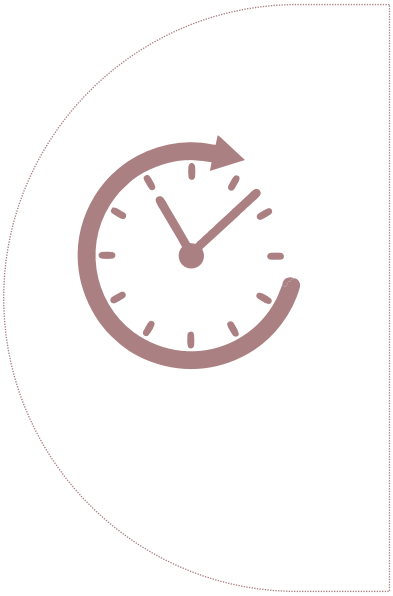
An entry gate with iconic structure will be developed as main entrance along with three plazas that will serve as a main contact point for visitors, a walkway promenade with facilities, and entry points to all the attractions.

It will have education centre, restaurants, and souvenir shops along with following facilities: -



(1) Ticket booking windows - 8 (with a provision to increase to 12)
(2) Cloak room – 2
(3) Entry and exit gate for vehicles
(4) Administrative areas
(5) Public address system
(6) A ramp or similar structure wheelchair accessibility

The second entry gate will be utilized for back-office activities which will have access to staff, commissary, workshop and hospitals.



Zoo timings

- 15 June to 15 March
  07.30 Hr. to 12.30 Hr. (last ticket to be issued at 11.30 Hr.)
  14.30 Hr to 18.30 Hr (last ticket to be issued at 17.00 Hr.)
- 16 March to 14 June
  08.30 Hr. to 17.30 Hr. (last ticket to be issued at 16.30 Hr.)
- Plaza and ticket counter will open one and half hour before zoo time. Indian zoo is closed for visitors on every Monday.

Night Zoo timing

- Summer: - 18.00 Hr. to 23.00 Hr.
- Winter: - 17.00 Hr. to 22.00 Hr.

The zoo shall ensure that each section/ entry /zone is closed to visitrs for at least a day every week as per CZA norms. The zoo wish to offer some attraction available everyday for visitor coming without prior planning.

Toilets & drinking water points

These facilities are proposed to be provided near the following locations: -

- Parking Area
- Break Points
- Central Plaza at Bio-Park
- Entrance Plaza – Northern Side
- Entrance Plaza – Southern Side
- Walking Trails
- Central Plaza at Bird Park

4.15. Cafeteria, kiosk & souvenir shop

The visitors are likely to spend 2-4 hours to see per attraction, and 1-2 hours for night Zoo. They are likely to take ride or walk on foot. The visitors will like to sit and rest and take light refreshment.

Facilities have been proposed for their wellbeing and enjoyment. The location of these amenities is as follows: -

- Entrance Plaza – Safari Plaza, Tribal Plaza, Bio-Discovery Plaza, and Plaza.
- Break Points within certain attractions, where feasible and appropriate.
- Wheel chair will be available at the entrance for the disabled visitors free of charges.
- Sitting benches & shelters - About 200 sitting benches and shelters will be provided at different locations throughout the facility for visitors.
- First Aid facility - It will be available at the entrance with the security office, office, field office, at each attraction entrance, and zoo veterinary hospital.

Dustbins- About 200 dustbins will be placed at different locations to collect waste and left out.

4.16. Visitor Transport

Indian Safari Transport

For Indian safari, 38-seater AC buses are used as Safari Vehicles. At present 5 such buses are available. In total 6 buses will be made available in Indian Safari. Apart from AC buses closed canters are also available in Indian Safari. For more exclusive and premium experience, customised 4X4 SUV with 6-8 seating capacity are also proposed for Indian Safari.

In walking zones, all the roads and pathways are designed for wheelchair accessibility and easy to walk. For longer walks, we are proposing to have battery operated carts for visitor movement. These carts will have broad motorable roads along the pathways.

Non-AC Safari Canters

Non-AC Safari Canters

Themed ac Buses in Indian Safari

Battery Vehicles

African Safari

African Safari is different in design. Here Carnivores are enclosed in moated enclosure. Therefore, open canters and smaller SUV vehicles with following design are proposed. The canters are planned for mass movement where seating capacity is 30-40 people per vehicle. Whereas, The SUV is considered for more exclusive and premium experience, and seating capacity is restricted to 6 people only. In accordance with CZA's policy for eco-friendly fuel, the vehicles will be preferably battery operated or similar environment friendly fuel.

Themed vehicles proposed for African safari

Themed vehicles proposed for African safari

Night Zoo

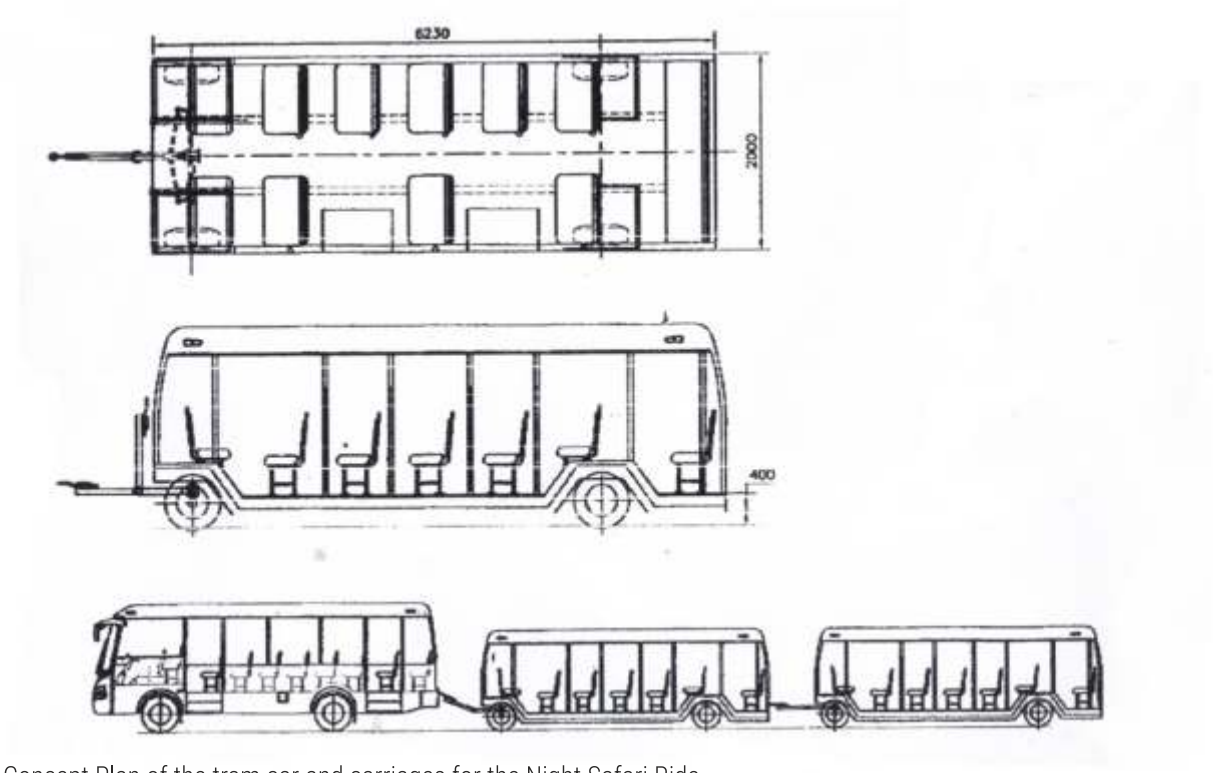
In the Night Zoo much larger crowds are expected during peak periods thus a much larger capacity vehicle is required. We recommend petrol or LPG powered, rubber tyre, articulated vehicle, pulling trailers.

These would be based on the vehicles used in the Night Safari, Singapore and fabricated by Specialty Vehicles, California, USA (http://www.specialtyvehicles.com/tram-trailers/metro-trailer). They are rubber wheeled vehicles with a rear axle driven, prime mover that seats 18 people. The prime mover tows two or three carriages each seating 30 people. Thus, total capacity should be about 80 to 110 people. All the carriages should be articulated, (have a permanent pivot joint in its construction) allowing the carriages to turn more sharply, ensure a tight turning radius and track the carriage in front.

Discussions should be held with a local vehicle manufacture about the reality of fabricating sets of trams for the Night Safari.

Rubber wheeled vehicle

Carriage



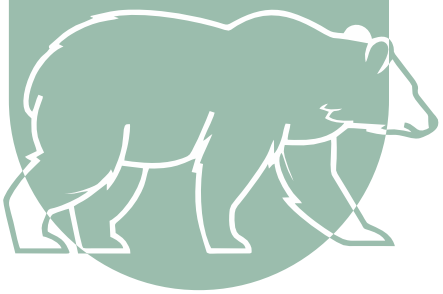
Concept Plan of the tram car and carriages for the Night Safari Ride

The charming leopards at Gorewada Zoo captivate visitors with their graceful movements and striking rosette-patterned coats. Observing these elusive predators up close offers a thrilling and educational wildlife experience

Part:2

CHAPTER: 5

05



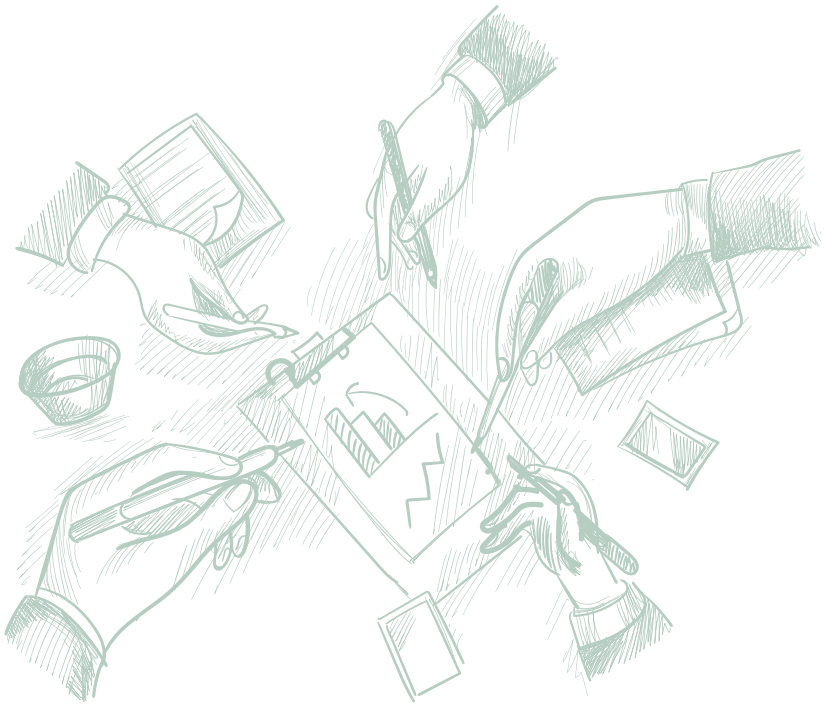
Personnel Planning

5.1. Organisation Structure

The BTGIZP has been proposed to have day and night safaris, traditional zoo enclosures, moated enclosures and experiential wildlife themed components; the staffing pattern is prepared accordingly.

The proposed administrative structure for management of BTGIZP shall have adequate liberty and powers for its functioning as well as it shall be capable of drawing benefits of being a governing body.

A special SPV (Subsidiary under the Forest Development Corporation of Maharashtra) with a mandate to develop, run and maintain zoos established for working of BTGIZP.



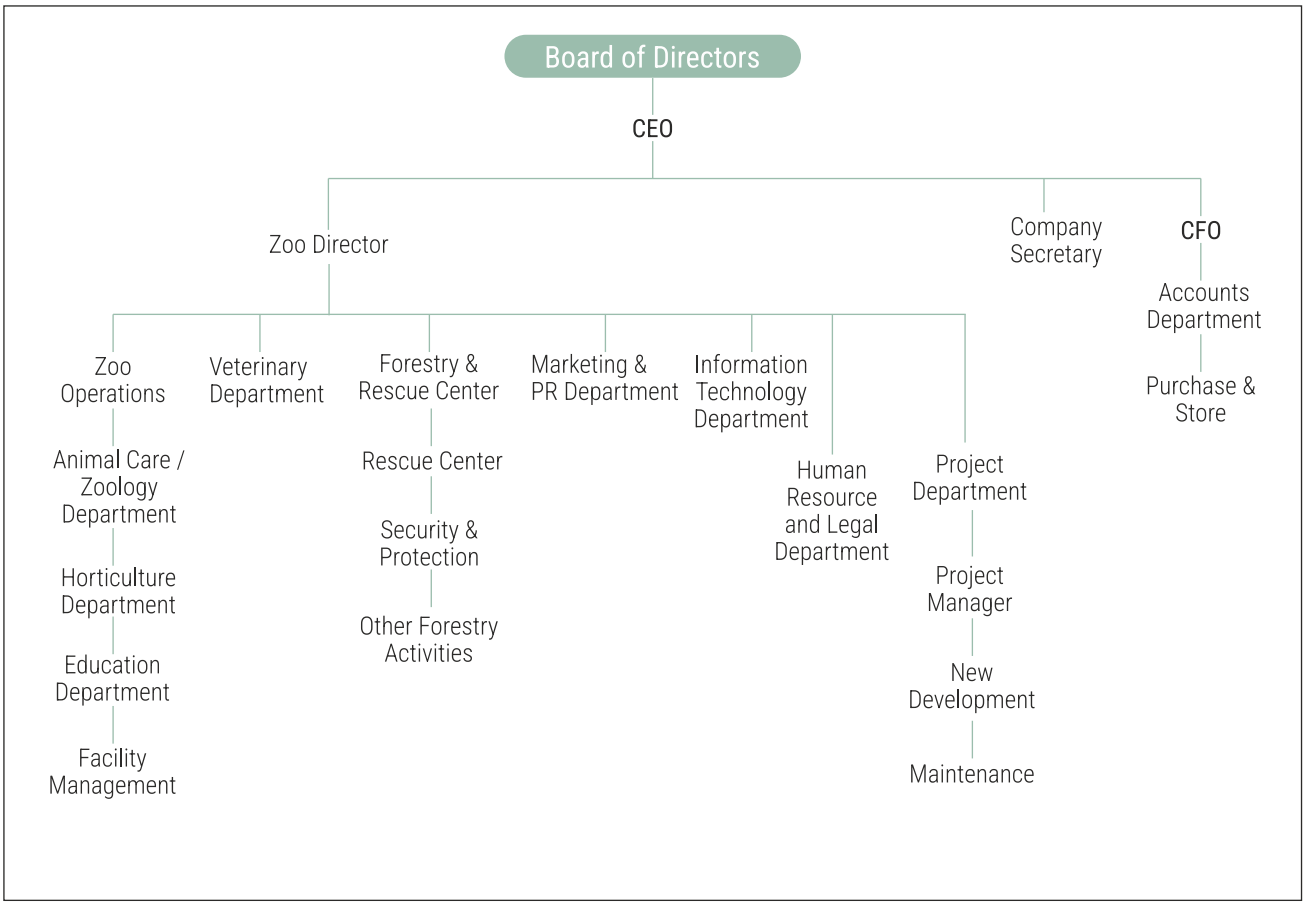


Fig. 137 : Organisational Chart - Phase 1

5.2. Administrative Model

- Administration require the following salient features for its smooth functioning
- Autonomous in Functioning (Administrative and Financial operations)
- Autonomy to hire and fire staff (Similarly to attract talents from Government and private sector alike.)
- Commitment to Wildlife and Public Welfare
- Commercial mindset
- Ability to draw benefits of a government body
- Authority under Wildlife (Protection) Act

A Special Purpose Entity (SPV) under the Forest Development Corporation of Maharashtra is proposed to oversee the development, administration and functioning of this Park. Accordingly, A subsidiary company namely FDCM Gorewada Zoo Ltd, Nagpur has been established for the purpose. The Company is governed by the nominee directors from the Government of Maharashtra under the Chairmanship of Managing Director, FDCM.

5.3. Justification for Staff & Hierarchy

On the recommendation of Indian board for wildlife in 1973, Govt. of India constituted an expert committee on zoos to suggest administrative pattern for various categories of zoos. This committee suggested that Director should be a whole-time officer and should be overall in charge of the zoo operation at site. He is responsible to the governing body which may be the government or a departmental head or a management committee. He will have adequate administrative and financial power. There must be a second officer to assist the Director and to function as in- charge in his absence. In a zoo, the various branches should be headed by qualified and trained Curators, Veterinarian and Engineers. Separate staff is necessary for construction, maintenance of the buildings and gardens.

According to Wildlife Institute of India, Dehradun, the management of a zoo is a multidisciplinary team work which requires inputs from various disciplines such as personnel management, planning, finance, biology, veterinary science, horticulture, sanitation, security, public relations, education, research, engineering etc. The organizational set up of a zoo should, therefore be suitably structured so as to provide for professional inputs from these disciplines.

Promotion opportunities

Most of the posts in the BTGIZP shall be manned by forest officials who have already in-built promotion prospects. Similarly, the post of Asst. Curators can be taken as a feeder cadre post for the promotion to the post of curators. Further the recruitment rules may be made in such a way that each cadre should get at least three promotions in his service time. All the employees should be given pay scale as recommended by VII pay commission. The benefit of ACP (assured carrier promotion) should also be granted as per pay commission recommendation

5.4. Staffing pattern Gorewada International Zoo, Nagpur

Under the BTGIZP recognition rules, CZA has prescribed the requirement of scientific & technical staff to support the officer in–charge of the BTGIZP in carrying out the responsibility of housing, upkeep and healthcare of zoo animals, research and visitor's education as specified in the table below:

5.4.1. Administrative Structure

The BTGIZP is a visionary project designed and planned for futuristic development of Indian Zoo Industry. The project is to be implemented through a Subsidiary Company of Forest Development Corporation of Maharashtra i.e FDCM GOREWADA ZOO LTD. for development and operation and maintenance. In the existing Administrative Structure, The Managing Director, FDCM is also the Chairman of Company and is Zoo Director, as per the definition in WPA, 1972. Following staff is appointed/ Deputed as full-time staff or permanent staff in FDCM GOREWADA ZOO LIMITED: -

Sr. No.	Post	Sanctioned strength	Proposed strength
1	Chief Executive Officer	1	1
2	Zoo Director / Divisional Manager	1	1
3	A.M/ Assistant conservator of forest	1	1
4	Range forest officer	1	1
5	Project Manager	1	1
6	General Curator	1	1
7	Company Secretary and Manager Accounts	1	1
8	Chief Finance Officer	1	1
9	Forest Guard	1	4
10	Accountant	1	4
11	Executive Stores	1	4

Following staff will be outsourced or will be on contract on as and when required basis.

BALASAHEB THACKERAY GOREWADA INTERNATIONAL ZOOLOGICAL PARK

CONTRACTUAL/ OUTSOURCED MANPOWER REQUIREMENT IN VARIOUS PHASES

S.No	POSITION	Post Sanctioned	Post filled up	Proposed
1	Biologist	1	1	3
2	Facility Manager	1	1	2
3	Naturalist/ Education officer	2	2	2
4	Ticketing Manager	1	1	2
5	Souvenir Shop assistant	2	2	5
6	Ticket vendors	4	4	9
7	Supervisors (Security-in-charge/LSS/ Head of particular group)	5	5	8
8	Receptionist	1	1	4
9	Executives	2	2	6
10	Horticulturist	1	1	3
11	Drivers HMV (Promotable category for skilled)	9	9	23
12	Head Animal Keeper	2	2	5
13	Assistant Animal keepers	68	38	87
14	office attendants	16	8	14
15	IT tech	2	2	3
16	Plumber	4	3	5
17	Electrician	4	3	5
18	Carpenter	2	1	3
19	Multi-skilled personnel	3	3	7
20	Gardeners	3	3	6
21	Driver (LMV TR)	16	8	10
22	Safety officer	2	2	5
23	Bus attendant	8	8	28
24	House keepers	36	24	65
25	Gate keeper/ Security Guard	42	30	77
26	Casual labour for any miscellaneous works	20	10	28
27	Civil Engineer	1	1	3
28	Electrical Engineer	1	1	2
29	Architect	0	0	2
30	Site Supervisors	0	0	5
31	Site Store In-charge	0	0	5
	Total posts	259	178	432
	Grand Total posts			691

The Gorewada Reserve Forest boasts a wide variety of flora, featuring an array of native trees, shrubs, and wildflowers that create a vibrant and diverse ecosystem. This rich plant life supports the park's wildlife and offers visitors a lush, green landscape to explore.

Part:2

CHAPTER: 6

06

Disaster management

6.1 Disaster management Introduction

Disaster is an emergency event that occurs with little or no warning, causing more destruction or disruption of operations than the Safari Park can correct by application of its own readily available resources. These threatening conditions may arise suddenly due to various environmental factors as well as factors created due to civil disturbances. Some of the natural events like severe weather led to flooding, earth quakes, draught, severe cold and wild fire not only can damage the park and its animals but will do serious damage to the local community, resources and equipment to salvage the natural catastrophes will be a challenge.

Meticulous prior planning with adequate finance is needed for preparedness to face such exigencies in the interest of the park animals, its property, as well as the public safety. Portable generators, chain saws, gasoline, fresh water and an adequate supply of food stuffs should be maintained by Safari Park at all times. Staff may be needed around the clock to deal with problems occurring during severe weather. Normal access to the Safari Park may be limited or cut off due to flooding, downed trees or damaged roadways.

Disaster Management Definitions of terms

Preparedness means being ready to handle disasters and emergencies; i.e. Risk assessments, disaster planning, adequate supplies, trained staff and community partnerships. All these contribute to disaster preparedness.

Mitigation is the process of preventing or minimizing the losses and damages that emergencies can cause.

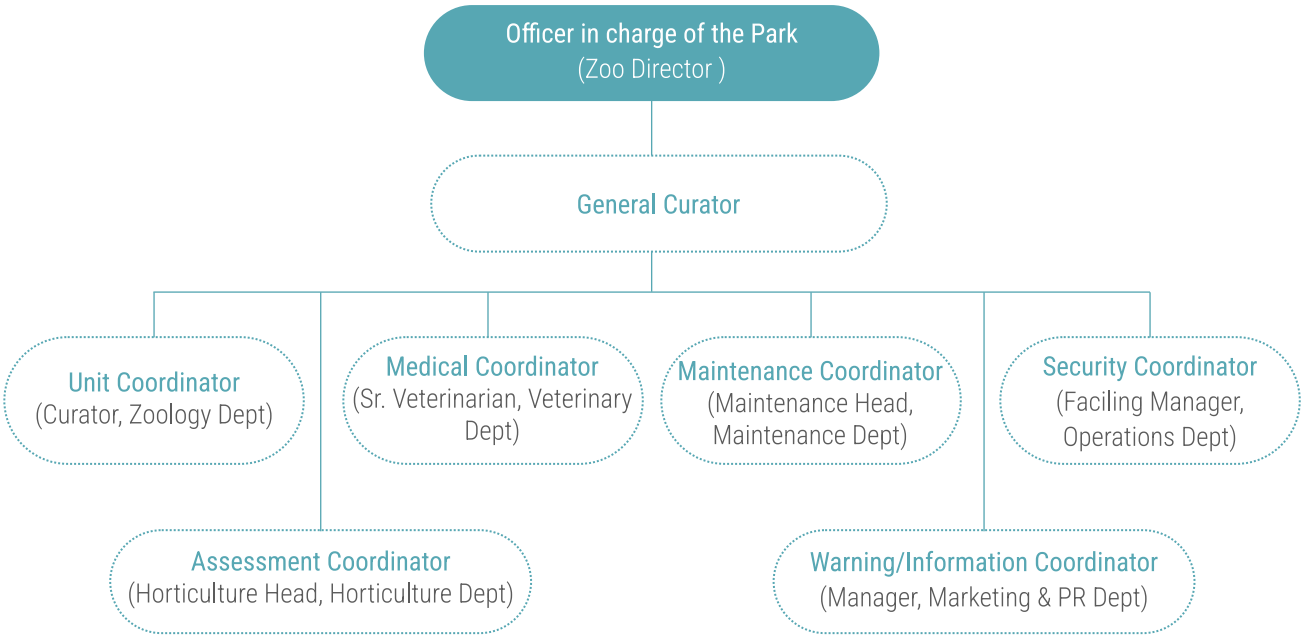
Response involves actions taken to deal with a disaster or emergency. Response is about the emergency itself, as well as the problems it creates.

Recovery means restoring services, facilities, programs, collections, and infrastructure.

6.2 Disaster Management Team

Efficient management of the disaster will be utmost priority in the park management. The well planned and timely attended disasters would minimize the damage which is possible through a team constituted for the purpose.

The following is the team constituted as disaster management team having the jurisdiction over all units of the park to address various kinds of disasters which are mentioned in the plan or otherwise.



6.2.1. Flow of Information

The concerned animal keepers or official in-charge of the place where such disaster take place shall immediately report to the General Curator. The General Curator immediately reports to the Zoo Director for immediate action. The Zoo Director after the receipt of such information shall immediately spring into action to combat and also to take stock of the situation. The team shall immediately convene an emergency meeting to plan and mitigate the problem. The disaster management team shall look into the following by conducting a regular meeting at least once in quarter and three meetings compulsorily in a year under the chairmanship of team leader.

- Assessment of risk.
- Likely impact and damage likely to be caused. Falling of trees, flooding of enclosures, snapping of power lines, breaking of water supply, breaking of enclosures, barriers, and escape of animals. In most cases it shall affect the life of animals, their safety and security besides that of the staff and visitors.
- What shall be the line of command for facing such exigencies and alternate command module if first one fails.
- Equipment's needed to speed up restoration measures.
- Training to the staff to meet such exigencies and operate such equipment's.
- Periodic mock drills to stimulate preparedness among staff and to test the working of the equipment's, which shall be kept maintained all times.

6.2.2.Duties of Emergency Team

Team Member	Key Responsibilities
In-charge/ Director	• Getting the plan prepared and get approved. • Identifying the members and assigning tasks to them. • Deciding and implementing protective actions so that the consequences of the disaster are minimized. Allowing the use of internal resources of the park whenever it is required to do so and arranging necessary logistics. • Arranging the finances for implementing the plan.
Unit Coordinator	• Maintaining a disaster management plan and testing it on regular basis. • Ensuring that all members of the teams are well-trained in dealing with exigencies. • Coordinating the functioning of different teams that are involved in crisis management. • Notifying local authorities (Police/ Fire brigade/ hospital, etc.) of an emergency or disaster situation. • Ensuring that vital records are identified and protected. • Making arrangements for logistics, emergency housing and feeding for personnel likely to be affected during emergency operations. • Making provisions for food and water requirements of Park animals. • Organizing and maintaining control room with adequate communication facilities. • Implementing decisions and directives from the in charge of the Park Director. • Participating in the plan review meetings and giving inputs. • Training the people working under them, conducting mock drills. • Taking in protective actions within their jurisdiction before an actual emergency occurs. Mobilizing resources and personnel. • Identifying and ensuring protection of vital things under their jurisdiction. • Ensuring that stranded Park visitors are taken safely to the designated shelter/ evacuation areas. • Ensuring that the electricity points identified at risk are shut down during emergencies. • Helping in the proper movement of people and vehicles.
Warning/ Information Coordinator	• Ensuring that protective actions are publicized for all employees. • Participating in emergency plan review meetings. • Training the people working under them. • Establishing a media center and making arrangements for logging the messages. • Maintaining communication equipment like wireless sets, fax machines, telephone lines etc. • Receiving and disseminating information about the disaster. • Communicating with district administration, police/fire departments for help. • Preparing press notes after consulting assessment coordinator and submitting them to the officer in charge of the Park for press release.

Team Member	Key Responsibilities
Assessment Coordinator	• Participating in emergency plan review meetings. • Training the people working under him. • Collecting and compiling information on disaster situation. • Maintaining a hard copy documentation of all events that occur including actions taken. • Evaluation or decisions made, personnel involved, costs incurred etc. • Reporting verified damage information to the officer in charge of the Park. • Assisting with the preparation of reports like after-action report.
Maintenance Coordinator	• Participating in emergency plan review meetings. • Proper maintenance of cages, squeeze cages, fire extinguishers, tube wells, electrical supply points, tractor, trolleys, welding machines, earth moving equipment, shovels, axes, cutters, blades, ropes, ladders and spare parts of different mechanical devices etc. • Training the people working under him. • Putting up of barricades for the control of traffic. • Getting the fallen trees, poles, maintenance waste etc. cleared off. • Inspecting the affected areas with his team and giving recommendations for entry/ reuse etc.
Medical Coordinator	• Participating in site emergency plan review meetings. • Ensuring that emergency medical care/ first aid is provided to injured persons and animals. • Maintaining adequate quantities of medicines. • Collecting and compiling health/medical disaster information for the Assessment Coordinator. • Coordinating ambulance calling and pick-up, medical assistance etc.
Security Coordinator	• Inspecting real-time video images for the chain of line of site CCTV cameras installed along the barrier for intruders. Participating in emergency plan meetings. • Providing training and conducting of mock drills. • Ensuring that all wire meshes, chain link fences, walls, double doors, shutters etc. are in good condition and getting them repaired immediately. • Ensuring that the trapping materials are in good working condition and are available as per requirement. • Periodic checking for breached boundary walls. • Lopping and cutting of trees that might pose danger. • Controlling the movement of people and vehicles. • Preventing unauthorized entry. • Assisting with the care and handling of injured persons. • Assisting with fire suppression, if necessary, etc.

6.3. Cyclone /Thunderstorms/ Storms, Etc.

Chances of cyclones are very low in Park, however park management should always be prepared for such situation. Cyclone may cause sort of devastation at the Safari Park. The big trees in the Park or their branches may fall on the Safari enclosures or may block the road due to heavy cyclone. The disaster management team of will be available to tackle the situation in case of exigency.

6.4. Earthquake

The buildings of the Safari parks are designed to earthquake response on the lines of technology developed by the institutions like HUDCO, Building Materials and Technology Promotion Council (BMTPC), the premium institutions working on developing earthquake resistant building technologies. This will definitely help in saving the lives of animals in the events of disasters.

Due to earth quake if any buildings, compound walls, animal enclosures, big trees etc., are collapsed the evacuation of animals and people trapped underneath will be the first priority. The departments involved in the evacuation such as fire force, police and task force constituted for building demolition will be approached for immediate assistant. Further it is a must to seek the support from outside agencies since such disaster cannot be handled by the park personals alone. It is absolute to maintain a good contact with other government department and non-government agencies in such emergencies. The contact telephone number, address, email id to be kept ready for insisting their services.

6.5. Flood

The Safari Park will have contingency plan for dealing with exigency associated with flooding. The contingency plan will envisage the cleaning and sanitizing the food items to eliminate the pathogens. Furthermore, the food items will be stored above ground and the storage will have sufficient ventilation and sunlight. Similarly, preventive measures will be taken to cope up with large scale contamination of the drinking water supply by identifying alternative sources of water and mobilizing water tankers.

6.6. Forest Fire

The Safari Park will have the threat of forest fire as it is located in the midst of forest area. The harsh summer prevails between mid-February to June poses severe threat of forest fire. In order to manage the forest fire problem some of the strategies will be adopted. Such as clearance of fire protection lines around the animal enclosure and engaging the forest fire watchers. Fire in an animal facility requires quick thinking and discretionary judgment on the part of the employee discovering the problem.

The fire department should be called immediately and directed to Safari Park entrance nearest the fire that allows the passage of its vehicle. The staff should also notify appropriate Safari Park personnel to assist at the scene. The public should be evacuated from the area, if the fire is within an animal facility, attempts should be made to remove the animals threatened by the fire. If possible, employees should attempt to extinguish the fire with a fire extinguisher. Circuit breakers to affected area should be turned off. Water pipelines will also be used.

All guidelines on Forest Fire Disaster Management: Standard and Kaushik, A.D.(2014): Forest Fire Disaster Management. National Institute of Disaster Management, Ministry of Home Affairs, New Delhi. (http://nidm.gov.in/pdf/pubs/forest%20fire.pdf) shall be followed appropriately.

6.7. Heat Wave

A Heat Wave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the summer season. Heat Waves typically occur between March and June, and in some rare cases even extend till July.

The extreme temperatures and resultant atmospheric conditions adversely affect people and animals living in these regions as they cause physiological stress, sometimes resulting in death.

The management plan to avoid problems due to heat waves should be prepared for animals as well as visitors and employees of the Safari Park. Following precautions should be taken.

- A detailed action plan to tackle heat related illnesses well in advance of hotter months.
- Standard Operating procedures to tackle all levels of heat related illnesses.
- Capacity building measures for vet doctors, animal keepers and others staff should be undertaken.

6.8. Civil Disturbances/ Law & Order Problem

During the breakdown of the law and order due to social disturbances, it is very important that arrangements may be made to send the Safari Park visitors and the staff safely to safer areas as well as have a plan for the supply of feed and fodder to the animals. Accordingly, a standby food storage and food supply system is guaranteed to the animals.

The Park is visited by large number of veterans, women, children and physically challenged persons. During civil disturbance period, evacuating the visitors to the safer area is more imminent as panic may result in further injuries if people attempt to evacuate in a disorganized manner. Therefore, the park is equipped with evacuation team with volunteers. A siren should be installed to give a warning alarm of such danger situation in the park. Adequate police support also will be obtained from the local police office.

6.9. Bomb Threat

Bomb threats should be immediately referred to the local police station. Generally, in a bomb threat emergency, Safari Park staff should follow the same evacuation procedure as for a fire, except all radio communications in the area should cease immediately. Visitors overhearing conversation concerning a bomb threat could panic, creating yet another problem.

6.10. IT System Failure

E-governance has been the tool of park administration as most of the important activities related to the administration are being carried out through e-media. E-ticketing, park website, CCTV and other electronic surveillance system is supported by power supply. If the failure of power supply in the park limits would paralyze the day-to-day management. For continuous power supply Express feeder lines have been ensured for power supply.

In order to ensure the power backup even during power failures the alternatives such as wind power, solar power, UPS backup and generator system have been included in the planning. However, in worst scenario the alternative power will be linked only to the needed facilities for the day-to-day requirements like e-ticketing, veterinary hospital, CCTV.

6.11. Emergency arising due to Food Supply disturbance

The zoo has proposed dedicated areas for grass and fodder production as an alternative to relying on external supply. Additionally, fruit trees will be planted along service roads and in non-visitor areas to serve as a secondary food source. To ensure food security in unforeseen situations, the zoo has planned for a sufficiently large commissary for the storage of both perishable and non-perishable food items.

At Gorewada, leopards are a standout feature, admired for their stealth and stunning spotted coats. These agile predators offer visitors an exciting glimpse into the life of one of the wild's most captivating creatures.

Part:2

CHAPTER : 7

07

Contingency plan

7.1. Introduction

A well-documented technical contingency plan is needed to deal with contingency situations in the Parks. Further it is mandatory on the part of management to earmark the required financial resources apart from identifying the human resources dealing with emergency situations. This report is summary of contingency situations commonly faced by the zoos and safari Parks. The Park Management shall be regularly indulged in identifying possible threats and their solutions.

7.2 Animal Rescued from The Wild

A separate rescue centre to cater the needs of rescued animals is part of Gorewada Project. Various wild animals involved in the conflict from nearby region can be rescued and brought to the Rescue Centre for rehabilitation.

These rescue operations can be performed with the Forest Department or Local NGO's. For treatment of animals with minor injuries within city may be referred to Transit Treatment Centre.

For best veterinary expertise, Gorewada has signed a collaboration MoU with Maharashtra Animal and Fishery Science University. Latest equipment and modern facilities are available at Wildlife Research & training Institute under the Gorewada Project

A separate rescue centre to cater the needs of rescued animals is part of Gorewada Project. Various wild animals involved in the conflict from nearby region can be rescued and brought to the Rescue Centre for rehabilitation.

7.3. Incidence of Animal Escape

The Safari Park boundaries shall be protected by a tall compound wall, tall enough to restrict animal inside the campus. Animal enclosures should be designed such that there shall be no chance of animals escaping from them.

The Safari Park boundaries shall be protected by a tall compound wall, tall enough to restrict animal inside the campus. Animal enclosures should be designed such that there shall be no chance of animals escaping from them. However, the Safari Park authorities shall conduct detailed patrolling inside and outside of the Safari Park periphery and the enclosures therein to avoid any such mishaps. The keepers of each and every enclosure thoroughly check the Safari Vehicle tracks, fences, and service areas.

Public safety shall be on highest priority; otherwise, the damage caused by the escaped animals can be immense, in terms of the injuries/fatalities done to the guests/staff or in terms of possible loss of wild animal/s. All the animal keepers shall be sensitized about the issue of animal escapes during their animal keepers training program and often during interactions with the technical staffs. The trees around the enclosure boundaries should be trimmed to keep them in shape and to avoid falling of branches on the compound which may serve as an escape route for the animals, thus the same should be monitored on regular basis. Barriers will be designed, constructed and maintained to contain animals within enclosures.

Measures to prevent escapes

- The perimeter boundary, including access points, should be so designed, constructed and maintained to discourage escape and undesired entry.
- The peripheral path of the safaris and the moat be regularly maintained
- The Chain link fencing mesh checked on annual basis and repaired as and when required.
- There should be a comprehensive system to minimize the risk of theft, malicious damage or release of animals by intruders entering the Park after and during the visiting hours.

Planning

- In the likelihood of an animal escape, consider the possible or likely attempted route.
- Every effort must be made to recover the animal dead or alive.
- The Park staff should be familiar with procedures to be adopted in case of an animal escape.
- Procedure should include reporting of the escape by the quickest possible means to the most senior member of the staff.
- What needs to be done in the event of an escape; including recapturing, protecting visitors, alerting the police and any concerned authority / Forest Department.
- Control of visitors, ushering into buildings, closing doors and windows, evacuating the Park;
- The security of the perimeter boundary, involving closure of all points of entry and exit from the park.
- Provision of fire-arms and darting equipment to tranquillize or (If Necessary), kill the escaped animal.
- A senior member of the staff should be readily available at all times to take decisions regarding euthanasia of escaped animal.

Firearm selection and deployment

- The presence of dangerous animals will require the presence of personnel trained in the use and deployment of firearms, in the event of animal escape.
- Firearm selection should be suitable calibre rifles or shotgun loaded with solid ammunition.
- Military-grade firearms are unsuitable for this type of deployment as they are usually light-calibre with full metal jacket ammunition designed for through and through penetration – large calibre, soft-nosed ammunition is needed for high impact, hydrostatic shock to immobilize an animal in a compromised situation.

7.4. Monkey and Dog Menace

Controlling monkeys

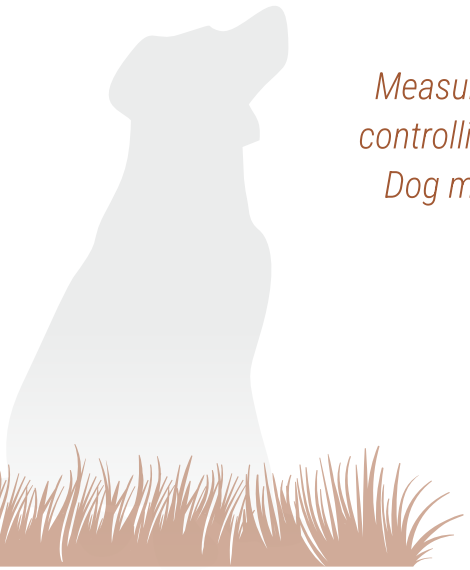
Monkeys in Safari Park pose a great threat not only to the visitors but also to the animal collections of the Safari Park. Monkeys may carry various life-threatening diseases like TB. Availability of abundant food in open areas of the Safari Park attracts the monkeys into it. Monkeys in Safari Parks get their food from the fruiting trees and sometimes they eat the food given to the animal collections. The visitors of the Safari Park sometimes feed the monkeys also.

Rescue Operation Planning

- Visitors will not be allowed to feed the monkeys.
- The monkeys will be captured and vasectomy and tubectomy operations will be performed and then released back to check their population.
- Tranquilize and recapture, relocate along with forest department (for monkeys)
- For capturing or restraining a monkey, appropriate permission should be acquired.
- The staff should have thorough knowledge of species to be handled. Including its reaction, ability to defend itself & appropriate physical & chemical restraint procedures.
- Method for Catching Monkeys
    - Using a Hook Net
    - Using big Nylon net
    - Tranquilizing
    - Using walk in traps
    - Using cage traps

Controlling Dogs

Boundary wall shall restrict any undesired entries in the Park, sometimes dogs can enter in to the Safari Park. They can cause havoc among the free ranging animals of the Safari Park and can cause deaths among them. If they happen to enter the enclosures of deer or flightless birds they can result in heavy losses in collection.



Measures for controlling the Dog menace

- The boundary wall is checked periodically. All entry/exit gates should be designed to restrict dog entries.
- All large gates should remain closed all the time and open only to allow vehicles entry.
- No open dustbins / waste disposals are allowed near any of the park gate.
- The watchmen keep a look out for the stray dogs.
- Dogs that enter the Safari Park are captured and released or handed over to animal welfare organizations for rehabilitation.
- The main gates shall be guarded by staffs of Safari Park.
- The leftover meat should be kept in closed bins and properly disposed.

7.5. Arrangement of Alternative Food Source in Case of Strike/ Natural Disaster

The supply of food and feed for the animals may be affected by public strikes, vehicle breakdown, non-supply of the contractor, natural calamities… etc. In these circumstances, it is essential to get the required feed items to be fed.

The disaster management team will take the responsibility of borrowing the staff services from any voluntary service organization. In addition, the security personal available under the control of Park will be deployed to monitor the crisis.

- The store of Safari Park shall have the capacity to store non-perishable feed for a period of three months. The factor to be considered here is that, if the feed is stored for more than a month, insect pests and rodents may destroy the quality of feed.
- For perishable feed items, Safari Park shall have a cold storage unit having two tones capacity and can accommodate feed required for a period of one to two weeks.
- A small food animal farm and grazing farm will also provide the required food for Carnivorous and Herbivorous animals respectively.

7.6. Snake Bite

Enough anti-snake venom is stocked in the Safari Park veterinary hospital and will be used in case of any eventuality. Vehicles are readily available to transport the victim to the nearest hospital for proper treatment and care.

First aid in the case of Snake bite

- Do not panic. Remain calm. Remember that the person may have been bitten, but no venom is injected.
- Remove all jewellery from the bitten limb.
- Call an ambulance to take the patient to a government hospital. If possible, carry the patient or assist him in such a way that movement is reduced. Ensure that the patient is lying down while waiting.
- During transportation, it is necessary to restrict movement. Inactivity slows down the circulation of the venom through the body.
- Wash and clean the wound. Apply a tourniquet, if required.

Anti-Snake Venom (ASV)

- Pinak tablet, an Ayurvedic antivenom remedy can be administered sublingual as a preliminary treatment and adjuvant to ASV treatment. The tablet can be ground into powder and kept under the tongue, give effective results within minutes that last for 6 - 12 hours. The patient may require a dose of 1 to 10 tablets depending upon the severity of the bite. It can be taken immediately after any snake bite. It is recommended to keep PINAK tablets for any snake bite emergencies.

7.7. Visitors Getting Injured

An Emergency Medical Service Centre is planned to have first aid facility. The injured visitor will be immediately shifted to first aid medical centre and treated. If it is further needed, he will be referred to the hospital through Park Vehicle.

- First aid boxes are kept ready in important points of the Safari Park like safari gates, entry plaza, bus stops, Veterinary Hospital and office.
- Every Safari Vehicle carrying visitors is having a first-aid kit.
- Use of walkies and cell phones for effective communication to communicate emergency information.

At last one Vehicle is always kept readily available to transport the victim to the nearest hospital for proper treatment and care.

7.8 Visitor Falling Inside the Enclosure/ Visitors Falling From Safari Vehicle

As there are only closed vehicles roaming inside the enclosures; there are no chances of visitors falling in a very close proximity of animals. Still incidences of visitor falling from the safari vehicle might happen. In such cases following measures will be taken.

- Distract the attention of animal from the fallen visitor.
- Safari Guides and drivers will be trained to handle such incidences.
- In critical situations information will be immediately passed to the General Curator, he will depute a team of skilled animal keepers to rescue the victim.
- Sometimes the animals may have to be chemically immobilized to avoid any injury to the fallen victim or to the animal.

7.9 Fighting Among Animals

Fighting among carnivore animals can pose a serious threat and potentially result in casualties or grave injuries. To prevent further fighting, a protocol is in place to drive the fighting animals back to their shelters or kraals. Techniques such as using crackers or pressure water jets may be employed to separate the fighting animals and restore calm.

Herbivores can be separated by loud shouting or/and water jet sprays and driven to kraal. It is crucial to carefully plan the release of animals into open enclosures, ensuring that only compatible animals are placed together. This reduces the likelihood of territorial disputes and aggression.

During the breeding season, animal fights can become more common. Vigilance is necessary to closely monitor the animals and intervene promptly to prevent fights. If necessary, animals may need to be chemically immobilized and safely returned to their shelters or kraals.

The overall goal is to maintain a safe environment for both animals and staff, minimizing the risk of injuries or fatalities resulting from fights. By implementing these measures and closely managing animal behaviour during breeding seasons, the zoo can mitigate potential conflicts and prioritize the well-being and safety of the animals.

7.10. Epidemics

Contingency measures in zoos during epidemics involve various steps to ensure the safety and well-being of both the animals and the staff. Here are some key measures:

1. **Disease surveillance:** Implement robust surveillance systems to monitor the health of animals regularly. This includes closely monitoring any signs of illness, conducting diagnostic tests, and promptly reporting any unusual symptoms.

2. **Quarantine protocols:** If an outbreak occurs or there is a risk of contagious disease transmission, affected animals may be quarantined. Quarantine areas separate sick or potentially infected animals from healthy individuals to prevent further spread of the disease.

3. **Enhanced biosecurity:** Zoos reinforce their biosecurity protocols during epidemics. This involves strict control of access to animal areas, limiting visitor interactions and ensuring staff adhere to rigorous hygiene practices such as handwashing, disinfection, and wearing appropriate personal protective equipment.

4. **Animal isolation:** In situations where a disease poses a significant risk, vulnerable or susceptible species may be isolated to minimize the chances of infection. This can involve keeping animals in separate enclosures or even relocating them to off-site facilities if necessary.

5. **Visitor education and restrictions:** Communicate with visitors about potential health risks, provide guidelines for responsible behaviour, and may implement restrictions on certain activities to prevent disease transmission.

6. Staff training and monitoring: Organise specialized training on disease prevention, recognition, and response. Educate staff on the proper handling of animals, personal hygiene, and the use of protective measures to minimize the risk of disease transmission.

7. **Collaboration with veterinary experts:** work closely with veterinary professionals and relevant authorities to develop and implement effective disease management strategies. They seek advice and guidance on specific measures to protect the health of their animal populations.

These contingency measures aim to minimize the risk of disease spread, protect the animals' health, and ensure the safety of zoo visitors and staff during epidemics.

7.11. Breakdown of Power Supply

An express feeder typically refers to a high-capacity power transmission line or circuit that carries electricity from a substation or power generation source to a distribution substation.

Express feeders are designed to handle significant loads and are typically associated with major power generation facilities or substations. They play a crucial role in efficiently transmitting electricity over long distances and are often interconnected with other feeders, transformers, and distribution lines to ensure a reliable and stable electricity supply to various areas or regions.

As Zoo is equipped with HT express feeder of 11KW, hence chances of power failure are very less. In addition to express feeder 3 DG sets are proposed for uninterrupted supply.

7.12. Breakdown of Safari Vehicles

The specific procedures and protocols in such situations' overarching goal is to ensure visitor safety, efficient resolution of the breakdown, and minimal disruption to the safari experience. The Park shall keep and use the high-quality vehicles which are noiseless and safe for animal as well as for visitors.

In case if there is breakdown of safari vehicle which is carrying the visitors to the Animal Safaris, there shall be one stand by vehicle available to meet such emergencies and for the safety of visitors. These vehicles shall also be designed in such way

that at no point of time animals shall be able to harm the visitors as well the staff, which are involved in the bus management including Bus Driver and Safari Guide.

1. Communication and assessment: The safari guide or driver will immediately communicate the breakdown to park management or the designated staff responsible for handling such incidents. They will provide details about the location, nature of the problem, and the number of visitors involved.

2. Dispatching assistance: Park management will coordinate the dispatch of assistance to the location of the breakdown. This may involve sending another safari vehicle, a maintenance team, or a rescue team depending on the severity of the situation.

3. Visitor safety and communication: prioritize visitor safety and ensure open lines of communication. They will keep visitors informed about the situation, estimated arrival times for assistance, and any relevant instructions or precautions to follow while awaiting help.

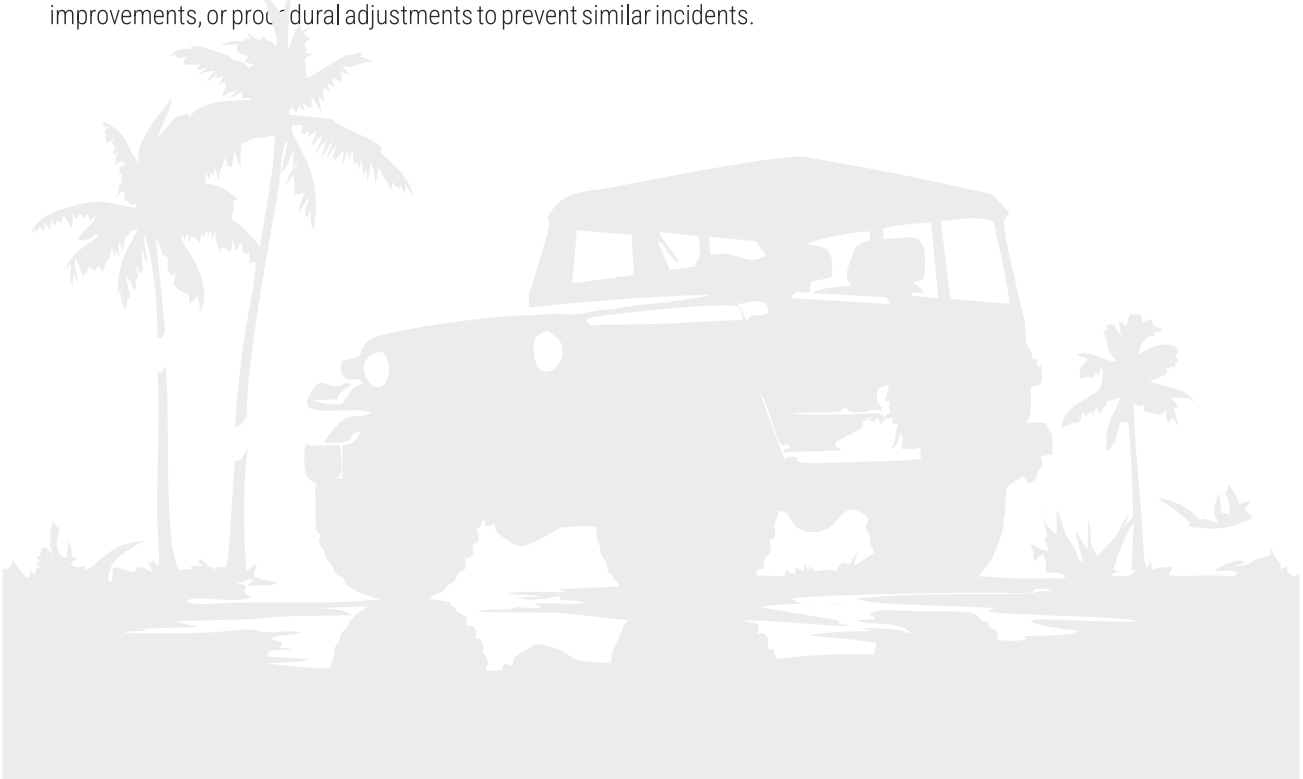
4. Evaluation of risks: Management will assess the risks associated with the breakdown. This includes evaluating the proximity of wildlife, weather conditions, and any other potential hazards. Based on this assessment, appropriate actions will be taken to ensure visitor safety.

5. Evacuation procedures: If necessary, initiate evacuation procedures to safely relocate visitors from the broken-down vehicle to another secure location. This could involve transferring visitors to a replacement vehicle or providing temporary shelter until assistance arrives. In case a carnivore is in proximity, use protocols to call back animal in kraal or distract it from location of vehicle.

6. Timely repairs or vehicle retrieval: Once assistance arrives at the scene, park management will facilitate repairs or coordinate the retrieval of the broken-down vehicle. If repairs cannot be completed on-site, arrangements will be made to transport the vehicle to a maintenance facility for further assessment and repairs.

7. Incident documentation and review: After the incident, park management will typically document the details of the breakdown, including the cause, response actions, and any lessons learned. This information may be used for future staff training, vehicle maintenance improvements, or procedural adjustments to prevent similar incidents.

The specific procedures and protocols in such situations' overarching goal is to ensure visitor safety, efficient resolution of the breakdown, and minimal disruption to the safari experience. The Park shall keep and use the high-quality vehicles which are noiseless and safe for animal as well as for visitors.



Part:2

CHAPTER: 8

08

Capacity building

Capacity Building of different category of office staff and frontline personnel is very essential for better care of animals, providing better nature education and smooth function of the BTGIZP

Skilled and knowledgeable personnel are essential to maintain and up-keep of Zoo. As time changes the new challenges will emerge and the staff is required to upgrade their skills and potential to handle any eventualities.

8.1. Interactive Trainings to Upgrade Skills of Staff Members

Ex-situ management either in Zoo or Safari essentially requires a very Skilled, knowledgeable and trained personnel for manage, upkeep and maintain the various captive establishments. As time changes the new challenges will emerge and the staff is required to upgrade their skills and potential to handle any eventualities.

The task of capacity Building in different categories of park management more particularly in the field managerial level is very essential from the point of better care and management of animals by providing better nature education and smooth function of the BTGIZP.

The task of capacity Building in different categories of park management more particularly in the field managerial level is very essential from the point of better care and management of animals by providing better nature education and smooth function of the zoo.

ADMINISTRATIVE TRAINING

The personnel working in administration section in the Park will be sent for training to improve their skills. Their talents need to be recognized and encouraged for exposure training for the benefit of the Park.

MIDDLE LEVEL, TOP LEVEL TRAINING ON ZOO MANAGEMENT

The Wildlife Institute of India and the Central Zoo Authority regularly conduct special and focused training and workshops on different aspects of wildlife management and policy. Participation of top-level management of Park is must and essential to upgrade their knowledge and bring changes and adopt newer techniques as enunciated in national zoo/park policies and rules.

Regular interaction and opportunity to visit other zoos would help to acquire suitable animals, enrichment of enclosure and other aspects of zoo/park management such as crowd management and initiation of better visitor facilities etc. It also provides an opportunity to interact with many experts in the field, who shall participate as faculty in the training programme. The Safari Park should take the benefit of the training to have trained officers in the management for better results.

EXECUTIVE TRAINING

It is always advisable an officer to work as the Executive Director for at least 5 years and he should be exposed for all the training in the country and foreign countries. He should also be sent to all the zoos/Safari Parks to gain experience and to run the Park on scientific lines. Further all other second line executives also should be sent to various trainings, exposure trips to various zoos inside the country and abroad.

VETERINARIANS TRAINING

The works of the vets are very important from the point of healthcare management of animals. As the Park will house valuable animals and failure to diagnose and to provide treatment in time may lose the valuable animals. The vets need to be sent to foreign countries and also to participate in workshop/conference to acquire knowledge.

EDUCATORS TRAINING

As conservation education is one of the fundamental objectives of Park, the Education officer should be trained properly to organize training programme for the students NGO"s and Park volunteers.

ANIMAL KEEPERS TRAINING PROGRAMME

The park will be planned to organize keepers training programme in collaboration with the Central Zoo Authority in regional languages for keepers. The programme could be organized for one month, providing opportunity to visit various Parks/zoos in the country to have practical knowledge and to interact with them for better management.

The keepers so trained should be entrusted with higher responsibility and incentives will be given. Also experienced and dedicated keepers will be sent to foreign zoos for learning the advanced skills of Park management.

VOLUNTEERS TRAINING

The volunteers should be given orientation training regularly, so that they can assist the Park management in due necessities.

IN-HOUSE TRAINING

Skills acquired are getting transferred to next generation. Documentation and regular demonstration of the skills and knowledge acquired has to be done on regular basis. Therefore, it is proposed to organize training sessions with experienced people for the benefit of youngsters.

A group of youngsters would be attached to such senior staff for some time, so that all the fine skills and nuances of animal handling and care could be learnt "on job". Also, working in groups fosters team spirit and brings out the best of the ordinary, which is the modus operandi of modern corporate work.

ENCOURAGING STAFF MEMBERS

Motivation is important to sustain the interest of staff members. Therefore, awards in the form of cash and appreciation certificate can be given to staff members recognizing their service for exemplary services.

8.2. To Encourage Specializations & Interaction with Retired Staff and Other Zoos

Tapping the experience of skilled and retired personnel is advantageous to maintain the Park in good conditions. By virtue of spending lifetime in animal handling and care, some would develop finite and highly special knowledge about particular animal with respect to behaviour and breeding ability.

Safari Park must tap this knowledge and encourage willing personnel among the existing staff to acquire and get expertise in particular group of animal species. It is desirable to elicit the preferences of each person and assign jobs to attain specialization in the field. In this background, it is planned to conduct interactive sessions to select staff with notable retired staff in Animal Keeping, Gardening, Security and Veterinary care.

Also, regular interaction with other Zoo/Parks in India and abroad will help to share experiences and learn from them.

Safari Park must tap this knowledge and encourage willing personnel among the existing staff to acquire and get expertise in particular group of animal species. It is desirable to elicit the preferences of each person and assign jobs to attain specialization in the field.

Part : 2

CHAPTER : 9

09

E-governance

Information technology plays a significant role in modern zoos, aiding in various aspects of BTGIZP management, visitor experience, animal care, and conservation efforts.

Animal records and management:

Specialized software and databases like ZIMS can be used to maintain detailed records of animal collections. This includes information such as individual profiles, medical histories, breeding programs, and feeding schedules. This system helps to track and manage the well-being and genetic diversity of the animals.

Exhibit management:

IT systems assist in managing and monitoring zoo exhibits. This includes controlling environmental parameters like temperature and humidity, ensuring proper lighting, and automating feeding systems. Real-time monitoring allows staff to respond promptly to any issues or changes.

Visitor management and ticketing:

Comprehensive IT solutions for visitor management, including ticketing systems, online ticket sales, and entry control systems. These technologies streamline the ticketing process, improve visitor flow, and provide valuable data on visitor demographics and preferences.

Digital signage and interactive displays:

Digital signage and interactive displays enhance the visitor experience by providing educational and engaging content. These displays offer information about animals, conservation initiatives, and interactive activities that educate and entertain visitors.

Mobile applications:

BTGIZP may have dedicated mobile application that provide visitors with interactive maps, exhibit information, show schedules, and educational content. This app can enhance the visitor experience, help with wayfinding, and provide additional information about the animals.

Education and interpretation:

IT tools such as interactive kiosks, touch screens, and multimedia displays are used to deliver educational content and interpretive materials to visitors. They provide in-depth information about animal species, conservation efforts, and research initiatives.

Conservation and research:

Information technology supports conservation and research efforts in BTGIZP. Researchers use software for data analysis, statistical modelling, and tracking animal behaviour. IT also facilitates collaboration and data sharing among zoos and conservation organizations worldwide.

Online platforms and social media:

use websites and social media platforms to engage with the public, share educational content, and promote conservation initiatives. These platforms help raise awareness, solicit donations, and foster a sense of community among BTGIZP visitors and supporters.

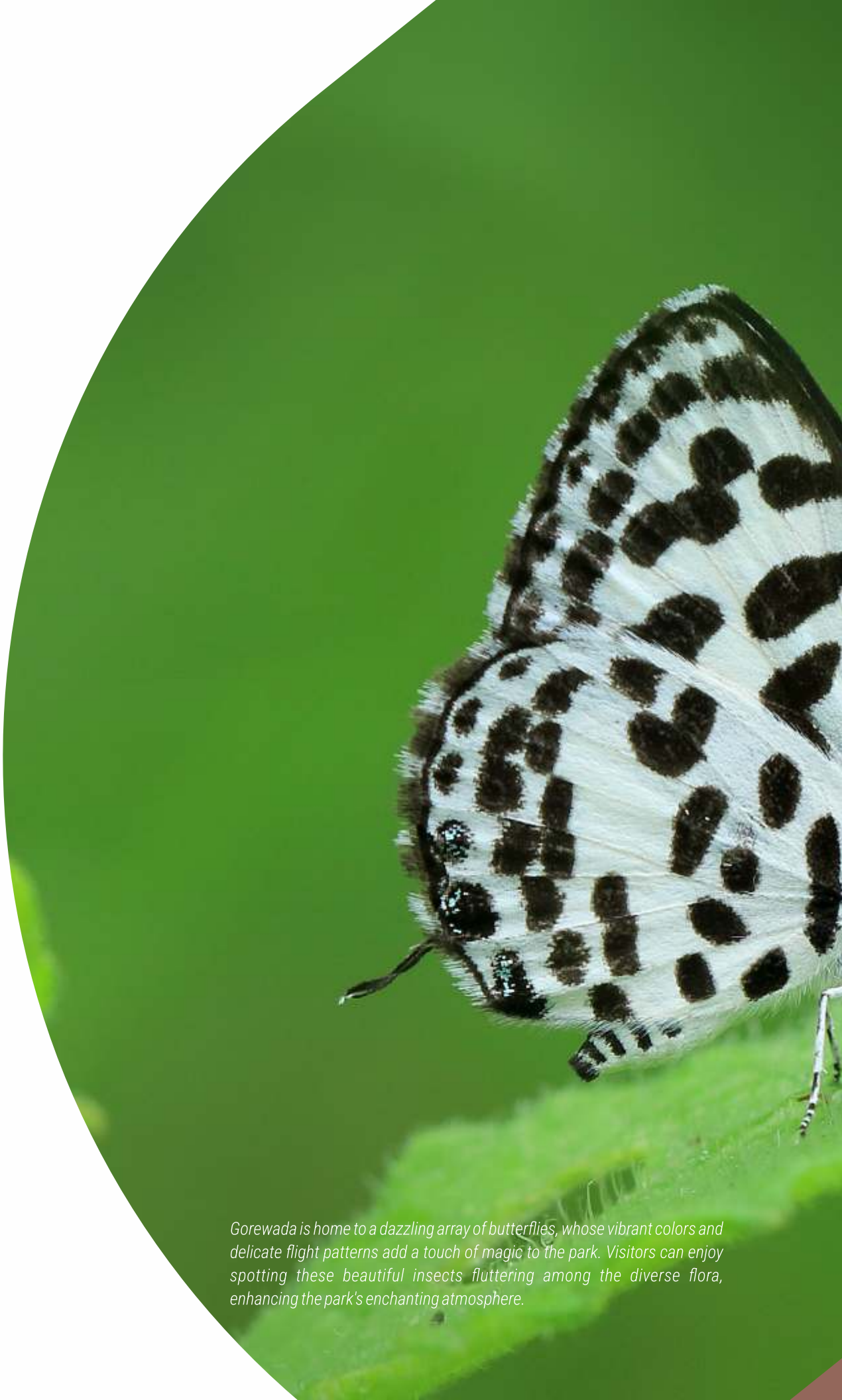
Surveillance and security:

IT systems enable video surveillance, access control, and alarm systems to enhance the security of animals, staff, and visitors. These systems help monitor exhibits, identify potential threats, and ensure the safety of the BTGIZP premises.

Administration and operations:

IT tools support various administrative tasks such as inventory management, financial operations, employee scheduling, and resource planning. These systems improve operational efficiency, streamline processes, and enable better decision-making.

The use of information technology in zoos continues to evolve, allowing for better animal care, visitor experiences, and conservation efforts. By leveraging technology, zoos can enhance their educational and conservation missions while ensuring effective management and operation of their facilities.



Gorewada is home to a dazzling array of butterflies, whose vibrant colors and delicate flight patterns add a touch of magic to the park. Visitors can enjoy spotting these beautiful insects fluttering among the diverse flora, enhancing the park's enchanting atmosphere.

Part : 3

CHAPTER : 10

10

Budget

The initial project cost of Rs 452 crore was based on master plan approved in 2014. The revised master plan was prepared in 2019 and finally it is revised in 2023. The budget estimates indicate tentative projected costs of each component. The actual costs may vary depending on schematics and final detailed drawings. The costs are including contingencies & consultancy fees of the consultant.

S.No	Particulars	Revised cost as (Rs in Crores)
1	Gorewada Reserve	5
2	Reservoir and Ancillary Works	24
3	Indian Safari	182
4	Walking Trail	12
5	African Safari	213
6	Gondwana Park	71
7	Entry Plaza (main)	72
8	Bio Discovery Plaza	56
9	Buffer Zone and Land Development	20
10	Animal Quarantine and Hospital	30
11	Night safari	153
12	Bio Park	150
13	Trail of Senses	44
14	Tribal Trail	23
15	Archaeological Theam Park	15
16	Water Supply Scheme & Distribution	67
17	Electricity & IT	28
18	Sewerage System Line	18
19	Vehicles	34
20	Furnishing, Interiors, Air Conditioning etc.	35
21	Housing Area for Staff	20
22	Service area development	15
23	Aquarium	150
24	Animal Procurement	125
25	Ancillary works	40
26	Fees for PMC Services, MEP Consultant, Zoo Consultant, any other consultant.	22
27	Theming Work	110
28	Landscapting and Platation Work	54
29	Miscellaneous works and contingency	55
	Total Capital Expenditure of the Project	1843
	Rounded off Total (in crores)	1850

The peacocks at Gorewada are a stunning attraction, displaying their iridescent plumage and iconic fan-like tails. Visitors are often mesmerised by their graceful movements and the spectacular beauty of their courtship dances.

Part : 4

CHAPTER : 11

11

Financial Management Plan

11.1 Management Plan

This chapter outlines the project's financial management strategies for effectively managing financial resources throughout the project's lifecycle. It includes the year wise components to be executed, budgeting, cost estimation, and financial controls. The project funds will be made available by the Government of Maharashtra. This plan ensures that funds are allocated efficiently, expenses are monitored, and financial risks are mitigated. It also includes mechanisms for tracking and reporting financial performance, ensuring transparency and accountability.

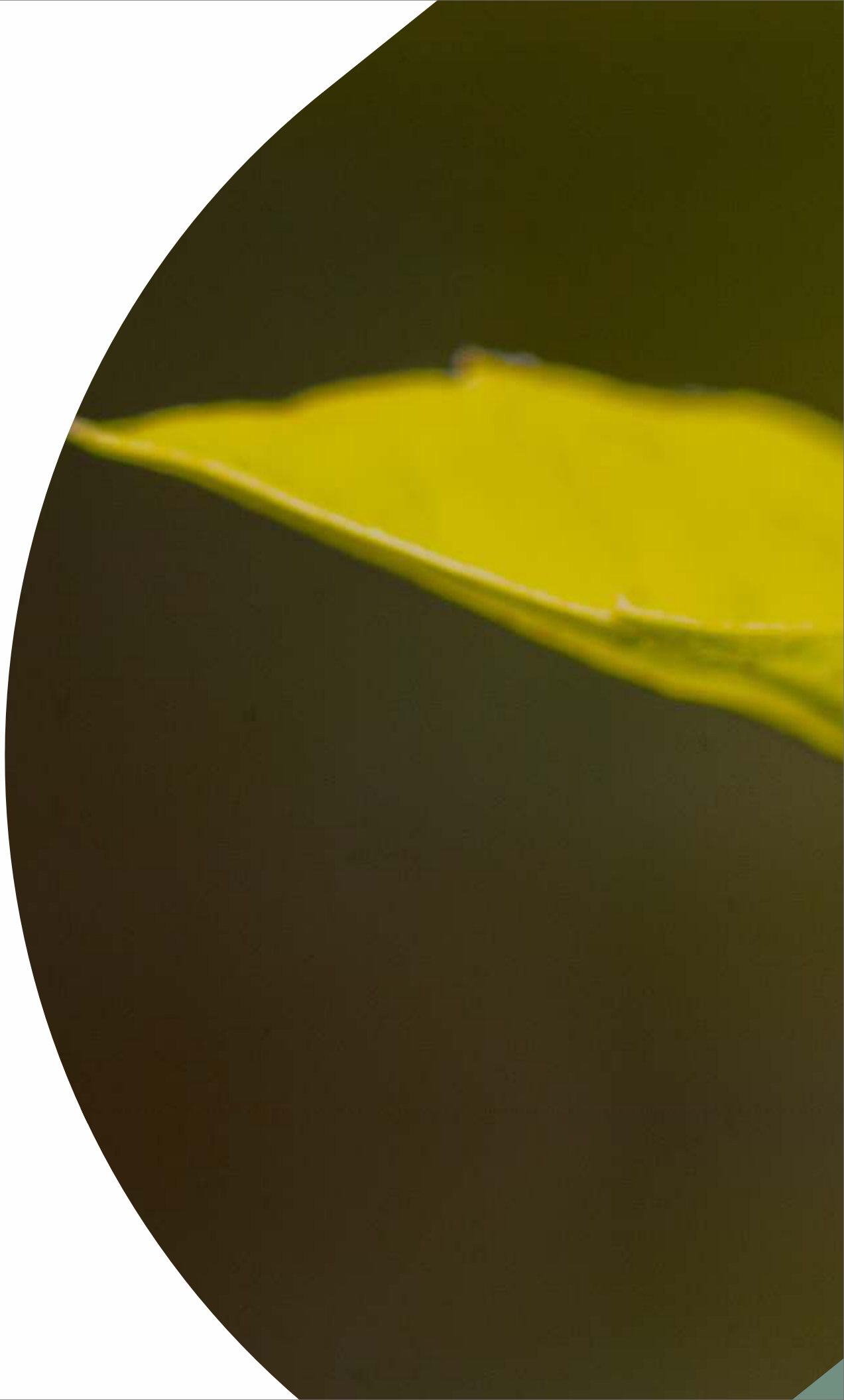
This financial management plan contributes to the project's success by optimizing resource utilization, controlling costs, and providing stakeholders with accurate financial information for informed decision-making.

BALASAHEB THACKERAY GOREWADA INTERNATIONAL ZOOLOGICAL PARK, NAGPUR

S.No	Item	Estimated Cost (Rs Lakhs)	Up to 2022-23	2023-24	2024-25	2025-26	2026-27
1	Gorewada Reserve	5	5				
2	Reservoir and Ancillary Works	24	8	8	8		
3	Indian Safari	182	62			60	60
4	Walking Trail	12	11	1			
5	African Safari	213		70	120	23	
6	Gondwana Park	71			50	21	
7	Entry Plaza (main)	72		30	42	0	
8	Bio Discovery Plaza	56			36	20	
9	Buffer Zone and Land Development	20			10	10	
10	Animal Quarantine and Hospital	30		15	15		
11	Night safari	153			20	80	53
12	Bio Park	150			50	80	20
13	Trail of Senses	44			20	14	10
14	Tribal Trail	23			14	9	
15	Archaeological Theam Park	15			5	10	
16	Water Supply Scheme & Distribution	67		12	30	25	
17	Electricity & IT	28		5	7	8	8
18	Sewerage System Line	18			4	10	4
19	Vehicles	34			15	10	9
20	Furnishing, Interiors, Air Conditioning etc.	35			15	15	5
21	Housing Area for Staff	20				5	15
22	Service area development	15			8	7	
23	Aquarium	150			20	100	30
24	Animal Procurement	125		6	60	40	19
25	Ancillary works	40		10	10	10	10
26	Fees to PMC Services, MEP Consultant any other Consultant	22		4	7	6	5
27	Theming Work	110		30	30	30	20
28	lanscaping and Platation Work	54			25	15	14
29	Miscellaneous works and contingency	55		15	12	14	14
	Total Capital Expenditure of the Project	1843	86	206	633	622	296
	Round off Total (in crores)	1850					

11.2 Expenditure on Day-to-Day Maintenance

Sr. No.	Description	2020-21 (Audited)	2021-22 (Audited)	2022-23 (Unaudited)	2023-24 Tentative	2024-25 Tentative	Total
1	Salary	78,57,744.00	1,67,04,848.97	2,82,86,571.65	3,37,00,000.00	4,04,40,000.00	12,69,89,164.62
2	Office Expenses	1,21,661.64	14,20,378.36	42,00,224.33	1,50,00,000.00	1,88,00,000.00	3,95,42,264.33
3	Electricity	-	33,67,130.00	52,61,300.00	55,00,000.00	58,00,000.00	1,99,28,430.00
4	Animal Feed	-	21,10,766.50	48,18,845.50	94,00,000.00	1,12,80,000.00	2,76,09,612.00
5	Veterinary Care	-		15,079.00	5,00,000.00	6,00,000.00	11,15,079.00
6	Vehiclemaintenance & running	-	18,78,833.00	48,37,219.50	86,00,000.00	1,03,20,000.00	2,56,36,052.50
7	Building Repair & General Maintenance	6,100.00	9,05,834.89	49,48,553.27	1,00,00,000.00	1,20,00,000.00	2,78,60,488.16
8	Miscellaneous	-	14,25,494.87	10,21,959.50	20,00,000.00	24,00,000.00	68,47,454.37
9	Contingency	-	9,68,662.00				9,68,662.00
10	(B) Total	79,85,505.64	2,87,81,948.59	5,33,89,752.75	8,47,00,000.00	10,16,40,000.00	27,64,97,206.98



Part : 4

CHAPTER : 12

12

Conservation Breeding Plan

Conservation Breeding Plan

Conservation breeding, also known as captive breeding or ex situ conservation, plays a significant role in zoos and other captive animal facilities. It is a crucial tool for the preservation and protection of endangered species and biodiversity. Here are some of the key significances of conservation breeding in zoos:

Species Preservation: Conservation breeding programs aim to maintain populations of endangered or threatened species that face risks in the wild, such as habitat loss, poaching, or disease outbreaks. By breeding animals in captivity, zoos help prevent the extinction of these species and contribute to their long-term survival.

Genetic Diversity: Many endangered species have small or fragmented populations, which can lead to reduced genetic diversity and increased vulnerability to diseases and environmental changes. Conservation breeding programs in zoos focus on maintaining healthy and genetically diverse populations. By carefully managing breeding pairs and minimizing inbreeding, zoos help preserve the genetic integrity of species.

Reintroduction and Reinforcement: Some conservation breeding programs have the ultimate goal of reintroducing captive-bred animals back into their natural habitats. These reintroduction efforts can help re-establish or bolster wild populations that have declined. By breeding animals in captivity, zoos provide a source of individuals for reintroduction programs, helping to restore ecosystems and recover endangered species.

Education and Awareness: Zoos serve as powerful educational platforms, and conservation breeding programs play a crucial role in raising awareness about endangered species and the need for their protection. By showcasing captive-bred animals, zoos can educate the public about conservation challenges, promote responsible stewardship of natural resources, and inspire people to take action to protect wildlife and their habitats.

Research and Conservation Science: Conservation breeding programs provide valuable opportunities for scientific research, allowing scientists to study various aspects of species biology, behaviour, genetics, and reproductive physiology. These studies contribute to our understanding of species' needs and aid in the development of effective conservation strategies both in captivity and in the wild.

Gorewada Zoo has identified following species for Conservation Breeding which are reported from Vidarbha Region at Maharashtra, where Zoo is situated.

1. The Wild Water Buffalo *(Bubalus arnee)*

also known as the Asian Water Buffalo, is an endangered species according to the IUCN. Their population decline is primarily attributed to habitat loss caused by agricultural expansion, infrastructure development, and human settlements, leading to fragmented and restricted habitats. Another significant threat is hybridization with domesticated water buffalo, jeopardizing the genetic integrity of the wild population and resulting in the loss of unique genetic traits. Additionally, Wild Water Buffalos are vulnerable to diseases transmitted by domestic livestock, such as bovine tuberculosis and foot-and-mouth disease, and face competition for resources from domesticated animals in shared habitats.

2. Caracal
(Caracal caracal schmitzi)

a conservation breeding and recovery program for Caracals in India, addressing their critical situation and declining populations. Caracals face various threats, including habitat loss, human-wildlife conflict, and illegal hunting, with no specific recovery program currently in place. To address this, the proposal suggests initiating a collaborative effort with European zoos to bring Caracals back to India for captive breeding. The program aims to increase the Caracal population and genetic diversity, support species recovery, conduct research and monitoring, and raise public awareness through educational initiatives.

3. Lesser Florican *(Sypheotides indicus)*

The Lesser Florican, a critically endangered bird species, faces significant threats such as habitat loss, agricultural intensification, and changes in land use practices. Currently, there is a lack of specific conservation initiatives to safeguard this species.

The key objectives of the proposed program include increasing the population and genetic diversity of the Lesser Florican in captivity, conducting research on their biology and behavior, promoting public awareness and education, and potentially reintroducing individuals into suitable habitats to aid species recovery.

4. Honey Badger / Ratel *(Mellivora capensis)*

Despite being widely distributed from Africa to Asia, there is limited information available about their natural history and population trends due to their shy and secretive nature. Although currently listed as a species of least concern by the IUCN, the lack of captive populations in India and the scarcity of information highlights the importance of proactive conservation efforts.

The proposed program aims to address this knowledge gap and ensure the long-term conservation of Honey Badgers in India. Collaborative partnerships will be formed with wildlife conservation organizations, research institutions, and relevant stakeholders to initiate comprehensive studies on the natural history, behavior, and population status of Honey Badgers. Simultaneously, efforts will be made to establish a captive breeding program to maintain a genetically diverse population as a safety net against potential future threats.

Furthermore, the program will focus on raising public awareness about the ecological significance of Honey Badgers and their conservation needs. This will involve educational campaigns, public outreach initiatives, and collaborative efforts with local communities to promote responsible coexistence and mitigate potential conflicts.

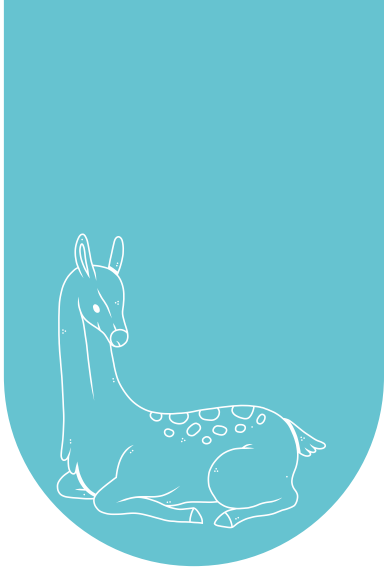
5. Forest Owlet *(Heteroglaux blewitti)*

in India. Previously considered extinct for several decades, recent surveys have identified populations of this critically endangered species in Central India. The Indian Forest Owlet, a diurnal owl species with specific habitat requirements, faces severe threats and is in urgent need of conservation measures. By conserving and breeding Indian Forest Owlets in captivity, the program will contribute to the recovery and long-term survival of this critically endangered species. The Indian Forest Owlet's critically endangered status, combined with their recent rediscovery, underscores the urgency of this proposal. Through collaborative research, captive breeding, habitat conservation, and public awareness campaigns, we can work towards the conservation and recovery of the Indian Forest Owlet population in Central India, ensuring the survival of this unique diurnal owl species.

6. Indian Softshell Turtle *(Nilssonia leithii)* : A species of least concern in the IUCN Red List until 2012, the Indian Softshell Turtle was subsequently upgraded to critically endangered in 2013. The species faces numerous threats, including water pollution, habitat destruction due to dam construction, poaching for meat, and overfishing in their habitats, resulting in rapid population declines.

The proposed program aims to address these pressing conservation concerns by focusing on collaborative efforts among wildlife conservation organizations, research institutions, and relevant stakeholders. Recognizing the existing populations of Indian Softshell Turtles in Indian zoos, steps will be taken to enhance knowledge and identification accuracy. The program will promote accurate recording and classification of the species, ensuring that Indian Softshell Turtles are correctly identified instead of being recorded under the general term "Flapshell turtle."

Part:4
Annexures



List of Annexures to the Master Plan

1. CZA Letter of Approval
2. The Government of Maharashtra approval of Hon'ble Supreme Court to establish a new zoo and rescue center at Gorewada
3. Approved Masterplan
4. Updated Masterplan 2023
5. Services Layout
6. A Details of Flora and Fauna on Site
7. Soil Sample Test Results
8. Water Sample Test Results

Annexure 1: CZA Letter of Approval

GOVERNMENT OF INDIA
भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय

Central Zoo Authority
केन्द्रीय चिड़ियाघर प्राधिकरण

F. No. 23-11/99-CZA(403)(Vol.II)(PKR)/510/2019

By Post / E-mail
Date: 08.03.2019

To,

The Chief Wildlife Warden,
Government of Maharashtra,
Van Bhawan, Ramgir Road, Civil Lines,
Nagpur – 440 001 (Maharashtra).

Sub:- **Revised Master (Layout) Plan of the Gorewada International Zoo, Gorewada, Nagpur, Maharashtra – reg.**

Ref:-

1. **This office letter F. No. 23-11/99-CZA(403)(Vol. II)(PKR)/073/2019, dated 14.01.2019.**
2. **The Managing Director, Forest Development Corporation of Maharashtra Limited, Nagpur, Maharashtra letter No. CGM/MPB/Gorewada/3732, dated 13.02.2019.**

Sir,

The revised Master (Layout) Plan of the Gorewada International Zoo, Gorewada, Nagpur, Maharashtra was placed before the 83rd Expert Group on Zoo Designing Meeting held on 06.03.2019, 89th Technical Committee Meeting held on 07.03.2019 and 34th Meeting of the Central Zoo Authority held on 08.03.2019.

The revised Master (Layout) Plan of the Gorewada International Zoo, Gorewada, Nagpur, Maharashtra was approved by the Central Zoo Authority subject to the compliance of the following observations -

a. The proposed parking area should be shifted towards entry side and buffer of the green, as proposed should be moved accordingly for the convenience of the visitors.
b. The term used as "plaza" should not be used elsewhere in the layout plan except the parking and the main entry.
c. The Zoo Operator should submit the detailed plan for long term water requirement and its sustainability taking into the account of water requirement of animal exhibits

Continued....

B-1 Wing, 6th Floor, Pt. Deendayal Antyodaya Bhawan, CGO Complex, Lodhi Road, New Delhi-110003
बी-1 विंग, छठा तल, पंडित दीनदयाल अन्त्योदय भवन, सीजीओ परिसर, लोधी रोड, नई दिल्ली-110003
Tel.: 011-24367846, 24367851, 24367852, Fax: 011-24367849
E-mail: cza@nic.in, Website: http://www.cza.nic.in

The proposal with regard to proposed construction of the Walking Trail at the Gorewada International Zoo, Gorewada, Nagpur, Maharashtra was also placed before the 83rd Expert Group on Zoo Designing Meeting of the Central Zoo Authority held on 06.03.2019. The Expert Group on Zoo Designing of the CZA approved the drawing of the proposed construction of the Walking Trail at the Gorewada International Zoo, Gorewada, Nagpur, Maharashtra.

Signed copy of the Master (Layout) Plan and design of Walking Trail at the Gorewada International Zoo, Gorewada, Nagpur, Maharashtra are enclosed with this letter for your perusal and records.

This is for your information and necessary action.

Yours sincerely,

Encl. As Above.

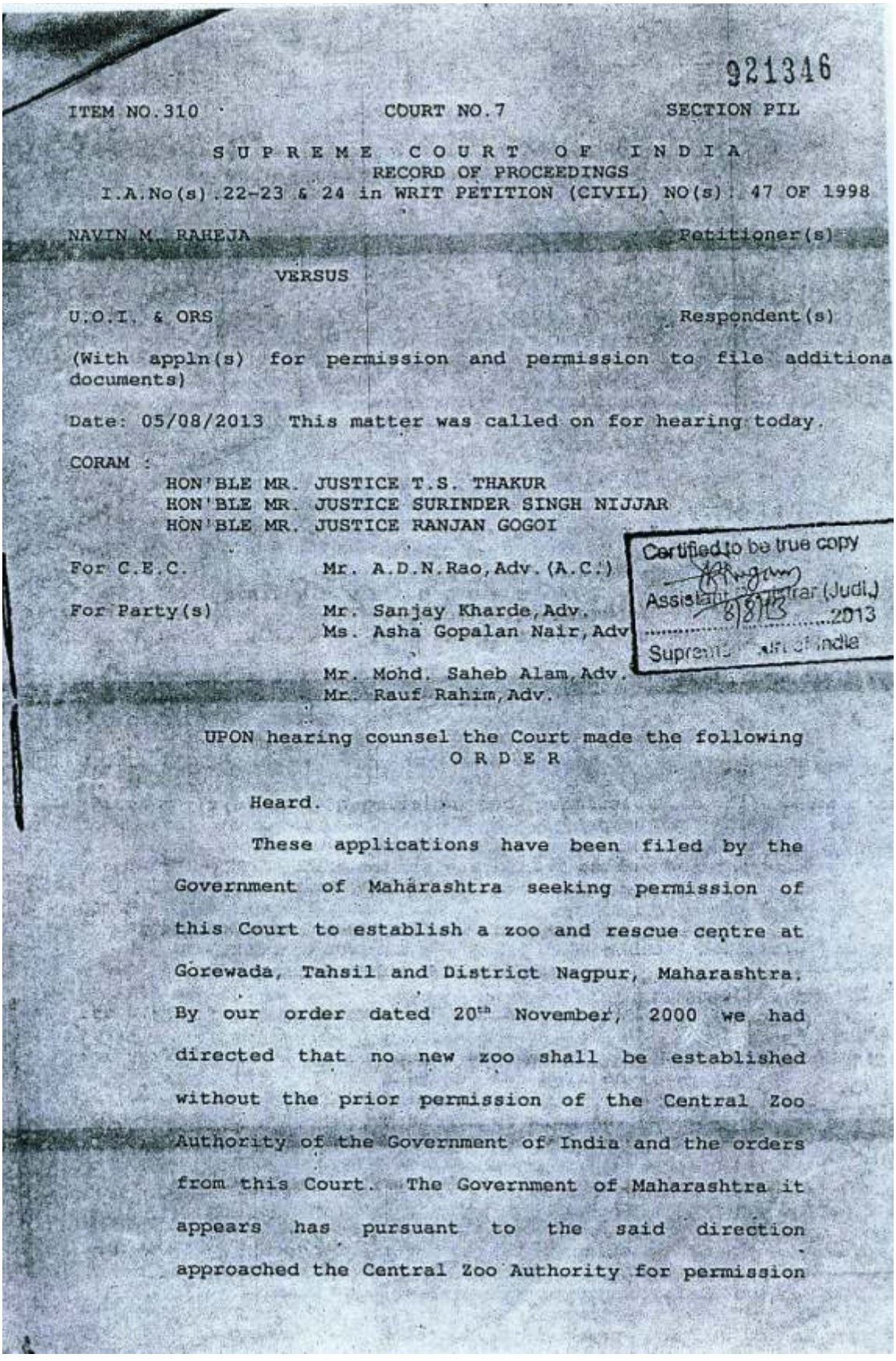
anayak 8/3/19

(Dr. Anup Kumar Nayak)
Member Secretary

Copy for information and necessary action to:-

1. The Managing Director, Forest Development Corporation of Maharashtra Limited, FDCM Bhavan, 359/B, Hingna Road, Ambazari, Nagpur – 440 036 (Maharashtra), E-mail: md@fdcm.nic.in
2. The Member Secretary, Maharashtra State Zoo Authority, B-Wing, 3rd Floor, New Administrative Building No. 2, Civil Lines, Nagpur – 440 001 (Maharashtra). E-mail: mszoaauthority@gmail.com

Annexure 2: Approval from Hon'ble Supreme Court to establish a new zoo at Gorewada



921346

ITEM NO.310 COURT NO.7 SECTION PIL

S U P R E M E C O U R T O F I N D I A
RECORD OF PROCEEDINGS
I.A.No(s).22-23 & 24 in WRIT PETITION (CIVIL) NO(s). 47 OF 1998

NAVIN M. RAHEJA Petitioner(s)

VERSUS

U.O.I. & ORS Respondent(s)

(With appln(s) for permission and permission to file additiona documents)

Date: 05/08/2013 This matter was called on for hearing today.

CORAM :
HON'BLE MR. JUSTICE T.S. THAKUR
HON'BLE MR. JUSTICE SURINDER SINGH NIJJAR
HON'BLE MR. JUSTICE RANJAN GOGOI

For C.E.C. Mr. A.D.N.Rao, Adv. (A.C.)

For Party(s) Mr. Sanjay Kharde, Adv.
Ms. Asha Gopalan Nair, Adv

Mr. Mohd. Saheb Alam, Adv.
Mr. Rauf Rahim, Adv.

Certified to be true copy
Assistant Registrar (Judl.)
8/8/13 2013
Supreme Court of India

UPON hearing counsel the Court made the following

O R D E R

Heard.

These applications have been filed by the Government of Maharashtra seeking permission of this Court to establish a zoo and rescue centre at Gorewada, Tahsil and District Nagpur, Maharashtra. By our order dated 20th November, 2000 we had directed that no new zoo shall be established without the prior permission of the Central Zoo Authority of the Government of India and the orders from this Court. The Government of Maharashtra it appears has pursuant to the said direction approached the Central Zoo Authority for permission

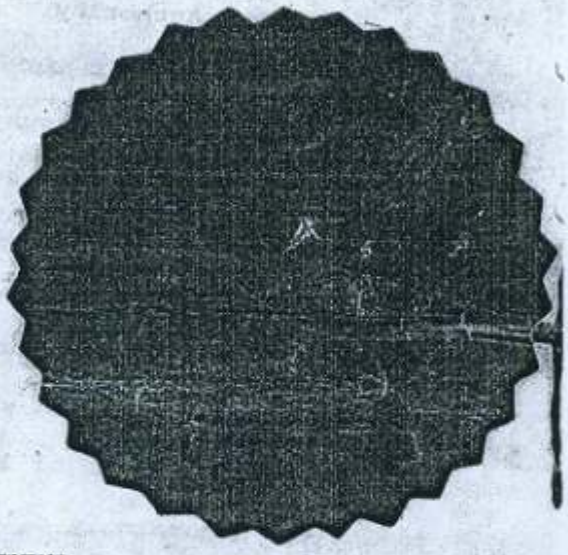
to establish the rescue centre and the zoo, at the location indicated above. The Central Zoo Authority has allowed that prayer by its order dated 17th May, 2013 subject to fulfilment of conditions stipulated in the said order.

Mr. Sanjay Kharde, learned counsel appearing for the Government of Maharashtra submits that the State Government is ready and willing to comply with all the conditions stipulated by the Central Zoo Authority. He submits that this Court could also permit the establishment of the rescue centre and the zoo, subject to those conditions.

In view of the order passed by the Central Zoo Authority by which the Authority has taken care to stipulate suitable conditions subject to which such rescue centre and zoo shall be established, we see no reason why the permission prayed for by the Government of Maharashtra should be declined. We accordingly allow these applications and permit the Government of Maharashtra to establish the proposed rescue centre and zoo subject to the fulfilment of conditions stipulated by the Central Zoo Authority in its order dated 17th May, 2013.

(Mahabir Singh)
Court Master

(Veena Khera)
Court Master



A1—No. 25013

Urgent Fee : Rs 5/-

Certification Fee Rs 10/-

No. of Folio 2 Rs 2

Total Cost Rs 17

Date of Application 25/10

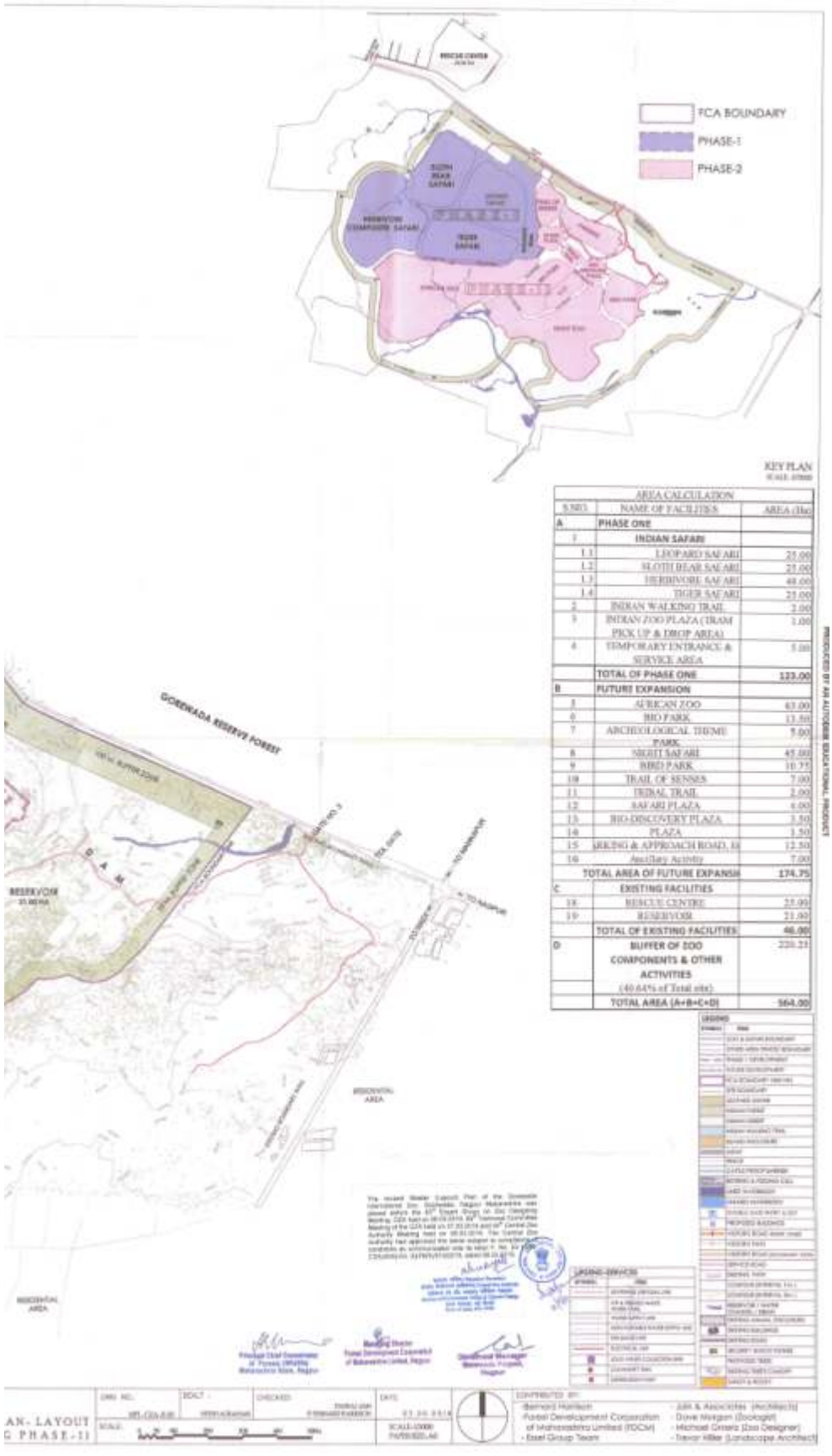
Copy Ready On 4

Date of Delivery 4/10/13

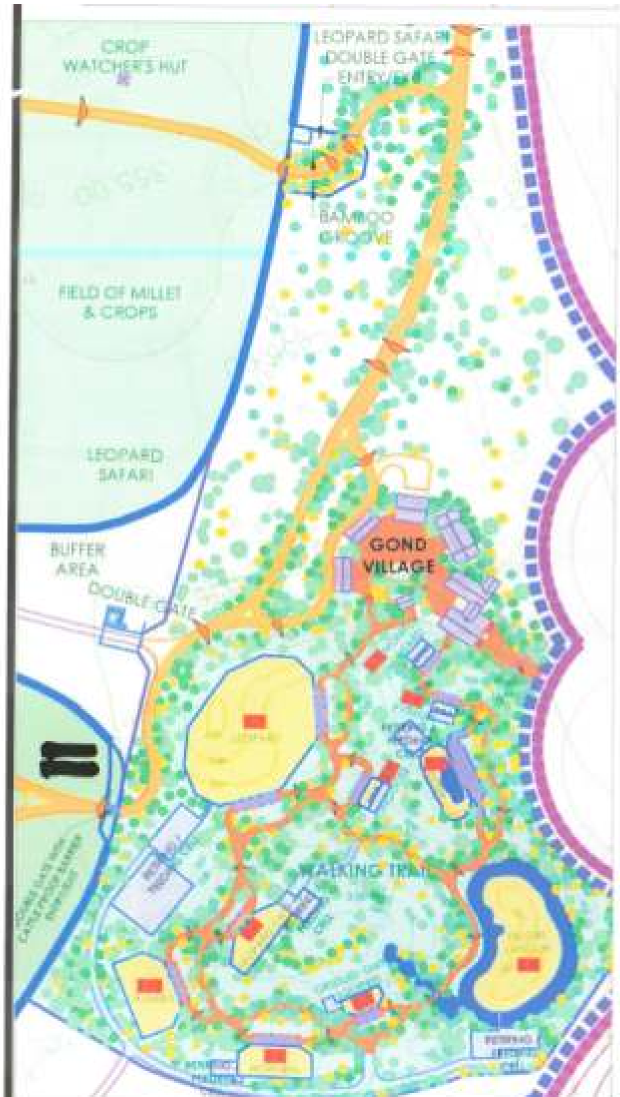
SEALED IN MY PRESENCE

Branch Officer
Supreme Court of India

Annexure 3: CZA Approved Masterplan (Layout) 2018



AREA CALCULATION		
S.NO'S	NAME OF FACILITIES	AREA (Ha)
A	**PHASE ONE**	
1	**INDIAN SAFARI**	
1.1	LEOPARD SAFARI	25.00
1.2	SLOTH BEAR SAFARI	25.00
1.3	HERBIVORE SAFARI	48.00
1.4	TIGER SAFARI	25.00
2	INDIAN WALKING TRAIL	2.00
3	INDIAN ZOO PLAZA (TRAM PICK UP & DROP AREA)	1.00
4	TEMPORARY ENTRANCE & SERVICE AREA	5.00
	TOTAL OF PHASE ONE	**123.00**
B	**FUTURE EXPANSION**	
5	AFRICAN ZOO	63.00
6	BIO PARK	13.50
7	ARCHEOLOGICAL THEME PARK	9.00
8	NIGHT SAFARI	45.00
9	BIRD PARK	10.75
10	TRAIL OF SENSES	7.00
11	TRIBAL TRAIL	2.00
12	SAFARI PLAZA	6.00
13	BIO-DISCOVERY PLAZA	3.50
14	PLAZA	3.50
15	ARRIVAL & APPROACH ROAD, Etc	12.50
16	Ancillary Activity	7.00
	TOTAL AREA OF FUTURE EXPANSION	**174.75**
C	**EXISTING FACILITIES**	
18	RESCUE CENTRE	25.00
19	RESERVOIR	21.00
	TOTAL OF EXISTING FACILITIES	**46.00**
D	**BUFFER OF ZOO COMPONENTS & OTHER ACTIVITIES** (40.64% of Total site)	220.25
	TOTAL AREA (A+B+C+D)	**564.00**



DETAIL PLAN OF INDIAN WALKING TRAIL & ZOO PLAZA

1.3. Indian Walking Trail:

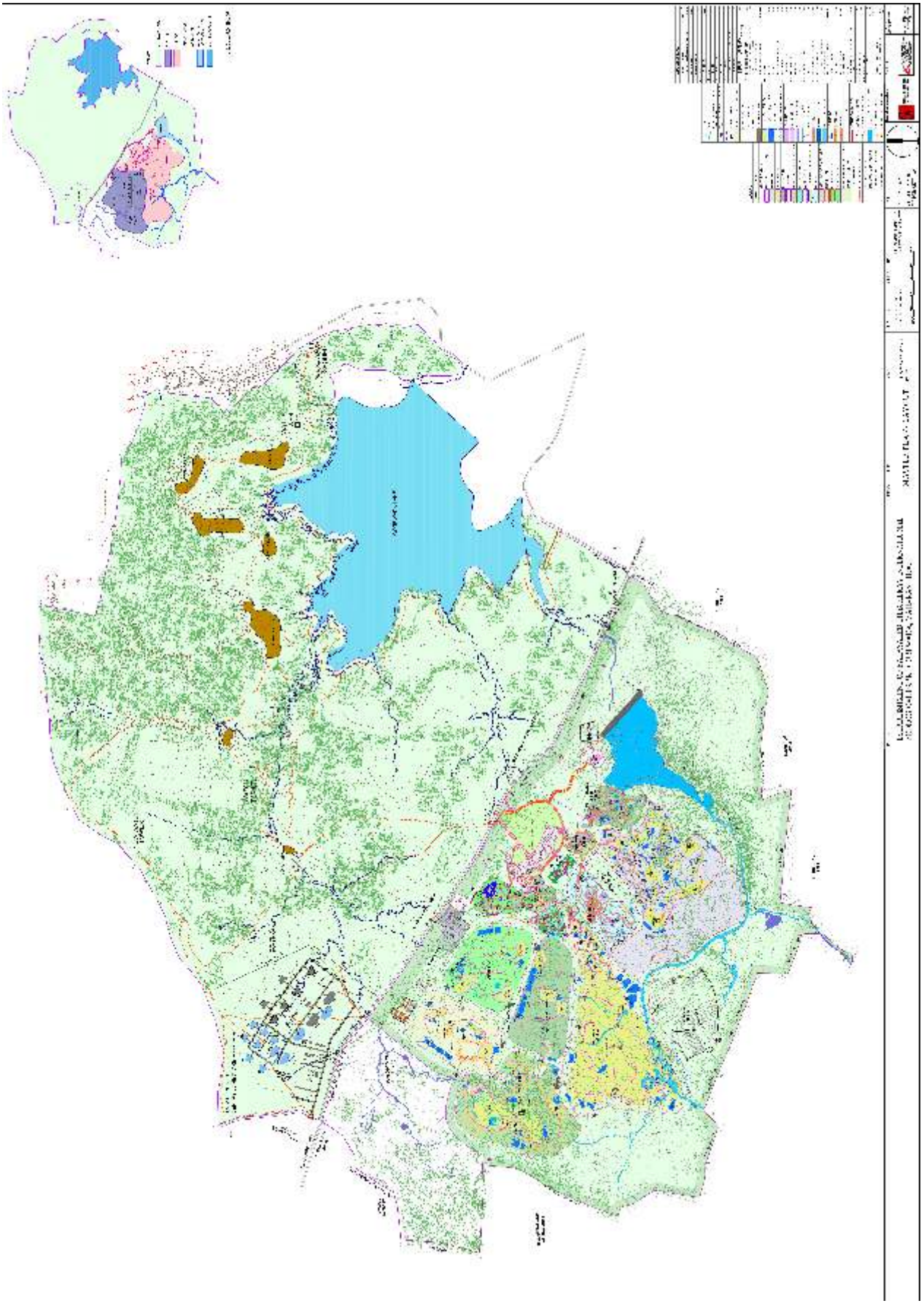
Animal Exhibits

Walking Trail	Animal Exhibit	Habitat Type Landscaping Elements	Supplementary Exhibits	Sign Post Elements
1	Leopard (Supplementary information at Annex B)	Forest Trees with horizontal branches Smooth rocks for sitting upon	Graphics Sculpture of leopard at entry to exhibit Leopard and tiger skull comparison Gond paintings of leopards Images of animals named after leopards	Alcove with seating facilities for 20 people Seating and viewing elements in rocks Concealed face in resting areas
2	Rufous-necked Hornbill (Supplementary information at Annex B)	Forest Trees with horizontal branches Nesting boxes	Graphics Stories of seed and beak. Flight feathers and armour quills. Display of casque hornbill casques	
3	Desert Monitor Lizard	Grassland	Graphics	
4	Indian Rock Python	Forest	Graphics	
5	[illegible]	Forest	Graphics	
6	Leopard Cat	Forest	Graphics	
7	Small-Clawed Otter	Grassland	Graphics	Filtration system to ensure water clarity. Underwater glass for under water viewing
8	[illegible] Langur	Grassland and forest fringe Mixture of real live and artificial climbing trees	Graphics	
9	Indian Grey Mongoose	Grassland	Graphics	
10	Aviary for Indian Birds	Grassland and forest fringe Live trees especially for endemic birds as well Village	Identification graphics	

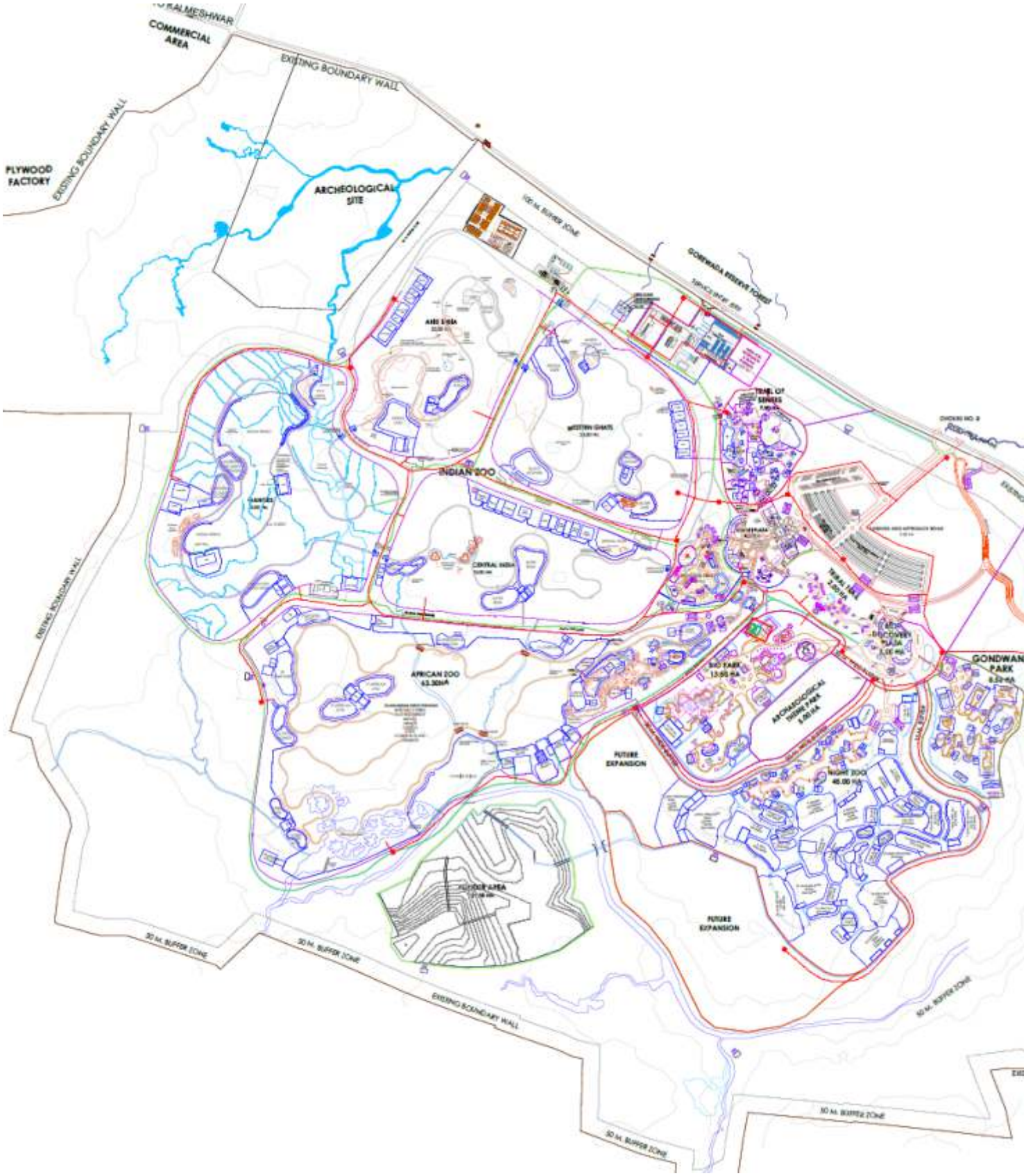
The design of the proposed construction of the Walking Trail at the Gorewada International Zoo, Gorewada, Nagpur Maharashtra was approved by the Expert Group on Zoo Designing Meeting of the Central Zoo Authority held on 06.03.2019.

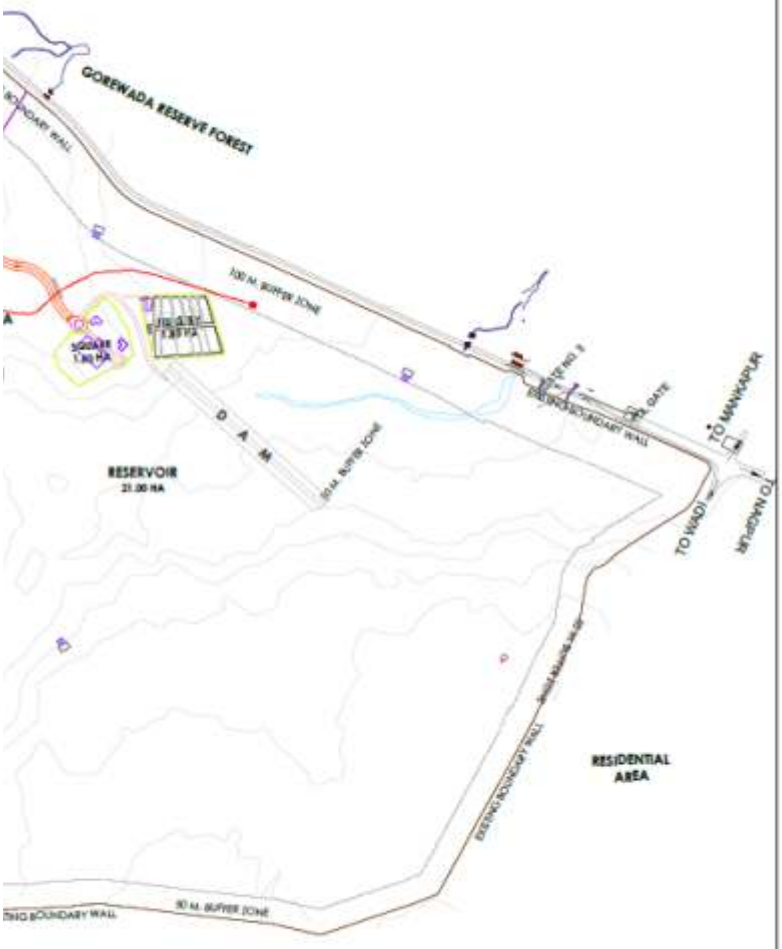
Ministry of Environment, Forest & Climate Change
Govt. of India, New Delhi

Annexure 4: Revised Masterplan (Layout) 2023



Annexure 5: Services Layout

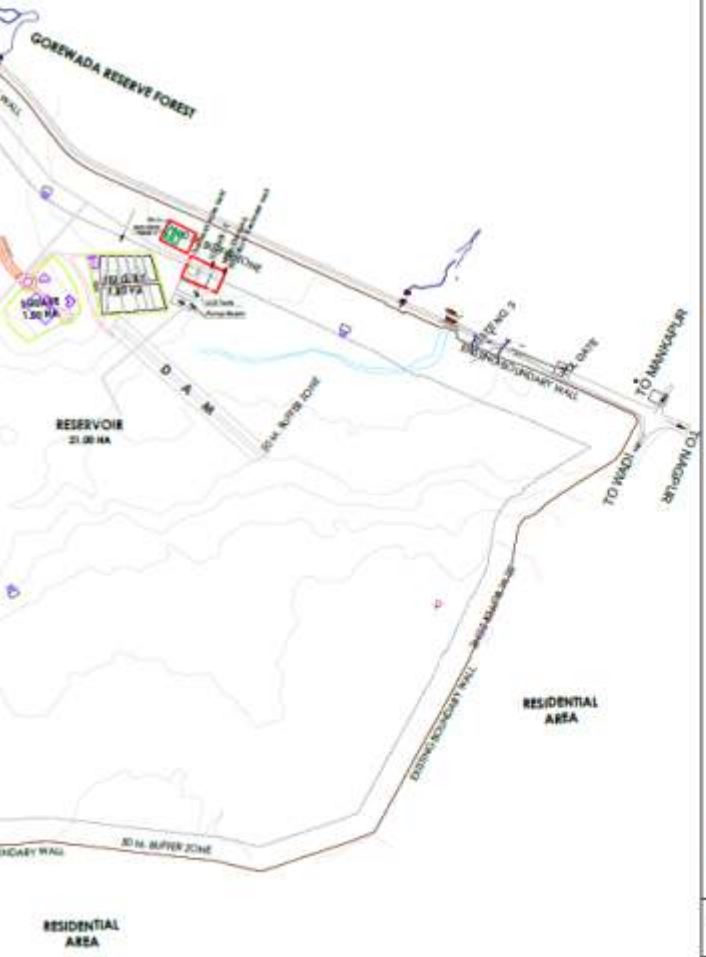




PROJECT: ESTABLISHMENT OF ZOO & RESCUE CENTRE AT GOREWADA NAGPUR

DRAWING TITLE: ELECTRICAL SUPPLY LINE


TO KALMESHWAR
COMMERCIAL AREA
EXISTING BOUNDARY WALL
PLYWOOD FACTORY
EXISTING BOUNDARY WALL
ARCHEOLOGICAL SITE
100 M. BUFFER ZONE
GONDWANA RESERVE FOREST
SERVICE AREA
AMD KUNA
WESTERN GHATS
INDIAN ZOO
CENTRAL INDIA
EXISTING BOUNDARY WALL
AFRICAN ZOO
63.30HA
FUTURE EXPANSION
FUTURE AREA
50 M. BUFFER ZONE
50 M. BUFFER ZONE
EXISTING BOUNDARY WALL
50 M. BUFFER ZONE
50 M. BUFFER ZONE
EXISTING BOUNDARY WALL
ARCHAEOLOGICAL THEME PARK
5.00 HA
NIGHT ZOO
46.00 HA
FUTURE EXPANSION
GONDWANA PARK
6.23 HA

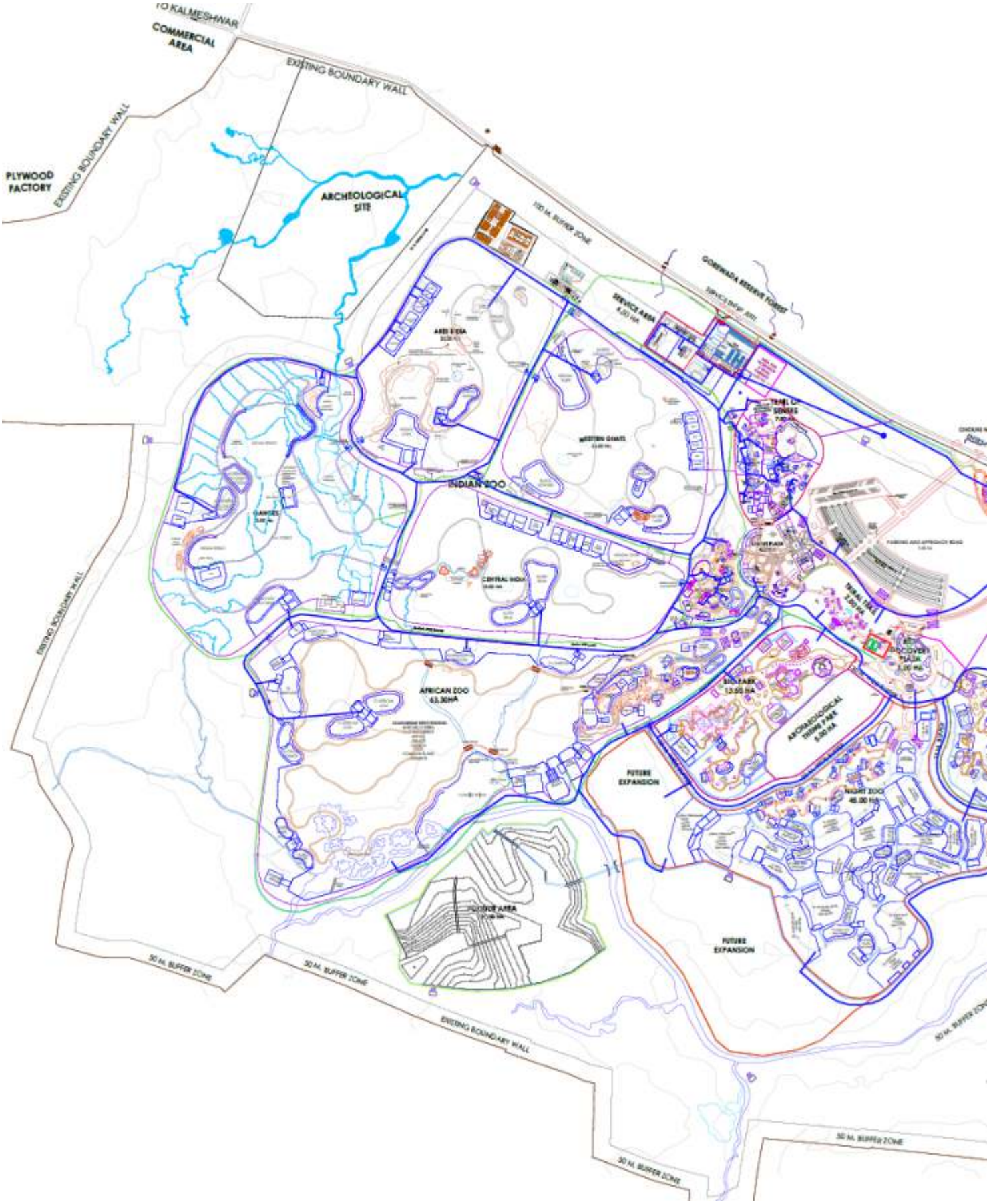


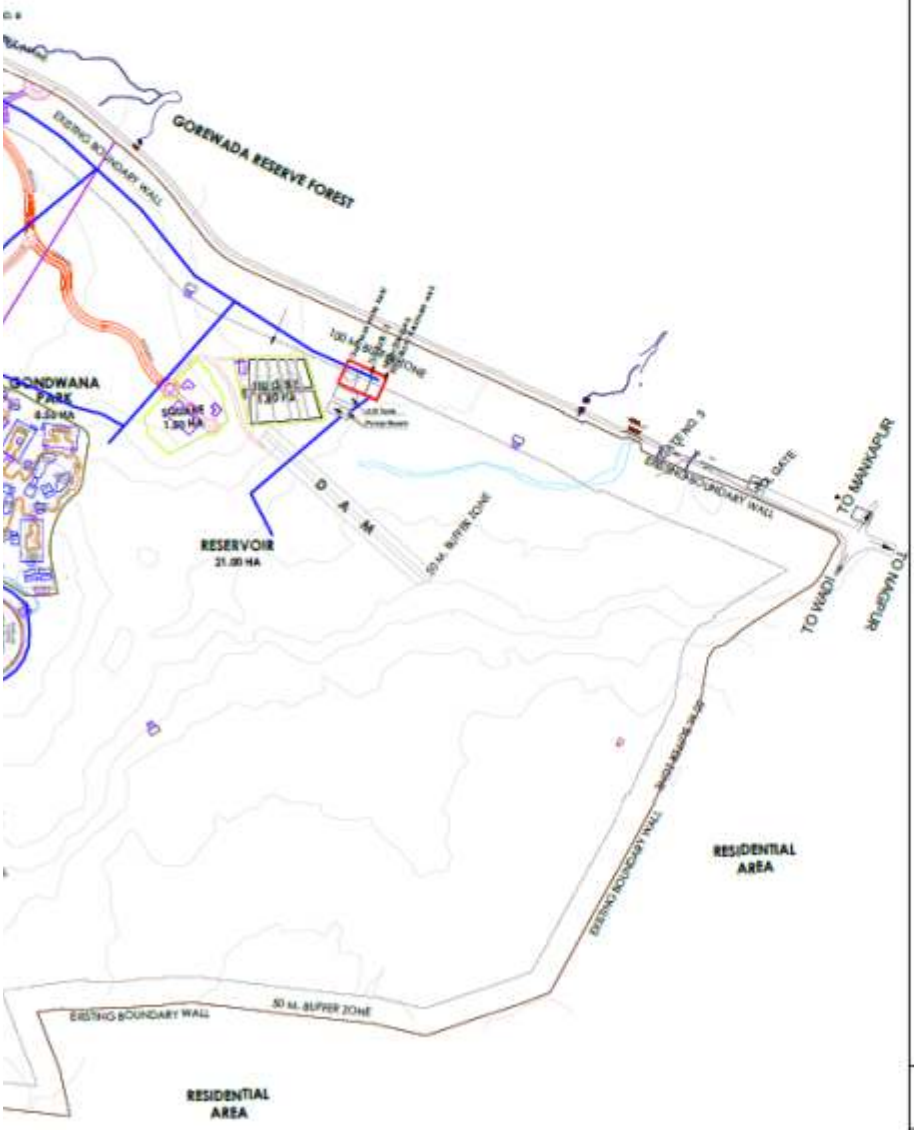
STP & TREATED WASTE WATER TANK.

NON PORTABLE WATER SUPPLY LINE

PROJECT: ESTABLISHMENT OF ZOO & RESCUE CENTRE AT GOREWADA NAGPUR

DRAWING TITLE: WATER SUPPLY LINE


TO KALMESHWAR
COMMERCIAL AREA
EXISTING BOUNDARY WALL
PLYWOOD FACTORY
EXISTING BOUNDARY WALL
ARCHEOLOGICAL SITE
100 M. BUFFER ZONE
GOREWADA RESERVE FOREST
SERVICE AREA
INDIAN ZOO
WESTERN GHATS
CENTRAL INDIA
AFRICAN ZOO
63.30HA
EXISTING BOUNDARY WALL
FUTURE EXPANSION
FUTURE EXPANSION
FUTURE AREA
50 M. BUFFER ZONE
50 M. BUFFER ZONE
EXISTING BOUNDARY WALL
50 M. BUFFER ZONE
50 M. BUFFER ZONE

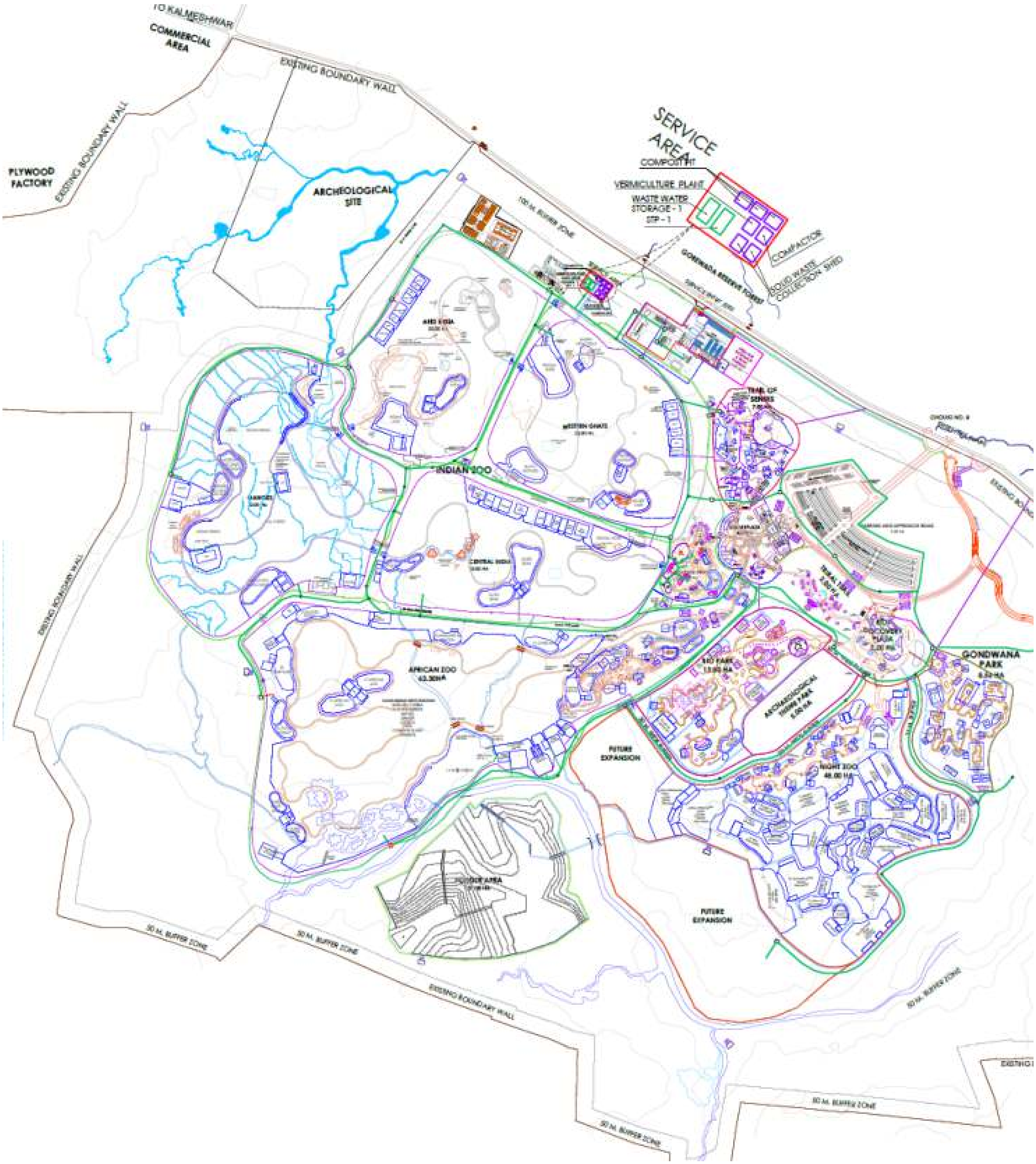


STP & TREATED WASTE WATER TANK.

WATER SUPPLY LINE

PROJECT: ESTABLISHMENT OF ZOO & RESCUE CENTRE AT GOREWADA NAGPUR

DRAWING TITLE: WATER SUPPLY LINE

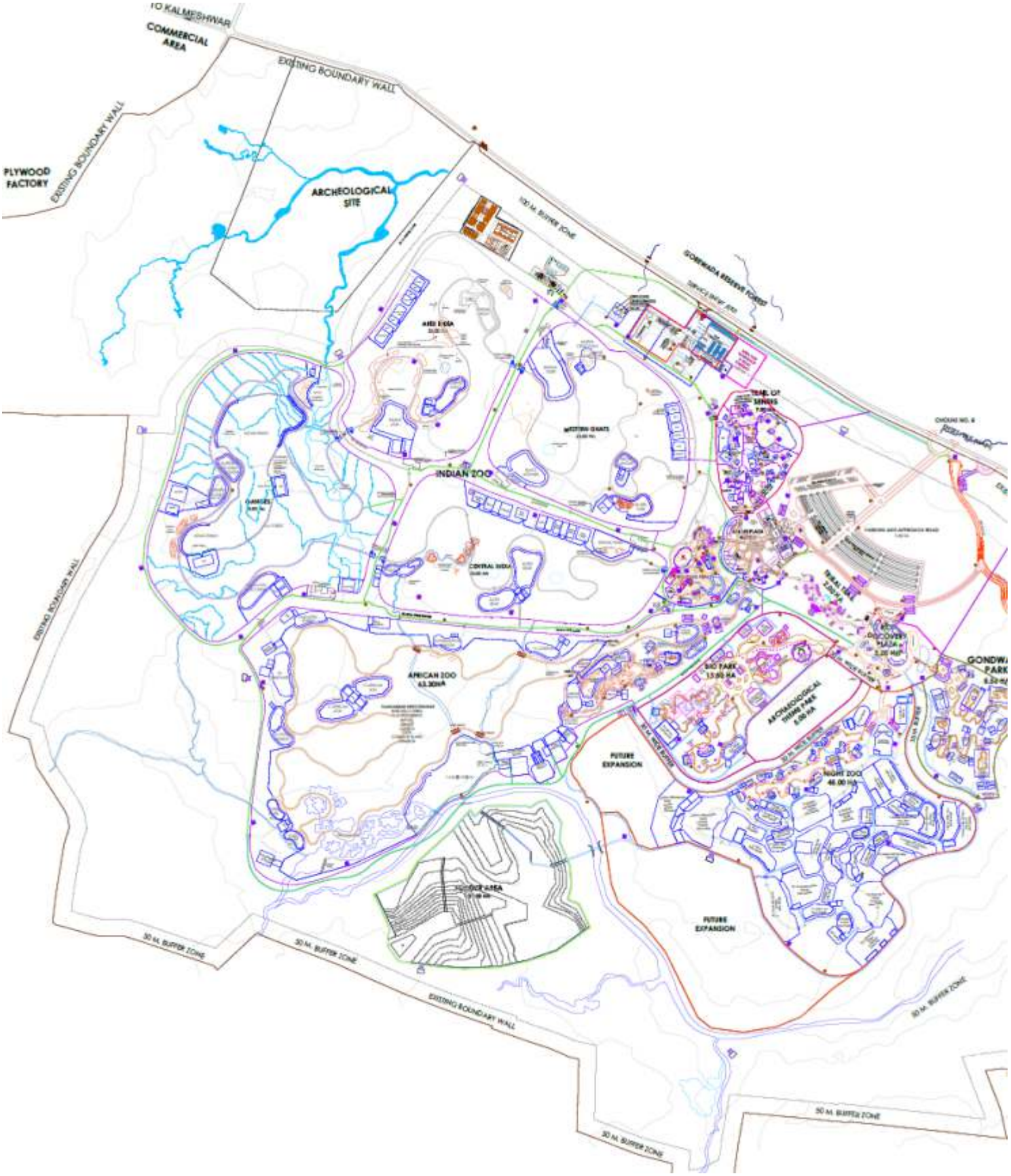

TO KALMESHWAR
COMMERCIAL AREA
EXISTING BOUNDARY WALL
PLYWOOD FACTORY
EXISTING BOUNDARY WALL
ARCHEOLOGICAL SITE
SERVICE AREA
COMPOST PIT
VERMICULTURE PLANT
WASTE WATER STORAGE - 1
STP - 1
COMPACTOR
SOLID WASTE COLLECTION SHED
INDIAN ZOO
AFRICAN ZOO
FUTURE EXPANSION
FUTURE EXPANSION
GONDWANA PARK
NIGHT ZOO
EXISTING BOUNDARY WALL
EXISTING BOUNDARY WALL
50 M. BUFFER ZONE
50 M. BUFFER ZONE
50 M. BUFFER ZONE
50 M. BUFFER ZONE
50 M. BUFFER ZONE

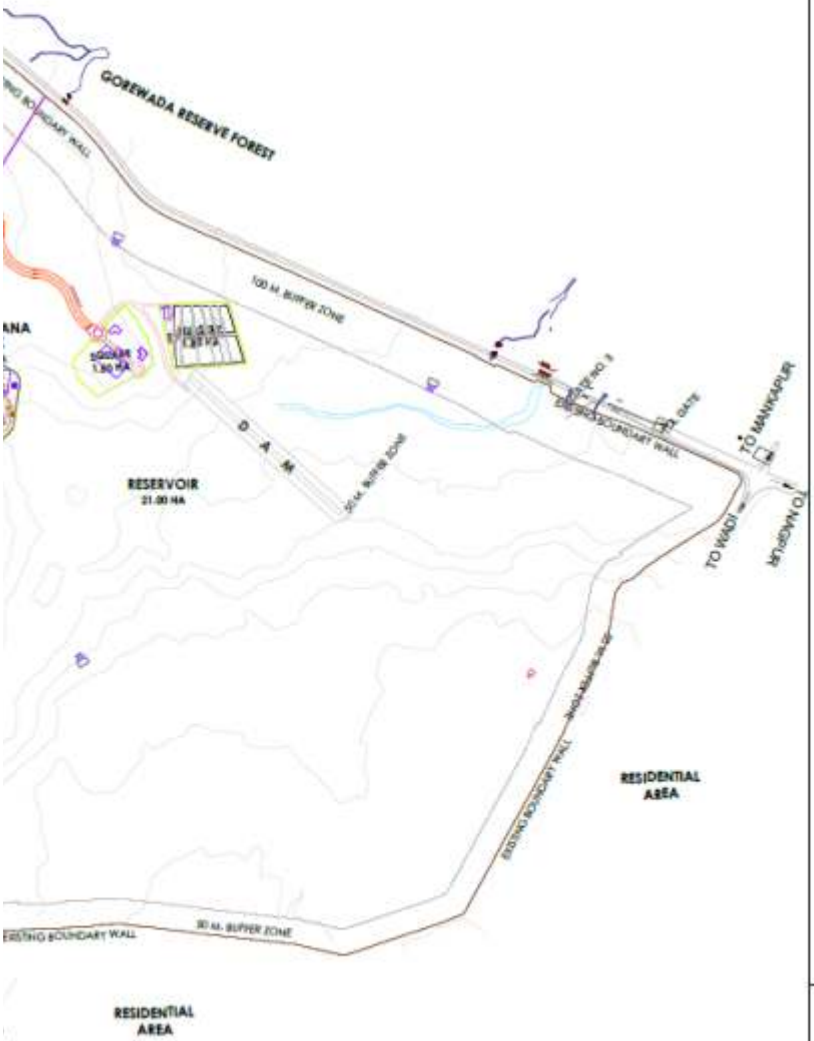
STP & TREATED WASTE WATER TANK.

SEWARAGE LINE

PROJECT: ESTABLISHMENT OF ZOO & RESCUE CENTRE AT GOREWADA NAGPUR

DRAWING TITLE: SEWARAGE LINE


TO KALMESHWAR
COMMERCIAL AREA
EXISTING BOUNDARY WALL
PLYWOOD FACTORY
EXISTING BOUNDARY WALL
ARCHEOLOGICAL SITE
100 M. BUFFER ZONE
GORAKHA RESERVE FOREST
INDIAN ZOO
AFRICAN ZOO
63.30HA
FUTURE EXPANSION
FUTURE EXPANSION
30 M. BUFFER ZONE
30 M. BUFFER ZONE
EXISTING BOUNDARY WALL
30 M. BUFFER ZONE
30 M. BUFFER ZONE
50 M. BUFFER ZONE



SOLID WASTE COLLECTION BINS

COMMUNITY BINS

PROJECT: ESTABLISHMENT OF ZOO & RESCUE CENTRE AT GOREWADA NAGPUR

DRAWING TITLE: WASTE DISPOSAL POINTS

Annexure 6: A Details of Flora and Fauna on Site

S.No	Habit	Family	Botanical Name	Common Name
1	Tree	Anacardiaceae	*Buchanania lanzan*	Chironji Tree
2	Tree	Anacardiaceae	*Lannea coromandelica*	Indian Ash Tree, Moya,
3	Tree	Anacardiaceae	*Semicarpus anacardium*	Marking Nut
4	Tree	Anacardiaccae	*Soymida febrifusa*	Bastard cedar
5	Tree	Annonaceae	*Annona squamosa*	Sugar Apple, Custard apple
6	Tree	Apocynaceae	*Holorhina antidysentrica*	Indrajao
7	Tree	Apocynaceae	*Plumaria rubra*	Frangipani
8	Tree	Araceae	*Phoenix sylvestris*	Wild Date Palm
9	Tree	Bignoniaccae	*Dolichandrone falcata*	Medhshingi
10	Tree	Bignoniaceae	*Kigellia pinnata*	Sausage Tree
11	Tree	Bignoniaceae	*Spathodia campanulata*	African tulip tree,
12	Tree	Bombaceae	*Bombax ceiba*	Silk Cotton Tree, Kapok Tree
13	Tree	Caesalpiniaccac	*Bauhinia purpuria*	Purple orchid tree
14	Tree	Caesalpiniaceae	*Bauhinia racemosa*	Bidi Leaf Tree
15	Tree	Caesalpiniaceac	*Bauhinia variegata*	White Orchid Tree
16	Tree	Caesalpiniaceae	*Cassia fistula*	Amaltas, Golden shower tree
17	Tree	Caesalpiniaceae	*Cassia renigera*	Burmese Pink Cassia
18	Tree	Caesalpiniaceae	*Cassia siamea*	Siamese Senna,
19	Tree	Caesalpiniaceae	*Delonix regia*	Gulmohar
20	Tree	Combrataceae	*Termanalia arjuna*	Arjun Tree
21	Tree	Combrataceae	*Terminalia alata*	Asan
22	Tree	Ebanaceae	*Diospyros melenoxylon*	Coromandel Ebony
23	Tree	Euphorbiaceae	*Cleistanthus collinus*	Garari
24	Tree	Fabaceac	*Albizzia procera*	White Siris
25	Tree	Fabaceae	*Albizzia odoratissima*	Black Siris
26	Tree	Fabaceae	*Anogeissus latifolia*	Axle Wood Tree
27	Tree	Fabacene	*Butea monosperma*	Flame of the Forest
28	Tree	Fabaceae	*Dalbergia latifolia*	Black Rosewood
29	Tree	Fabaceae	*Dalbergia paniculata*	Pachari
30	Tree	Fabaceae	*Dalbergia sisoo*	Shisham
31	Tree	Fabaceae	*Erythrina varigata*	Indian Coral Tree
32	Tree	Fabaceae	*Gliricidia sepium*	Mexican Lilac
33	Tree	Fabaceae	*Pongamia pinnata*	Pongam Tree
34	Tree	Fabaceae	*Pterocarpus marsupium*	Malabar Kino
35	Tree	Flacourtiaceae	*Flacourtia ramonchii*	batoko plum
36	Tree	Lycthadaceae	*Careya arborea*	Wild Guava
37	Tree	Lythraceae	*Lagerstroemia parviflora*	Small Flowered Crape Myrtle
38	Tree	Malaceae	*Kydia cordifolia*	Country mallow
39	Tree	Meliaceae	*Azadirachta indica*	Neem
40	Tree	Meliaceae	*Chloroxylon sweitiana*	Ceylon Satinwood

S.No	Habit	Family	Botanical Name	Common Name
41	Tree	Meliaceac	*Melia azadiracta*	Barbados Lilac, Bead Tree,
42	Tree	Mimosaceae	*Acacia auriculoformis*	Earleaf Acacia
43	Tree	Mimosaceae	*Acacia catechi*	Cutch Tree
44	Tree	Mimosaceae	*Acacia famesiana*	Mimosa Bush
45	Tree	Mimosaceac	*Acacia latifolia*	Golden Wattle
46	Tree	Mimosaceae	*Acacia leucophloea*	White Bark Acacia
47	Tree	Mimosaceac	*Acacia nilotica*	Babool
48	Tree	Mimosaceae	*Hardvcickia hipinata*	Anjan
49	Tree	Mimosaceae	*Lucena lucocephala*	Wild Tamarind
50	Tree	Mimosaceae	*Peltophorum ferruginum*	Yellow poinciana
51	Tree	Mimosaccac	*Pithocoelobium dulce*	Madras Thorn
52	Tree	Mimosaceae	*Tamarindus indica*	Tamarind
53	Tree	Moraceae	*Ficus benghalensis*	Krishna Fig
54	Tree	Moraceae	*Ficus religiosa*	Peepal
55	Tree	Moraceae	*Ficus sp*	Hilteetan
56	Tree	Myrtaceae	*Eucalyptus sp*	Eucalyptus
57	Tree	Myrtaceae	*Syzygium cumuni*	Jambolan plurn, Jamun
58	Tree	Rhmnaceae	*Ziziphus glaberrima*	Kath Ber
59	Tree	Rhmnaceae	*Ziziphus jujuba*	Jujube, red date
60	Tree	Rhmnaceae	*Ziziphus mauritiana*	Ber
61	Tree	Rhmnaceae	*Zizyphus oenopilia*	Jackal Jujube
62	Tree	Rubiaceae	*Adina cordifolia*	Gao, Haldu
63	Tree	Rubiaceae	*Anthocephalus chinensis*	Kadam
64	Tree	Rubiaceae	*Gardenia resinifera*	Brilliant Gardenia
65	Tree	Rubiaceae	*Gardenia turgida*	Shumeo
66	Tree	Rubiaceae	*Ixora arborea*	Small Flowered Ixora
67	Tree	Rubiaceae	*Mitragyna parviflora*	Kaim
68	Tree	Rubiaceae	*Morinda citrussifolia*	Great Morinda
69	Tree	Rubiaceae	*Randia dumeratum*	Mountain Pomegranate
70	Tree	Rubiaceae	*Xeromphis dumeratum*	Emetic nut
71	Tree	Rutaceae	*Aegle marmalos*	Bel
72	Tree	Santalaceae	*Santalum album*	Sandalwood
73	Tree	Sapindaceae	*Schleichera oleosa*	Kusum Tree
74	Tree	Simarubiaceae	*Ailanthus excelsa*	Indian Tr
75	Tree	Tiliaceae	*Grewia hrisuta*	Kukurbicha
76	Tree	Tiliaceae	*Grewia tilifolia*	Dhaman
77	Tree	Verbenaceae	*Gmelina arborea*	Gamhar
78	Tree	Verbenaceae	*Tectona grandis*	Teak
79	Tree	Verbenaceae	*Vitex negundo*	Chaste Tree

Fauna of Gorewada Reserve Forest: Birds

S.No		Latin Name	Status	Abundant	Habitat
1	little Grebe	*Tachybaptus ruticollis*	R	C	G
2	Great Crested Grebe	*Podiceps crislatus*	W	Rr	G
3	Darter	*Anhinga rufa melanogaster*	LM	U	G
4	Indian Cormorant	*Phalacrocorax fuscicollis*	R	U	G
5	Little Cormorant	*Phalacrocorax niger*	R	C	G
6	Great Egret	*Casmerodius albus modestus*	R	U	G
7	Intermediate Egret	*Mesophayx intermedia*	R	U	G
8	Little Egret	*Egretta garzetta garzetta*	R	U	G
9	Cattle Egret	*Bubulcus ibis coromandus*	R	A	G.F
10	Grey Heron	*Ardea cinerea rectirostris*	LM	U	G
11	Purple Heron	*Ardea purpurea manillensis*	LM	U	G
12	Little Heron	*Butorides striatus*	R	U	G
13	Indian Pond Heron	*Ardeola grayii*	R	C	G
14	Cinnamon Bittern	*Ixobrychus cinnamomeus*	R	U	G
15	Yellow Bittern	*Ixobrychus sinensis*	R	U	G
16	Woollynecked Stork	*Ciconia episcopus*	R	U	G
17	Asian Openbill	*Anastomus oscitans*	R	U	G
18	Lesser Whistling-Duck	*Dendrocygna javanica*	R	C	G
19	Ruddy Shelduck	*Tadorna ferruginea*	W	U	G
20	Northern Pintail	*Anas acuta*	W	C	G
21	Common Teal	*Anas crecca crecca*	W	C	G
22	Spot-billed Duck	*Anas poecilhorhynchus*	R	C	G
23	Gadwall	*Anas strepera strepera*	W	U	G
24	Eurasian Wigeon	*Anas penelope*	W	U	G
25	Garganey	*Anas querquedula*	W	O	G
26	Northern Shoveler	*Anas clypeata*	W	C	G
27	Cotton Pygmy-Goose	*Nettapus coromandelianus*	R	C	G
28	Redcrested Pochard	*Rhodonessa rufina*	W	C	G
29	Common Pochard	*Aythya ferina*	W	C	G
30	Ferruginous Pochard	*Aythya nyrocha*	W	Rr	G
31	Tufted Duck	*Aythya fuligula*	W	U	G
32	Oriental Honey Buzzard	*Pernis ptilorhynchus*	R	C	F
33	Black-shouldered Kite	*Elanus caerulus*	R	C	F
34	Black Kite	*Milvus migrans govinda*	R	C	F
35	Shikra	*Accipiter badius dmsumieri*	R	C	F
36	Eurasian Sparrowhawk	*Accipiter nisus*	W	Rr	F
37	White-eyed Buzzard	*Butastur teesa*	R	U	F
38	Osprey	*Pandion haliaetus*	W	O	G
39	Eurasian Marsh Carrier	*Circus aeruginosus*	W	C	G
40	Short-toed Eagle	*Circaetus gallicus gallicus*	R	U	F

S.No	Name of Bird	Latin Name	Status	Abundant	Habitat
41	Crested Serpent Eagle	*Spilornis cheela melanotis*	R	O	F
42	Common Kestrel	*Falco tinnunculus*	R	O	F
43	Grey Francolin	*Francolinus pondicerianus*	R	C	F
44	Painted Francolin	*Francolinus pictus*	R	C	F
45	Common Quail	*Coturnix coturnix coturnix*	R	C	F
46	Rain Quail	*Coturnix coromandelicha*	W	C	F
47	Jungle Bush Quail	*Perdicula asiatica*	R	C	F
48	Rock Bush Quail	*Perdicula argoondah*	R	C	F
49	Small Button Quail	*Turnix sylvatica*	R	U	F
50	Yellowlegged Button Quail	*Turnix tanki*	R	U	F
51	Barred Button Quail	*Turnix suscitator*	R	U	F
52	Common Peafowl	*Pavo cristatus*	R	C	F
53	White-breasted Waterhen	*Amaurornis phoenicurus*	R	C	G
54	Common Moorhen	*Gallinula chloropus*	R	C	G
55	Common Coot	*Fulica atra*	R	C	G
56	Purple Swamphen	*Porphyrio porphyrio*	R	C	G
57	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	R	C	G
58	Bronzewinged Jacana	*Metopidius indicus*	R	C	G
59	Blackwinged Stilt	*Himantopus himantopus*	R	C	G
60	Eurasian Thick-knee	*Burhinus oedicnemus*	R	U	F
61	Great Thick-knee	*Esacus recurvirostris*	R	U	F
62	Indian Courser	*Cursorius coromandelicus*	R	U	F
63	Small Pratincole	*Glareola lactea*	R	Rr	G
64	Yellow-wattled Lapwing	*Vanellus malabaricus*	R	C	F
65	Red-wattled Lapwing	*Vanellus indicus indiciis*	R	A	F
66	Little Ringed Plover	*Charadrius dubius jerdoni*	R	C	G
67	Spotted Redshank	*Tringa erythropus*	PM	Rr	G
68	Common Redshank	*Tringa totanus*	W	U	G
69	Common Greenshank	*Tringa nebularia*	W	U	G
70	Green Sandpiper	*Tringa ochropus*	W	U	G
71	Common Sandpiper	*Actitis hypoleucos*	W	C	G
72	Wood Sandpiper	*Tringa glareola*	W	C	G
73	Common Snipe	*Gallinago gallinago gallinago*	W	U	G
74	Little Stint	*Calidris minuta*	W	U	G
75	River Tern	*Sterna aurantia*	R	C	G
76	Little Tern	*Sterna albifrons*	BM	U	G
77	Chestnutbellied Sandgrouse	*Pterocles exustus*	R	U	F
78	Eurasian Collared Dove	*Streptopelia decaocto*	R	C	F
79	Little Brown Dove	*Streptopelia semgalensis*	R	A	F
80	Spotted Dove	*Streptopelia chinensis*	R	U	F

S.No	Name of Bird	Latin Name	Status	Abundant	Habitat
81	Yellow-footed Green	*Treron phoenicoptera*	R	U	F
82	Rock Pigeon	*Columba livia*	R	A	F
83	Plumheaded Parakeet	*Psittacula cyanocephala*	R	C	F
84	Rose-ringed Parakeet	*Psittacula krameri*	R	A	F
85	Common Hawk-Cuckoo	*Hierococcyx varius*	R	C	F
86	Pied Cuckoo	*Clamator jacobinns*	BM	C	F
87	Asian Koel	*Eudynamys scolopacea*	R	A	F
88	Greater Coucal	*Centropus sinensis*	R	C	F
89	Indian Nightjar	*Caprimulgus asiaticus*	R	C	F
90	Savanna Nightjar	*Caprimulgus affinis*	R	C	F
91	Grey Nightjar	*Caprimulgus indicus*	R	C	F
92	Barn Owl	*Tyto alba stertens*	R	C	F
93	Rock Eagle-Owl	*Bubo bubo bengalensis*	R	C	F
94	Collared Scops Owl	*Otus hakkomoena*	R	U	F
95	Jungle Owlet	*Glaucidium radiatum radiatum*	R	U	F
96	Spotted Owlet	*Athene brama brama*	R	C	F
97	Asian Palm Swift	*Cypsiurus balasiensis*	R	C	F
98	House Swift	*Apus affinis affinis*	R	A	F
99	Crested Treeswift	*Hemiprocnne coronettu*	R	U	F
100	Indian Roller	*Coracias benghalemis*	R	C	F
101	Pied Kingfisher	*Ceryle rudis*	R	C	G
102	Common kingfisher	*Alcedo atthis*	R	C	G
103	Whitethroated kingfisher	*Halcyon smyrnensis*	R	C	G.F
104	Bluetailed Bee-eater	*Merops philippinus*	BM	U	G
105	Green Bee-eater	*Merops orientalis*	R	A	F
106	Coppersmith Barbet	*Megalaima haemacephala*	R	A	F
107	Common Hoopoe	*Upupa epops*	R	U	F
108	Common Grey Hornbill	*Ocyceros birostris*	R	U	F
109	Blackrumped Flameback	*Dinopium benghalense*	R	C	F
110	Greater Flameback	*Chrysocolaptes lucidus*	R	U	F
111	Yellow-crowned	*Dendrocopus mahrattensis*	R	C	F
112	Common lora	*Aegithina tiphia*	R	C	F
113	Golden-fronted Leafbird	*Chloropsis aurifrons*	R	U	P
114	Bluewinged Leafbird	*Chloropsis cochinchinensis*	R	Rr	F
115	Eurasian Golden Oriole	*Oriolus oriolus kundoo*	R	C	F
116	Black-hooded Oriole	*Oriolus xanthornus*	R	U	F
117	Indian Pitta	*Pitta brachyura*	BM	U	F
118	Singing Bushlark	*Mirafra cantillans*	R	C	F
119	Indian Bushlark	*Mirafra erythroplera*	R	C	F
120	Ashycrowned Sparrow Lark	*Eremopterix grisea*	R	C	F

S.No	Name of Bird	Latin Name	Status	Abundant	Habitat
121	Rufoustailed Lark	*Ammomanes phoenicrurus*	R	C	F
122	Sykes' Lark	*Galerida deva*	R	C	F
12	Oriental Skylark	*Alauda gulgula*	R	C	F
124	Dusky Crag Martin	*Hirundo concolor*	R	C	F
125	Barn Swallow	*Hirundo rustica*	W	U	F
126	Wiretailed Swallow	*Hirundo smithii*	R	A	F
127	Red-rumped Swallow	*Hirundo daurica*	R	A	F
128	Streak-throated Swallow	*Hirundo fhivicola*	R	C	F
129	Black Drongo	*Dicrurus macrocercus*	R	A	F
130	Whitebellied Drongo	*Dicrurus caerulescens*	R	U	F
131	Common Woodshrike	*Tephrodornis pondicerianus*	R	U	F
132	Southern Grey Shrike	*Lanius meridionalis lahtora*	R	Rr	F
133	Longtailed Shrike	*Lanius schach*	R	C	F
134	Baybacked Shrike	*Lanius vittatus*	R	C	F
135	Brown Shrike	*Lanius cristatus*	W	O	F
136	Chestnut-tailed Starling	*Sturnus malabaricus*	R	C	F
137	Brahminy Starling	*Sturmus pagodarum*	R	A	F
138	Rosy Starling	*Sturnus roseus*	W	C	F
139	Common Starling	*Sturnus vulgaris*	W	Rr	F
140	Asian Pied Starling	*Sturnus contra contra*	R	C	F
141	Bank Myna	*Acridotheres gingianus*	R	U	F
142	Common Myna	*Acridotheres tristis tristis*	R	A	F
143	Indian House Crow	*Corvus splendens*	R	A	F
144	Rufous Treepie	*Dendrocitta vagabunda*	R	U	F
145	Large Cuckooshrike	*Coracina macei*	R	O	F
146	Blackheaded Cuckoo-shrike	*Coracina melanoptera*	R	O	F
147	Whitebellied Minivet	*Pericriocotus erythropygius*	R	U	F
148	Redvented Bulbul	*Pycnonotus cafer*	R	A	F
149	Whitebrowed Bulbul	*Pycnonotus luteolus*	R	U	F
150	Tawnybellied Babbler	*Dumetia hyperythra*	R	O	F
151	Yellow-eyed Babbler	*Chrysomma sineme*	R	U	F
152	Jungle Babbler	*Turdoides striata*	R	A	F
153	Large Grey Babbler	*Turdoides malcolmi*	R	C	F
154	Common Babbler	*Turdoides caudalus*	R	U	F
155	Asian Brown Flycatcher	*Muscicapa dauurica*	W	Rr	F
156	Redthroated Flycatcher	*Ficedula parva*	R	O	F
157	Tickell's Blue Flycatcher	*Cyornis tickelliae tickelliae*	R	O	F
158	Asian Paradise Flycatcher	*Terpsiphone paradisii*	R	U	F
159	Blacknaped Monarch	*Hypothymis azurea styani*	R	O	F
160	Whitebrowed Fantail	*Rhipidura aureola*	R	U	F

S.No	Name of Bird	Latin Name	Status	Abundant	Habitat
161	Whitethroated Fantail	*Rhipidura albicollis albogularis*	R	O	F
162	Ashy Prinia	*Prinia socialis socialis*	R	C	F
163	Plain Prinia	*Prinia inornata*	R	C	F
164	Jungle Prinia	*Prinia sylvatica*	R	C	F
165	Clamorous Reed Warbler	*Acrocephalus stentoreus*	W	U	G.F
166	Booted Warbler	*Hippolais caligata rama*	W	U	F
167	Common Tailorbird	*Orthotomus sutorius*	R	A	F
168	Orphean Warbler	*Sylvia hortensis*	W	U	F
169	Lesser Whitethroat	*Sylvia curruca blythii*	W	U	F
170	Common Chiffchaff	*Phylloscopus collybita*	W	U	F
171	Greenish Warbler	*Phylloscopus trochiloides*	W	U	F
172	Bluethroat	*Luscinia svecica*	W	U	G.F
173	Black Redstart	*Phoenicrurus ochrurus*	W	C	F
174	Brown Rock Chat	*Cercomela fusca*	R	C	F
175	Oriental Magpie Robin	*Copsychus saularis*	R	C	F
176	Indian Robin	*Saxicolodes fulicata*	R	C	F
177	Pied Bushchat	*Saxicola caprata*	R	U	F
178	Common Stonechat	*Saxicola torquata*	R	C	F
179	Blue Rock Thrush	*Monticola solitarius*	W	Rr	F
180	Whitethroated Ground	*Zoothera citrina*	R	U	F
181	Great Tit	*Parus major stupae*	R	U	F
182	Black-lored Tit	*Parus xanthogenys*	R	U	F
183	Tree Pipit	*Anthus trivialis*	R	U	F
184	Paddyfield Pipit	*Anthus nifulus*	R	C	F
185	Whitebrowed Wagtail	*Motacilla madraspatemis*	R	C	F
186	Citrine Wagtail	*Motacilla c. citreola*	W	U	G
187	Grey Wagtail	*Motacilla cinerea*	W	U	G
188	Yellow Wagtail	*Motacilla flava*	W	U	G
189	White Wagtail	*Motacilla alba*	W	U	G
190	Purple-rumped Sunbird	*Nectarinia zeylonica*	R	A	F
191	Purple Sunbird	*Nectarinia asiatica*	R	A	F
192	Oriental White-eye	*Zosterops palpebrosus*	R	C	F
193	Palebilled Flowerpecker	*Dicaeum erythrorhynchos*	R	U	F
194	Red Avadavat	*Amandava amandava*	R	U	F
195	Indian Silverbill	*Lonchurra malabarica*	R	A	F
196	Whiterumped Munia	*Lonchurra striata*	R	Rr	F
197	Scalybreasted Munia	*Lonchurra punctulata*	R	C	F
198	Blackheaded Munia	*Lonchurra malacca*	R	U	F
199	House Sparrow	*Passer domesticus*	R	A	F
200	Chestnut-shouldered	*Petronia xanthocollis*	R	U	F
201	Baya Weaver	*Ploceus philippinus*	R	U	F
202	Common Rosefinch	*Carpodacus erythrinus*	W	0	F

648 A650

जि.मृ.स.मृ.चा.प्र.नागपूर

जमीन आरोग्य पत्रिका (सुपि.पातळी)

नमूना प्रकार सूक्ष्म मूलद्रव्ये OutWard No. 615 28-March-2014

प्रयोगशाळा नमुना क्रमांक: 277M201300082001
जमीन आरोग्य पत्रिका क्रमांक 27090910926001

शेतक-याचे नाव: अशफाक अहमद अंड असोसिअतेस
शेतक-याचे राज्य महाराष्ट्र

शेतक-याचा जिल्हा नागपूर
शेतक-याचा तालुका नागपूर(ग्रामीण)

शेतक-याचे गांव कापसा
सर्वे \ गट क्रमांक 1

अ.क्र.	गुणधर्म	वाचन	शेरा	विशेष सल्ला
1	तांबे	0.80 (पीपीएम)	पुरेसे	
2	लोह	1.35 (पीपीएम)	कमी	लागवडीच्या वेळी सेंद्रीय खतासोबत फेरस सल्फेट(हिराकस) 25 ते 30 किलो प्रति हेक्टरी जमिनीतून द्यावे
3	जस्त	0.27 (पीपीएम)	कमी	लागवडीच्या वेळी सेंद्रीय खतासोबत झिंक सल्फेट 25 ते 30 किलो प्रति हेक्टरी जमिनीतून द्यावे
4	मंगल	0.89 (पीपीएम)	कमी	लागवडीच्या वेळी सेंद्रीय खतासोबत मॅंगेनीज सल्फेट 10 ते 25 किलो प्रति हेक्टरी जमिनीतून द्यावे

विशेष शिफारस –

प्रयोगशाळा प्रमुख
जि.मृ.स.मृ.चा.प्र.नागपूर

जमीन आरोग्य व्यवस्थापन योजना

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी नागपुर
कृषि महाविद्यालय परिसर, महाराज बाग, नागपूर - ०१

नोट: हा अहवाल कोर्टाच्या कामासाठी चालणार नाही.

कृषि महाविद्यालय परिसर, महाराज बाग, नागपूर - ०१

जि.मृ.स.मृ.चा.प्र.नागपूर

जमीन आरोग्य पत्रिका (सुपि.पातळी)

नमूना प्रकार सूक्ष्म मूलद्रव्ये **OutWard No.** 616 **28-March-2014**

प्रयोगशाळा नमुना क्रमांक:	**277M201300082002**	जमीन आरोग्य पत्रिका क्रमांक	27090910822002
शेतक-याचे नाव:	अशफाक अहमद अंड असोसिअलेस	शेतक-याचे राज्य	महाराष्ट्र
शेतक-याचा जिल्हा	नागपूर	शेतक-याचा तालुका	नागपूर(ग्रामीण)
शेतक-याचे गांव	गोधानी (रेल्वे)	सर्वे \ गट क्रमांक	2

अ.क्र.	गुणधर्म	वाचन	शेरा	विशेष सल्ला
1	तांबे	1.50 (पीपीएम)	पुरेसे	
2	लोह	1.69 (पीपीएम)	कमी	लागवडीच्या वेळी सेंद्रीय खतासोबत फेरस सल्फेट(हिराकस) 25 ते 30 किलो प्रति हेक्टरी जमिनीतून द्यावे
3	जस्त	0.37 (पीपीएम)	कमी	लागवडीच्या वेळी सेंद्रीय खतासोबत झिंक सल्फेट 25 ते 30 किलो प्रति हेक्टरी जमिनीतून द्यावे
4	मंगल	1.22 (पीपीएम)	कमी	लागवडीच्या वेळी सेंद्रीय खतासोबत मॅंगेनीज सल्फेट 10 ते 25 किलो प्रति हेक्टरी जमिनीतून द्यावे

विशेष शिफारस –

प्रयोगशाळा नाव
जि.मृ.स.मृ.चा.प्र.नागपूर

जमीन आरोग्य व्यवस्थापन यंत्रणा

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी नागपुर
कृषि महाविद्यालय परिसर, महाराज बाग, नागपूर - ०१

नोट: हा अहवाल कोर्टाच्या कामासाठी चालणार नाही.

कृषि महाविद्यालय परिसर, महाराज बाग, नागपूर - ०१

जि.मृ.स.मृ.चा.प्र.नागपूर

जमीन आरोग्य पत्रिका (सुधि.पातळी)

नमूना प्रकार सूक्ष्म मूलद्रव्ये OutWard No. 617 28-March-2014

प्रयोगशाळा नमूना क्रमांक: 277M201300082003

जमीन आरोग्य पत्रिका क्रमांक 27090910822003

शेतक-याचे नाव: अशपाक अहमद अंड असोसिअतेस

शेतक-याचे राज्य महाराष्ट्र

शेतक-याचा जिल्हा नागपर

शेतक-याचा तालका नागपर(ग्रामीण)

शेतक-याचे गांव गोधानी (रेल्वे)

सर्व्हे \ गट क्रमांक 3

अ.क्र.	गुणधर्म	वाचन	शेरा	विशेष सल्ला
1	तांबे	1.87 (पीपीएम)	पुरेसे	
2	लोह	0.90 (पीपीएम)	कमी	लागवडीच्या वेळी सेंद्रीय खतासोबत फेरस सल्फेट(हिराकस) 25 ते 30 किलो प्रति हेक्टरी जमिनीतून द्यावे
3	जस्त	0.46 (पीपीएम)	कमी	लागवडीच्या वेळी सेंद्रीय खतासोबत झिंक सल्फेट 25 ते 30 किलो प्रति हेक्टरी जमिनीतून द्यावे
4	मंगल	1.38 (पीपीएम)	कमी	लागवडीच्या वेळी सेंद्रीय खतासोबत मँगेनीज सल्फेट 10 ते 25 किलो प्रति हेक्टरी जमिनीतून द्यावे

विशेष शिफारस –

प्रयोगशाळा नाव

जि.मृ.स.मृ.चा.प्र.नागपूर

जमीन आरोग्य व्यवस्थापन योजना

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी नागपूर
कृषि महाविद्यालय परिसर, महाराज बाग, नागपूर - ०१
कृषि महाविद्यालय परिसर, महाराज बाग, नागपूर - ०१

नोट: हा अहवाल कोर्टाच्या कामासाठी चालणार नाही.

घटकनिहाय सर्वसाधारण प्रमाण

अ.क्र. (१)	घटकांचे प्रमाणे प्रमाण (२)	सेंद्रिय कार्य (Organic Carbon) टक्के (३)	उप. नत्र, (N) कि / हे (४)	उप. स्फुरद, (P) कि / हे (५)	उप. पालाश, (K) कि / हे (६)	शिफारस केलेल्या मात्रेच्या किती टक्के (%) कमी-जास्त मात्रा द्यावी (७)
१	अत्यंत कमी	०.२० पर्यंत	१४१ पेक्षा कमी	७ पेक्षा कमी	१०० पेक्षा कमी	५०% जास्त
२	कमी	०.२१ ते ०.४०	१४१ ते २८०	८ ते १४	१०१ ते १५०	२५% जास्त
३	मध्यम	०.४१ ते ०.६०	२८१ ते ४२०	१५ ते २१	१५१ ते २००	शिफारस केलेली मात्रा
४	साधारण भरपूर	०.६१ ते ०.८०	४२१ ते ५६०	२२ ते २८	२०१ ते २५०	१०% कमी
५	भरपूर	०.८१ ते १.००	५६१ ते ७००	२९ ते ३५	२५१ ते ३००	२५% कमी
६	अत्यंत भरपूर	१ पेक्षा जास्त	७०१ पेक्षा जास्त	३६ पेक्षा जास्त	३०१ पेक्षा जास्त	५०% कमी

सामु (पी एच्)

१	आत्यंतिक आम्ल	४.५ पेक्षा कमी
२	तीव्र आम्ल	४.६ ते ५.२
३	मध्यम आम्ल	५.३ ते ६.०
४	किंचीत आम्ल	६.१ ते ६.५
५	उदासीन	६.६ ते ७.०
६	किंचीत अल्कली	७.१ ते ७.५
७	मध्यम अल्कली	७.६ ते ८.३
८	तीव्र अल्कली	८.४ ते ९.०
९	आत्यंतिक अल्कली	९.० पेक्षा जास्त

क्षारता (इ.सी.) डेसी सायमन / मी

१	सर्वसाधारण	१.०० पेक्षा कमी
२	पिक उगवणीस हानीकारक	१.०१ ते २.००
३	क्षार संवेदनाक्षम पिक वाढीस नुकसान कारण	२.०१ ते ३.००
४	पिकास नुकसानकारक	३.०० च्या पुढे
	मुक्त चुना (टक्के)	
१	चुनखडीविरहित	०.५० पेक्षा कमी
२	अल्प चुनखडीयुक्त	०.५१ ते २.५०
३	मध्यम चुनखडीयुक्त	२.५१ ते ५.००
४	चुनखडीयुक्त	५.०१ ते १०.००
५	अति चुनखडीयुक्त	१०.०० चे पुढे

(अ) खतासंबंधी सर्वसाधारण सूचना :-

- १०० किलो युरियात ४६ किलो नत्र असते, तेव्हा १ किलो नत्रासाठी अंदाजे २ किलो १७० ग्रॅम युरिया द्यावा.
- १०० किलो सिंगल सुपर फॉस्फेट (सिंसुफा) मध्ये १६ किलो स्फुरद ऑक्साईड असते किंवा स्फुरद ऑक्साईड देण्यासाठी अंदाजे ६ किलो २५० ग्रॅम सिंसुफा द्यावे.
- १०० किलो म्युरेट ऑफ पोटॅश (म्युऑपो) मध्ये ६० किलो पालाश ऑक्साईड असते किंवा १ किलो पालाश ऑक्साईड देण्यासाठी अंदाजे १ किलो ६७० ग्रॅम म्युऑपो वापरावे.
- पालाश ऑक्साईडची शिफारस नसल्यास पालाश ऑक्साईड असलेले खत देऊ नये.
- खते दोन चाड्याच्या पाभरीने पेरून द्यावीत म्हणजे ती पिकांच्या मुळांच्या खालच्या थरात उपलब्ध होवुन त्याचा उपयोग होईल. पिकांसाठी निंबोळी पेंडीची बारीक भुकटी १ किलो व युरीया ६ किलो याप्रमाणात द्या.

(ब) वाढलेला विम्ल निर्देशांक कमी करण्यासाठी ढोबळ सूचना :-

- जमिनीचा चोपणपणा वाढत / वाढलेला आहे. त्यासाठी उतारास समांतर चर काढून पाण्याचा निचरा चांगला होईल अशी काळजी घ्यावी.
- हेक्टरी ५ ते १० टन जिप्सम व १५ ते २५ गाड्या चांगले कुजलेले शेणखत जमिनीत मिसळून घालावे किंवा साखर कारखान्यातील मळी (प्रेस मड) १० ते १५ गाड्या घालाव्यात.
- हिरवळीच्या खतांसाठी ताग, धैंचा, शेवरी या सारखी पिके घेऊन फुलावर येताच जमिनीत गाडावीत.
- भात, कापूस, गहू, सुगरबीट, बरसीम व ऊस यासारखी पिके घ्यावीत.

(क) वाढलेला क्षार कमी करण्यासाठी ढोबळ सूचना :-

जमिनीतील क्षाराचे प्रमाण वाढत / वाढलेले आहे. त्यावर खालील उपाय करावेत.

- जमिनीतील पृष्ठभागावर आलेले क्षार खरवडून शेताबाहेर टाकून द्यावेत.
- जमिनीचे लहान लहान वाफे तयार करुन टाकावे म्हणजे पाण्याबरोबर क्षार बाहेर जातील, चर खणून पाण्याच्या निचऱ्याची चांगली सोय करावी.
- गांडखते (सेंद्रिय खते) भरपूर प्रमाणात वापरावीत
- हिरवळीच्या खतांसाठी धैंचा, शेवरी, ताग या सारखी पिके घेऊन फुलावर येताच जमिनीत गाडून टाकावीत.
- क्षारास दाद देणारी पिके-कांदा, भात, कापूस, गहू, सुर्यफुल, ऊस यासारखी पिके घ्यावीत.

(ड) कमी झालेला आम्ल निर्देशांक वाढविण्यासाठी :-

- जमिनीचा सामू व पोत लक्षात घेऊन हेक्टरी ०.५ ते २.५ टन चुन्याची पावडर अगर चुनकळीची पावडर वापरावी.
- सेंद्रिय खतांचा व हिरवळीच्या खतांचा वापर करावा.

(इ) मुक्त चुन्याचा दाह कमी करण्याकरीताचे उपाय :-

- ताग, धैंचा, शेवरी यासारखी हिरवळीची पिके जमिनीत गाडावीत.
- डाय अमोनियम फॉस्फेटचा वापर करावा.
- सुपर फॉस्फेट खत द्यावयाचे असल्यास कंपोस्ट अथवा शेणखतात मिसळून ते चळी घेवून द्यावे.
- सहनशील पिकांची निवड करावी. उदा. बोरे, आवळा, अंजीर, सुर्यफुल, सोयाबीन, गहू, कापूस

टिप : मागील पानावर दिलेल्या अहवालाचा उपयोग कोर्ट कामासाठी करता येणार नाही.

घटकनिहाय सर्वसाधारण प्रमाण

अ.क्र. (१)	घटकांचे प्रमाणे प्रमाण (२)	सेंद्रिय कार्य (Organic Carbon) टक्के (३)	उप. नत्र, (N) कि / हे (४)	उप. स्फुरद, (P) कि / हे (५)	उप. पालाश, (K) कि / हे (६)	शिफारस केलेल्या मात्रेच्या किती टक्के (%) कमी-जास्त मात्रा द्यावी (७)
१	अत्यंत कमी	०.२० पर्यंत	१४१ पेक्षा कमी	७ पेक्षा कमी	१०० पेक्षा कमी	५०% जास्त
२	कमी	०.२१ ते ०.४०	१४१ ते २८०	८ ते १४	१०१ ते १५०	२५% जास्त
३	मध्यम	०.४१ ते ०.६०	२८१ ते ४२०	१५ ते २१	१५१ ते २००	शिफारस केलेली मात्रा
४	साधारण भरपूर	०.६१ ते ०.८०	४२१ ते ५६०	२२ ते २८	२०१ ते २५०	२०% कमी
५	भरपूर	०.८१ ते १.००	५६१ ते ७००	२९ ते ३५	२५१ ते ३००	२५% कमी
६	अत्यंत भरपूर	१ पेक्षा जास्त	७०१ पेक्षा जास्त	३६ पेक्षा जास्त	३०१ पेक्षा जास्त	५०% कमी

सामु (पी एच्) **क्षारता (इ.सी.) डेसी सायमन / मी**

१	आत्यंतिक आम्ल	४.५ पेक्षा कमी	१	सर्वसाधारण	१.०० पेक्षा कमी
२	तीव्र आम्ल	४.६ ते ५.२	२	पिक उगवणीस हानीकारक	१.०१ ते २.००
३	मध्यम आम्ल	५.३ ते ६.०	३	क्षार संवेदनाक्षम पिक बाढीस नुकसान कारण	२.०१ ते ३.००
४	किंचीत आम्ल	६.१ ते ६.५	४	पिकास नुकसानकारक	३.०० च्या पुढे
५	उदासीन	६.६ ते ७.०		मुक्त चुना (टक्के)	
६	किंचीत अल्कली	७.१ ते ७.५	१	चुनखडीविरहित	०.५० पेक्षा कमी
७	मध्यम अल्कली	७.६ ते ८.३	२	अल्प चुनखडीयुक्त	०.५१ ते २.५०
८	तीव्र अल्कली	८.४ ते ९.०	३	मध्यम चुनखडीयुक्त	२.५१ ते ५.००
९	आत्यंतिक अल्कली	९.० पेक्षा जास्त	४	चुनखडीयुक्त	५.०१ ते १०.००
			५	अति चुनखडीयुक्त	१०.०० चे पुढे

(अ) खतासंबंधी सर्वसाधारण सूचना :-

- १०० किलो युरियात ४६ किलो नत्र असते, तेव्हा १ किलो नत्रासाठी अंदाजे २ किलो १७० ग्रॅम युरिया द्यावा.
- १०० किलो सिंगल सुपर फॉस्फेट (सिंसुफा) मध्ये १६ किलो स्फुरद ऑक्साईड असते किंवा स्फुरद ऑक्साईड देण्यासाठी अंदाजे ६ किलो २५० ग्रॅम सिंसुफा द्यावे.
- १०० किलो म्युरेट ऑफ पोटॅश (म्युऑपो) मध्ये ६० किलो पालाश ऑक्साईड असते किंवा १ किलो पालाश ऑक्साईड देण्यासाठी अंदाजे १ किलो ६७० ग्रॅम म्युऑपो वापरावे.
- पालाश ऑक्साईडची शिफारस नसल्यास पालाश ऑक्साईड असलेले खत देऊ नये.
- खते दोन वाढ्याच्या पाभरीने पेरुन द्यावीत म्हणजे ती पिकांच्या मुळांच्या खालच्या थरात उपलब्ध होवुन त्याचा उपयोग होईल. पिकांसाठी **निंबोळी** पेंडीची बारीक भुकटी १ किलो व युरीया ६ किलो याप्रमाणात द्या.

(ब) वाढलेला विम्ल निर्देशांक कमी करण्यासाठी ढोबळ सूचना :-

- जमिनीचा घोपणपणा वाढत / वाढलेला आहे. त्यासाठी उताराला समांतर चर काढून पाण्याचा निचरा चांगला होईल अशी काळजी घ्यावी.
- हेक्टरी ५ ते १० टन जिप्सम व १५ ते २५ गाड्या चांगले कुजलेले शेणखत जमिनीत मिसळून घालावे किंवा साखर कारखान्यातील मळी (प्रेस मड) १० ते १५ गाड्या घालाव्यात.
- हिरवळीच्या खतांसाठी ताग, धैंचा, शेवरी या सारखी पिके घेऊन फुलावर येताच जमिनीत गाडावीत.
- भात, कापूस, गहू, शुगरबीट, बरसीम व ऊस यासारखी पिके घ्यावीत.

(क) वाढलेला क्षार कमी करण्यासाठी ढोबळ सूचना :-

जमिनीतील क्षाराचे प्रमाण वाढत / वाढलेले आहे. त्यावर खालील उपाय करावेत.

- जमिनीतील पृष्ठभागावर आलेले क्षार खरवडून शेताबाहेर टाकून द्यावेत.
- जमिनीचे लहान लहान वाफे तयार करुन टाकावे म्हणजे पाण्याबरोबर क्षार बाहेर जातील, चर खणून पाण्याच्या निचऱ्याची चांगली सोय करावी.
- गांडखते (सेंद्रिय खते) भरपूर प्रमाणात वापरावीत
- हिरवळीच्या खतांसाठी धैंचा, शेवरी, ताग या सारखी पिके घेऊन फुलावर येताच जमिनीत गाडून टाकावीत.
- क्षारास दाद देणारी पिके-कांदा, भात, कापूस, गहू, सुर्यफुल, ऊस यासारखी पिके घ्यावीत.

(ड) कमी झालेला आम्ल निर्देशांक वाढविण्यासाठी :-

- जमिनीचा सामू व पोत लक्षात घेऊन हेक्टरी ०.५ ते २.५ टन चुन्याची पावडर अगर चुनकळीची पावडर वापरावी.
- सेंद्रिय खतांचा व हिरवळीच्या खतांचा वापर करावा.

(इ) मुक्त चुन्याचा दाह कमी करण्यासाठीचे उपाय :-

- ताग, धैंचा, शेवरी यासारखी हिरवळीची पिके जमिनीत गाडावीत.
- डाय अमोनियम फॉस्फेटचा वापर करावा.
- सुपर फॉस्फेट खत द्यावयाचे असल्यास वंगोस्त अथवा शेणखतात मिसळून ते चळी घेवून द्यावे.
- सहनशील पिकांची निवड करावी. उदा. बोरे, आवळा, अंजीर, सुर्यफुल, सोयाबीन, गहू, कापूस

टिप : मागील पानावर दिलेल्या अहवालाचा उपयोग कोर्ट कामासाठी करता येणार नाही.

घटकनिहाय सर्वसाधारण प्रमाण

अ.क्र. (१)	घटकांचे प्रमाणे प्रमाण (२)	सेंद्रिय कार्य (Organic Carbon) टक्के (३)	उप. नत्र, (N) कि / हे (४)	उप. स्फुरद, (P) कि / हे (५)	उप. पालाश, (K) कि / हे (६)	शिफारस केलेल्या मात्राच्या किती टक्के (%) कमी-जास्त मात्रा द्यावी (७)
१	अत्यंत कमी	०.२० पर्यंत	१४१ पेक्षा कमी	७ पेक्षा कमी	१०० पेक्षा कमी	५०% जास्त
२	कमी	०.२१ ते ०.४०	१४१ ते २८०	८ ते १४	१०१ ते १५०	२५% जास्त
३	मध्यम	०.४१ ते ०.६०	२८१ ते ४२०	१५ ते २१	१५१ ते २००	शिफारस केलेली मात्रा
४	साधारण भरपूर	०.६१ ते ०.८०	४२१ ते ५६०	२२ ते २८	२०१ ते २५०	१०% कमी
५	भरपूर	०.८१ ते १.००	५६१ ते ७००	२९ ते ३५	२५१ ते ३००	२५% कमी
६	अत्यंत भरपूर	१ पेक्षा जास्त	७०१ पेक्षा जास्त	३६ पेक्षा जास्त	३०१ पेक्षा जास्त	५०% कमी

सामु (पी एच्) **क्षारता (इ.सी.) डेसी सायमन / मी**

१	आत्यंतिक आम्ल	४.५ पेक्षा कमी	१	सर्वसाधारण	१.०० पेक्षा कमी
२	तीव्र आम्ल	४.६ ते ५.२	२	पिक उगवणीस हानीकारक	१.०१ ते २.००
३	मध्यम आम्ल	५.३ ते ६.०	३	क्षार संवेदनाक्षम पिक दाणीस नुकसान कारण	२.०१ ते ३.००
४	किंचीत आम्ल	६.१ ते ६.५	४	पिकास नुकसानकारक	३.०० च्या पुढे
५	उदासीन	६.६ ते ७.०		मुक्त चुना (टक्के)	
६	किंचीत अल्कली	७.१ ते ७.५	१	चुनखडीविरहित	०.५० पेक्षा कमी
७	मध्यम अल्कली	७.६ ते ८.३	२	अल्प चुनखडीयुक्त	०.५१ ते २.५०
८	तीव्र अल्कली	८.४ ते ९.०	३	मध्यम चुनखडीयुक्त	२.५१ ते ५.००
९	आत्यंतिक अल्कली	९.० पेक्षा जास्त	४	चुनखडीयुक्त	५.०१ ते १०.००
			५	अति चुनखडीयुक्त	१०.०० चे पुढे

(अ) खतासंबंधी सर्वसाधारण सूचना :-

- १०० किलो युरियात ४६ किलो नत्र असते, तेव्हा १ किलो नत्रासाठी अंदाजे २ किलो १७० ग्रॅम युरिया द्यावा.
- १०० किलो सिंगल सुपर फॉस्फेट (सिंसुफा) मध्ये १६ किलो स्फुरद ऑक्साईड असते किंवा स्फुरद ऑक्साईड देण्यासाठी अंदाजे ६ किलो २५० ग्रॅम सिंसुफा द्यावे.
- १०० किलो म्युरेट ऑफ पोटॅश (म्युऑपो) मध्ये ६० किलो पालाश ऑक्साईड असते किंवा १ किलो पालाश ऑक्साईड देण्यासाठी अंदाजे १ किलो ६७० ग्रॅम म्युऑपो वापरावे.
- पालाश ऑक्साईडची शिफारस नसल्यास पालाश ऑक्साईड असलेले खत देऊ नये.
- खते दोन चाड्याच्या पाभरीने पेरुन द्यावीत म्हणजे ती पिकांच्या मुळांच्या खालच्या थरात उपलब्ध होवुन त्याचा उपयोग होईल. पिकांसाठी निंबोळी पेंडीची बारीक भुकटी १ किलो व युरीया ६ किलो याप्रमाणात द्या.

(ब) वाढलेला विम्ल निर्देशांक कमी करण्यासाठी ढोबळ सूचना :-

- जमिनीचा चोपणपणा वाढत / वाढलेला आहे. त्यासाठी उताराप्रमाणे चर काढून पाण्याचा निचरा चांगला होईल अशी काळजी घ्यावी.
- हेक्टरी ५ ते १० टन जिप्सम व १५ ते २५ गाड्या चांगले कुजलेले शेणखत जमिनीत मिसळून घालावे किंवा साखर कारखान्यातील मळी (प्रेस मड) १० ते १५ गाड्या घालाव्यात.
- हिरवळीच्या खतांसाठी ताग, धैंचा, शेवरी या सारखी पिके घेऊन फुलावर येताच जमिनीत गाडावीत.
- भात, कापूस, गहू, शुगरबीट, बरसीम व ऊस यासारखी पिके घ्यावीत.

(क) वाढलेला क्षार कमी करण्यासाठी ढोबळ सूचना :-

जमिनीतील क्षाराचे प्रमाण वाढत / वाढलेले आहे. त्यावर खालील उपाय करावेत.

- जमिनीतील पृष्ठभागावर आलेले क्षार खरवडून शेताबाहेर टाकून द्यावेत.
- जमिनीचे लहान लहान वाफे तयार करुन टाकावे म्हणजे पाण्याबरोबर क्षार बाहेर जातील, चर खणून पाण्याच्या निचऱ्याची चांगली सोय करावी.
- गांडखते (सेंद्रिय खते) भरपूर प्रमाणात वापरावीत
- हिरवळीच्या खतांसाठी धैंचा, शेवरी, ताग या सारखी पिके घेऊन फुलावर येताच जमिनीत गाडून टाकावीत.
- क्षारास दाद देणारी पिके-कांदा, भात, कापूस, गहू, सुर्यफुल, ऊस यासारखी पिके घ्यावीत.

(ड) कमी झालेला आम्ल निर्देशांक वाढविण्यासाठी :-

- जमिनीचा सामू व पोत लक्षात घेऊन हेक्टरी ०.५ ते २.५ टन चुऱ्याची पावडर अगर चुनखडीची पावडर वापरावी.
- सेंद्रिय खतांचा व हिरवळीच्या खतांचा वापर करावा.

(इ) मुक्त चुन्याचा थर कमी करण्यासाठीचे उपाय :-

- ताग, धैंचा, शेवरी यासारखी हिरवळीची पिके जमिनीत गाडावीत.
- ॲग्रो अमोनियम फॉस्फेटचा वापर करावा.
- सुपर फॉस्फेट खत द्यावयाचे असल्यास कंपोस्ट अथवा शेणखतात मिसळून ते चळी घेवून द्यावे.
- सहनशील पिकांची निवड करावी. उदा. बोरे, आवळा, अंजीर, सुर्यफुल, सोयाबीन, गहू, कापूस

टिप : मागील पानावर दिलेल्या अहवालाचा उपयोग कोर्ट कामासाठी करता येणार नाही.

G.Pz.P.,Pune-P/98-(1100 Pads)-6-13

~~State~~ / Regional / ~~District~~ / Sub Divisional Public Health Laboratory Nagpur

E-mail-ID : sphlnagpur@yahoo.co.in Phone No. : 0712-2582163

REPORT ON CHEMICAL EXAMINATION OF WATER FOR DRINKING PURPOSES

Date of Collection :— Nil Date of Receipt :— 11.04.14 Date of Examination :— 25.04.14 & onwards.

(All the Analytical Results are in mg./Litre except pH, Turbidity)

Sr. No.	TEST PARAMETER	(1) Borewell Situated near Rescue Centre at Compart No. 773 at Forest	(2)	(3)	BIS Specification 10500 : 2012 Normal Values	
					Desirable Limits	Permissible Limits
1.	Physical Appearance	Clear Colourless			—	—
2.	Odour	Odourless			Agreeable	Agreeable
3.	Turbidity (as N.T.U.)	0.96			1.0	5.0
4.	pH Value	8.1			6.5 to 8.5	No relaxation
5.	Chlorides (as Cl)	71.63			250	1000
6.	Nitrates (as NO_3)	28.97			45	No relaxation
7.	Total Hardness (as $CaCO_3$)	380.9			200	600
8.	Alkalinity (as $CaCO_3$)	312.0			200	600
9.	Total Dissolved Solids	580.0			500	2000
10.	Iron (as Fe)	Nil			0.3	No relaxation
11.	Fluoride (as F)	1.46			1.0	1.5
12.	~~Other Tests (if any)~~ Calcium (as Ca)	105.0			75	200
13.	Magnesium (as Mg)	37.02			30	100
14.	Sulfate (as SO_4)	32.0			200	400
15.						
16.						
17.						
18.						
19.						
20.						

- This report is restricted only for the Sample/s is Submitted to this Laboratory.
- This Sample/s is / are not Collected by this Laboratory.

[P.T.O.]

REMARKS

A) Sample No. (s) _____ is/are potable / chemically fit for drinking purpose on the basis of analysed parameters only.

However, this / these water source/s can be used for drinking purpose only after proper treatment, disinfection and ascertaining it's bacteriological quality frequently or regularly.

B) Sample No. (s) (1) Contains Total Hardness, Alkalinity, Total Dissolved Solids, Fluoride, Calcium & Magnesium more than the desirable limit of 200.0 mg/l, 200.0 mg/l, 500.0 mg/l, 1.0 mg/l, 75.0 mg/l & 30.0 mg/l. respectively.

However, if there is no any other alternate source available nearby then this / these water Source/s can be used for drinking purpose only after proper treatment, disinfection and ascertaining it's bacteriological quality frequently or regularly.

C) Sample No. (s) _____ Contains _____

Hence, this / these water Source/s is / are chemically non-potable / unfit for drinking purpose on the basis of analysed parameters only.

HEALTH SERVICES

No.RPHL/III/1821/1752/14
Regional Public Health Laboratory.
NAGPUR - 440 029
Date
Dated 7.4.14

Forwarded With Compliments To :

Ashfaque Ahmed Consultancy Services,
Pvt. Ltd.,
289, New Colony, Sadar, Nagpur.

With reference to letter No. : - Dated :- 11.04.2014.

Fees Rs. : 600/-

Receipt No. and Date : 9869746 dt. 11.04.14.

Officer-In-charge
Regional Public Health Laboratory
NAGPUR - 440 029