Sustaining the Natural Heritage of Hyderabad

Geological Park proposal for preserving the Rockscape of Hyderabad

Submitted
In partial fulfilment of the requirements for
the award of the degree of

MASTER OF ARCHITECTURE
(LANDSCAPE)

By
Abhilash Kolluri
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SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL
NEELBAD ROAD, BHAURI, BHOPAL – 462030

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Department of Landscape
School of Planning and Architecture, Bhopal

Declaration

I **Abhilash Kolluri**, Scholar No. : **2017 MLA 001** hereby declare that the thesis entitled – "**Sustaining the Natural Heritage of Hyderabad : Geological Park proposal for preserving the Rockscape of Hyderabad"**, submitted by me in partial fulfilment for the award of Master of Architecture (Landscape), in School of Planning and Architecture, Bhopal, India, is a record of bonafide work carried out by me. The matter embodied in this thesis has not been submitted to any other University or Institute for the award of any degree or diploma.

07th April 2019 Abhilash Kolluri

Certificate

This is to certify that the declaration of Abhilash Kolluri is true to the best of my knowledge and that the student has worked under the guidance of the following panel.

RECOMMENDED

Ar. Richa Raje
Asst. Professor

ACCEPTED

Prof. Sanjeev Singh
Head of Department of Architecture (Landscape)

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ABSTRACT

This thesis aim in designing a geological park as an open space focusing on appreciation of the landscape and the natural process of geo sites. And also to interpret the story and celebrate Hyderabad's granite landscape.

Hyderabad capital city of Telangana State, lies in the Deccan Plateau and displays rocky landscapes with rocks, huge rocks and rocky hills. These are not ordinary rock formations, they are geologically based on Archaean Eon, which goes from 3,5 to 2,5 billion years ago. These rocks are the oldest rocks in India and are far older than the Himalayas, they belong to the Dharwar rock family. The craton of Dharwar is the oldest foundation of the south peninsular Indian earth's crust The granite form of Hyderabad is Inselbergs and gigantic blocks. It consists in millions of years of weathering of the igneous rock.

In the last 4 decades Hyderabad has developed rapidly and creates a major danger to the city's natural heritage and the irreversible change in the Deccan landscape. Therefore, there is a need to preserve/conserve the rocks and appreciate the landscape character of the Deccan.

Rocks are not the biotic components which we want to save instead of getting extinct. But these are the remnants of early history and planet earth formation. They help to learn and enrich how our earth evolved and transformed into inner and outer forces over time. They also tell us how they support millions of other forms of life and people, how certain forms of life have been lost, and how those who survive have kept the relay. They contribute to predicting the continuity and evolution of new forms of life when millions of other forms of life evolved and extinct.

This thesis aims at promoting Hyderabad's natural heritage and also the cultural association of the people with the Hyderabad rock sites. And to include them as public open spaces in city and promote their preservation as rock sites, as an integral part of development.

CONTENTS

LIST OF FIGURES

LIST OF MAPS

LIST OF TABLES

“Landscape is indeed like a revelation: like a revelation, landscape draws things together, connects them, allows them to appear; also hides things, removes them from view; the landscape is both singular crystal and the remotest things. The landscape is where we find, and also lose ourselves.”

Jeff Malpas from “The Place of Landscape”

1.0 Introduction

This introductory chapter intends to explain – what defines a place and gives it an affinity or a place identity, what is the need to preserve that identity of that particular place and the followed chapter Premise gives an overview of the thesis project with a solution to preserve and sustain the identity of place and in place making.

1.1 Landscape Identity of a Place

Landscape identity of a place is often defined as – '*the perceived uniqueness of a place*'. Natural and Cultural landscapes contribute to the identity of a place. Place Identity is often characterized based upon the Physical features of the environment and the influence of human activity in terms of socio-cultural factors on the environment.

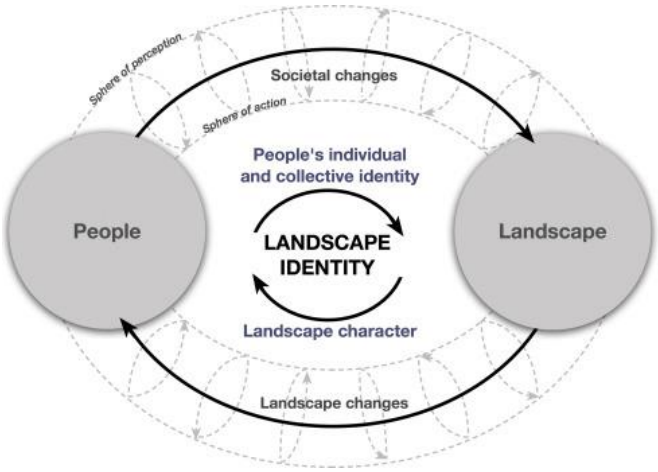


Figure 1-1 Landscape Identity of a Place

Landscapes are developed and changed through a series of interacting processes. These biotic and abiotic process of the environment shape the structure and character of the Landscape we live in and experience. The perception of these landscapes go beyond their visual appreciation of their beauty and into the understanding of how we experience them. (Bell, 2012)

1.1.1 Landscapes and Landforms

The Earth's surface is made up a various number of elements, composition, amazing shapes and gigantic to tiny formations. To study and understand these landforms, they are grouped and organized based on their characteristics. These different landforms are referred to as distinguished landscapes. Landforms are the physical shapes or features on the earth's surface which are formed by the natural processes. Examples of landforms include beaches, mountain range, flood plain, cliffs, valleys, sand dunes, etc.

The landscape is the part of Earth's surface consisting of a variety of geographical features and landscape elements that are characteristics of an area. Earth's landscapes are differentiated into two main categories – Natural and Cultural Landscapes.

1.1.2 Natural Landscapes

In particular parts of the world, natural landscapes are typical, mainly without anthropological activity. For example, Mountain Landscapes and desert landscapes, are generally not affected by human activity.

Natural Landscape is the collection of a group of elements and forms, like mountains, hills, plains, and plateaus. Other features of natural landscapes are lakes, streams, soil (sand or clay, as components), and natural vegetation. For example, a desert landscape usually indicates a few deciduous trees and sandy soil. For example, The Sahara Desert hilly sand dunes are quite different from the cactus-shaped scenery in the Mojavian Desert in the American South West. The desert sceneries may also vary.

1.1.3 Cultural Landscapes

Cultural landscapes are the result of human activity on the environment over a period of time. They provide a sense of place, outstanding value embraces the idea of belonging and identity to the place. Cultural landscapes are the expression of art, cultural narratives, traditional beliefs, they exhibit the indigenous local and regional identity of the place. Cultural landscapes can be cultivated terraces on

lofty mountains, grand estates, large gardens or sacred groves. The continuous existence of cultural and traditional values contribute to sustainable development and modern techniques that enhance nature and helps in maintaining the ecosystems of the place.

1.2 Conservation of Natural and Cultural Landscape for Place Identity

Landscape conservation of nature and culture is all about how we bring naturally associated action on the environment and how we shape the land we live in. Which is vital for the humankind of current and future generations to come.

1.2.1 Landscape change is constant

The changes on the Earth's surface is so dynamic, most of these changes are influenced by the Natural and Cultural Processes. Earth is constantly moving and undergoing changes every pace of time, such as flooding, weathering, earthquakes and human processes such as mining and construction activity, development of cities. These changes are at a slow rate or very fast and sudden. For example, a sudden change in the sea by volcanic eruption resulting in the formation of new islands in the sea. And the formation of mountains takes place by the slow rate movement of tectonic plates with an upward pressure over and over for millions of years.

1.2.2 Human interventions and Landscape degradation

There is no doubt that most of the constant change of force is by human interventions. Landscapes are undergoing constant changes by human activity for our living, development, shelter, food and other essentials for thousands of years. We clear the trees in the forests and threatens the wildlife of the forest for our convenience by shaping the land and for agricultural practices. Change the course of the rivers and build cities even breaking the mountains. We transformed the landscapes in such a way that only a few natural landscapes exist now. World population is increasing and the same as our demands for the resources.

Landscape degradation is the process in landscape transformation where the biophysical values of the natural and cultural landscapes are affected by the exploiting and overburdening the natural resources. Overexploiting of resources such as mining for building materials, clearing forests for agricultural practices, fuel, paper, and building materials, Soil erosion and fertility loss by over farming the land and poor agriculture practices. Soil erosion, desertification by loss off vegetation are the common forms of landscape degradation.

1.2.3 Landscape Values and Praxis of a place

A place is recognized based on the essential landscape components shaped by the human surroundings, and the expression of the diversity of cultural and natural heritage.

Landscapes and Landforms around the world are valued by different people for different reasons, they develop a deep connection with the place they live in, and the particular landscapes are associated with them for their well-being.

Landscape values are categorized as follows:

- *Cultural value*: They exhibit the indigenous values of past history through art, poetry, literature a traditional customs.
- *Spiritual value*: The spiritual value is an association with the landscape and the myths of the indigenous people. And the beliefs that are passed thru their ancestors for their succession.
- *Aesthetic Value :* Aesthetic value of the landscape is closely associated with the beauty and the uniqueness that it offers, it is the perception of an individual how he gets impressed with the landscape around him and people are drawn to such kind of landscapes, where they get sense of belonging and the freedom and develops connection with it over a period of time.
- *Economic value:* It is the additional value to the landscape, where it is the measurement of how landscapes are important for the financial growth of a place. For developing in tourism point of view.

These values of nature and culture cannot be neglected/separated from each other and go against the ethical order of Nature. They are inherited from the past generations and for the augmentation of a sustainable world.

1.3 Natural Heritage

- *Natural features* consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view.
- *Geological and physiographical formations* are precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation.
- *Natural sites* or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty.

(UNESCO, 1972)

1.3.1 Importance of Natural heritage and historic landscape sites

- The Natural heritage and historic landscape sites are an excellent resource in enriching the knowledge of how our earth evolved and changes over time to internal and external forces.
- They also tell us, how millions of other life forms and humans are supported by them, how certain life forms were lost and how the surviving ones have kept the relay. They help in predicting when millions of other life forms come to be, continuity and evolution of new forms of life.
- Conserving these natural heritage sites helps in maintaining the diversity of life on Earth and is very critical to global human welfare.

This urge for sustaining the natural and cultural value of a place and the importance of Natural Landscape that helped in building the historic development laid the way forward for this thesis.

The following sub-head Premise is the continuation of the previous understanding which strengthened the ideas and core aspects of the thesis project

1.4 Premise

Thesis Title: **Sustaining the Natural Heritage of Hyderabad**

Geological Park proposal for preserving the Rockscape of Hyderabad

1.4.1 Contextual Background

Hyderabad, the capital city of Telangana State lies in the Deccan plateau, exhibits rocky landscape with rocks, huge boulders, and rocky hillocks. These rock formations are not the ordinary one; they carry Archaean eon's geology, dating back to 3.5 to 2.5 billion years ago. These rocks are the oldest rocks in India, the age of these rocks is much older than the Himalayas and belonging to the family of rocks called Dharwar craton. Dharwar craton is the oldest bedrock of the earth's crust of southern peninsular India (Lal, 2016). Hyderabad's granitic Landform is of Inselbergs and huge boulders. They are formed by weathering of the igneous rock through million years.

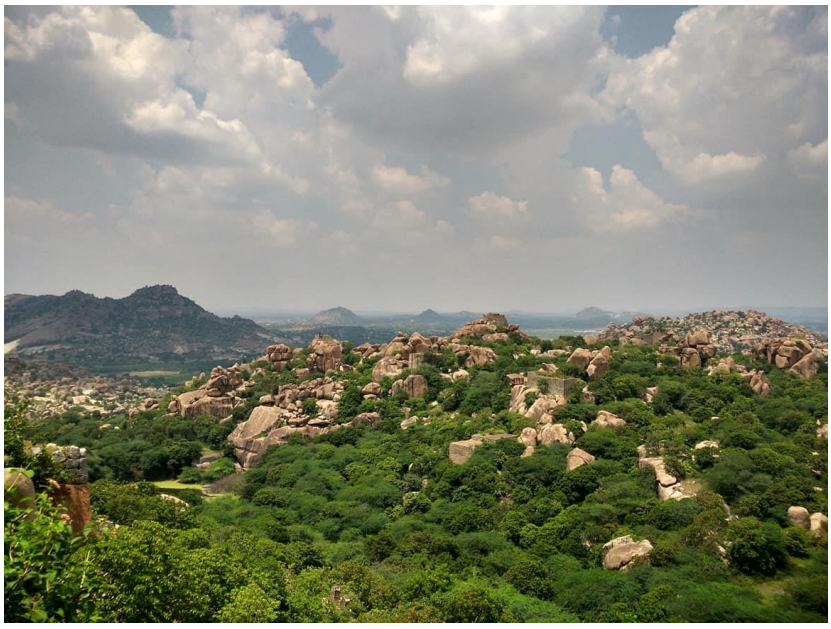


Figure 1-2 Rocky Landscape around Hyderabad

Image Source: Vijay Kumar

Hyderabad is the emerging global city with high urbanization, and high-density land-use in the past decade of years creating a risk to the Natural heritage of the city.

1.4.2 Thesis concern and need for the Study

Hyderabad with rapid urbanization during the past 4 decades is creating a major risk to the natural heritage of the city and irreversible change in the Deccan Landscape. Therefore, there is a need to preserve/conserve the rocks and appreciate the landscape character of the Deccan.

Figure 1-3 Rock formations amidst the core of the
the densely urbanized core of the city

Source: Society to save the rocks

Figure 1-4 Urbanisation overburdening the city's landscape

Source: Society to save the rocks

What is the purpose of preserving this landscape?

Rocks are not the biotic components which we want to save instead of getting extinct. But these are the remnants and reminders of the early history and the formation of the planet earth.

They help in studying and enriching the knowledge of how our earth evolved and changes over time to internal and external forces.

They also tell us, how millions of other life forms and humans are supported by them, how certain life forms were lost and how the surviving ones have kept the relay. They help in predicting when millions of other life forms come to be, continuity and evolution of new forms of life (D, 2015).

1.4.3 Project intent

This thesis project intents to promote the natural heritage or Natural Landscape of Hyderabad and the cultural association of the people with the rock sites of Hyderabad. And, to make them an integral part of the development and include them as the public open spaces in the city and promotes the preservation of the rock sites.

1.4.4 Aim of the project

This thesis project aims at designing the Geological Park as an open space which focuses on the landscape appreciation, experiencing the natural process involved in the geo-sites. And, also to interpret the story and celebrate the geology of granitic landforms of Hyderabad.

1.4.5 Objective

- ***Understand*** the natural processes involved in the rocky landscapes and their interrelationship between biotic and abiotic components.
- ***Analyse*** the natural layers to address the landscape issues of the site.
- ***Identify*** the landscape character of the site and appreciate them through design strategies.
- ***Develop*** a design framework and development plan for ensuring the protection of the natural rocky landscape of Hyderabad.
- ***Integrate*** the rocks as the open spaces in the densely urbanized city and provide a green buffer around the rocks for encouraging the flora and fauna habitat.

1.4.6 Scope of the project

Selected thesis subject falls under the domain of varied disciplines. Landscape Architecture and Urban and Regional planning which are completely complex and diverse because of their cross-disciplinary domains. Hence the scope is not widely described and is limited to address the landscape issues and developing a design framework and planning strategies.

Site documentation and observations made are limited to accessible areas. Site analysis is based upon the available research, data collected from the authentic sources, literature and the maps generated through the geographic information system (GIS) for the site. Assumptions are made based on the available data where the précised or accurate data is unavailable.

1.4.7 Thesis Methodology

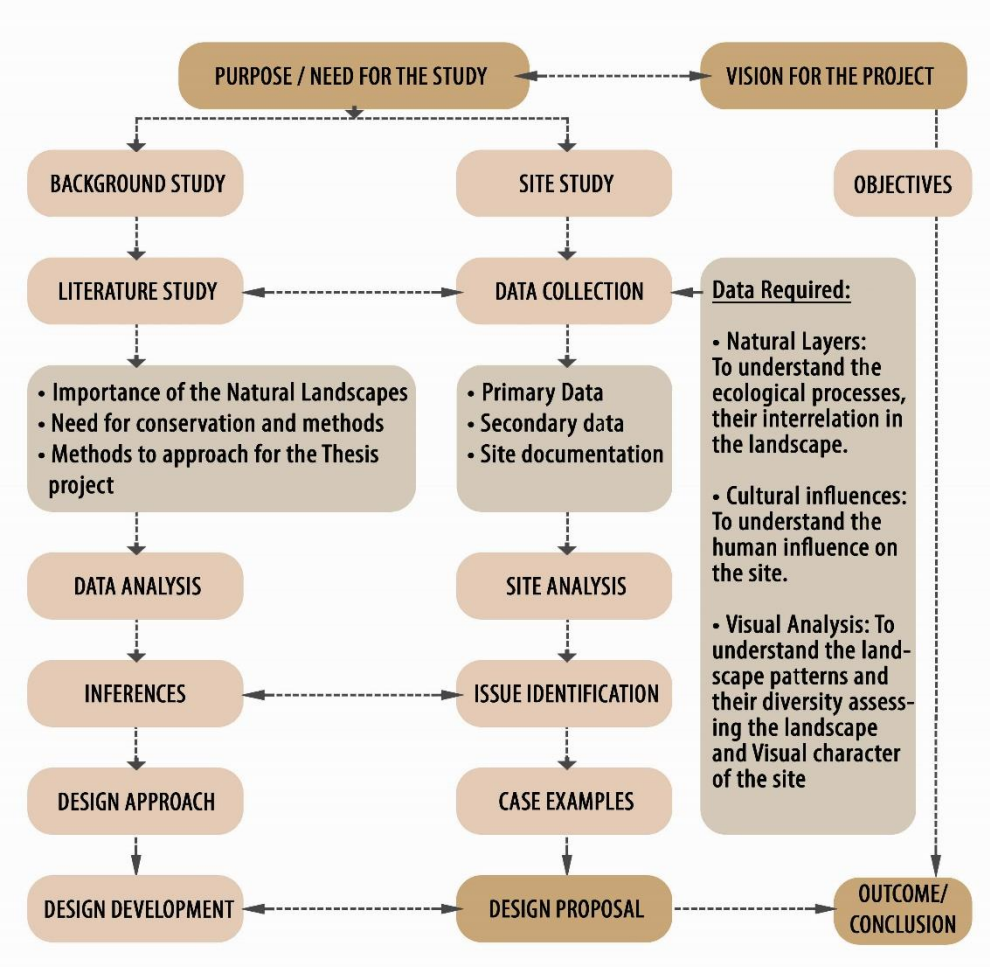


Figure 1-5 Proposed Methodology for the Thesis

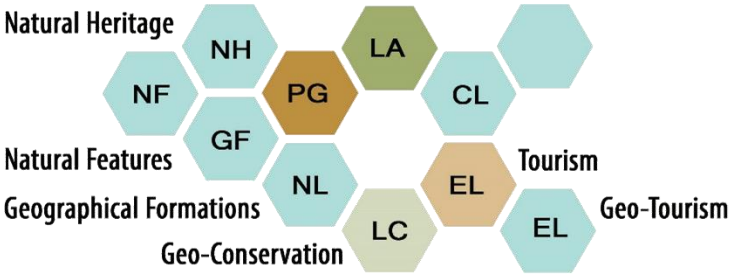
1.4.8 Thesis approach

Stage 1: Background/Literature study

Exploration of subjects of Landscape discipline:

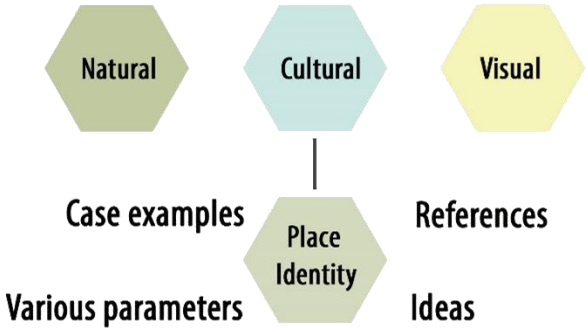
To study theories and their approaches towards Landscape from allied disciplines

Prioritization of Topics:



Selection of thesis topic for study based on their priority in the Landscape Architecture

Stage 2: Site Analysis/ Case study



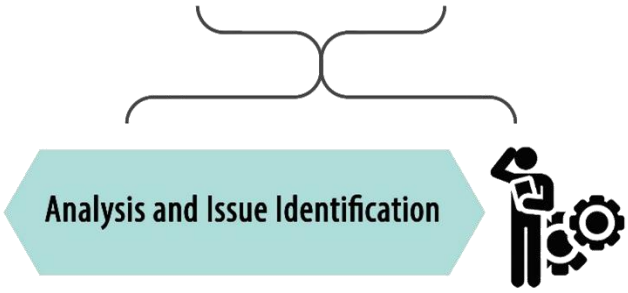
Synthesis:

Synthesis of theories, formulation off approach and the parameters for the study

Case Examples:

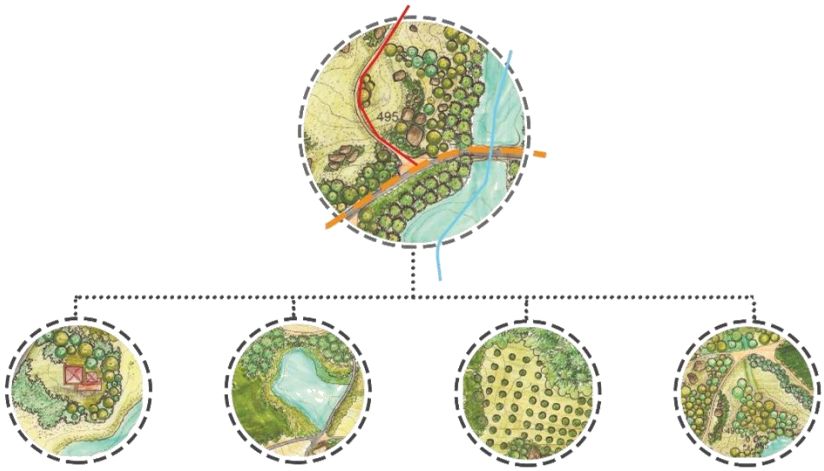
To formulate the interrelationship between Natural landscape and the place identity of Landscape

Site selection and Analysis:



Site selection based upon the parameters and outline of the site analysis and Issue identification

Stage 3: Design Proposal



Formulation of strategies:

Addressing the issues with the formulation of strategies for broader level and future development

Program development:

Development of the design program addressing the site concerns and providing opportunities for various activities and future development

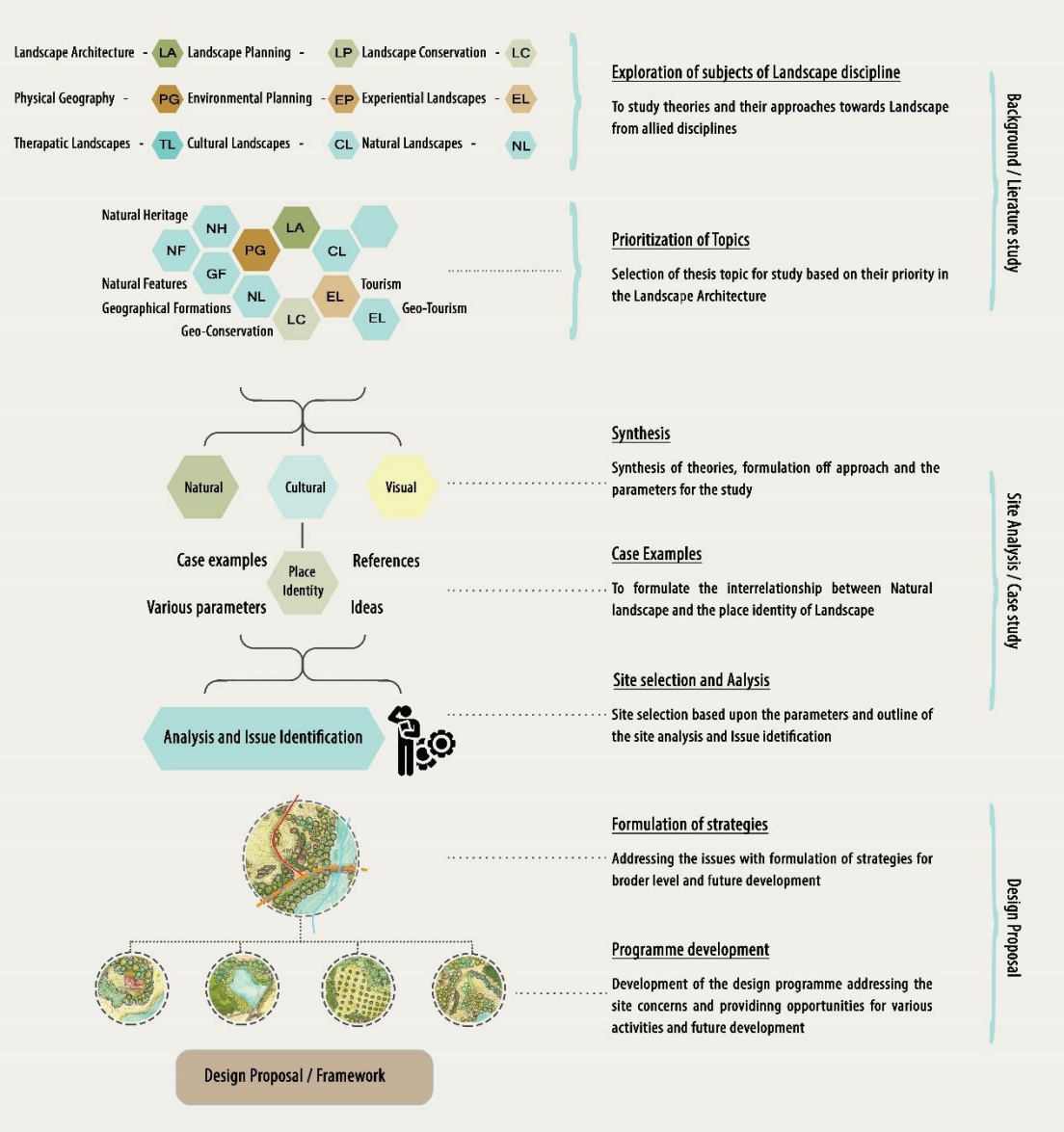


Figure 1-6 Proposed approach for the Thesis

1.4.9 Data required

Required data is categorized into three domains

Natural Layers: To understand the ecological processes, biotic and abiotic interrelationships in the landscape.

Cultural influences: To understand the human influence on the site.

Visual Analysis: To understand the landscape patterns and their diversity assessing the landscape and Visual character of the site

1.4.10 Data collection and Techniques

Required data is collected in three ways

- Data available from external sources such as:
  a) Various government offices, NGO's in Hyderabad,
  b) Society to Save Rocks, Hyderabad,
  c) From an interview with experts and the people participated in the rock walk,
  d) From various internet sources and blogs and email follow up,
- Data produced from:
  e) GIS-based maps, elevation model,
  f) Synthesizing data into maps, matrixes, and graphics,
  g) Information tabled and graphed
- Literature data collected from
  h) Various books,
  i) Research papers
  j) Journals and Newspaper clippings, and
  k) Case examples

1.4.11 Expected Outcome

The landscape development plan for the Geological park with the design programming, value addition to the site by design interventions and planning strategies for better livelihood of the people in the society. Branding the geological park as the potential geo-tourism and picnic spot and adventure activities for the enthusiasts and children.

2.0 The granitic landscape of Hyderabad

Hyderabad city with the glorious history, assimilation of various cultures, religions and everything that contrasts the rest of the world, the fastest growing global city in India with 12million people and the booming IT industry. It is the go-to the place of South India. Not many cities have the benefit of such grandeur and natural heritage. But with the population that is growing times in the past 4 decades is creating an irreversible change in the Deccan Granitic landscape of Hyderabad

2.1 Regional Setting

Location:

Hyderabad situated in the southern part of Telangana in southeastern India. It lies on the banks of the Musi River, in the northern part of the Deccan Plateau.

Greater Hyderabad covers 650 km2, making it one of the largest metropolitan areas in India. With an average altitude of 542 meters. Hyderabad lies on predominantly sloping terrain of grey and pink granite, dotted with small hills, the highest being Banjara Hills at 672 meters.

The city has numerous lakes referred to as sugar, meaning "sea". Examples include artificial lakes created by dams on the Musi, such as Hussain Sagar (built in 1562 near the city center), Osman Sagar and Himayat Sagar. As of 1996, the city had 140 lakes and 834 water tanks (ponds).

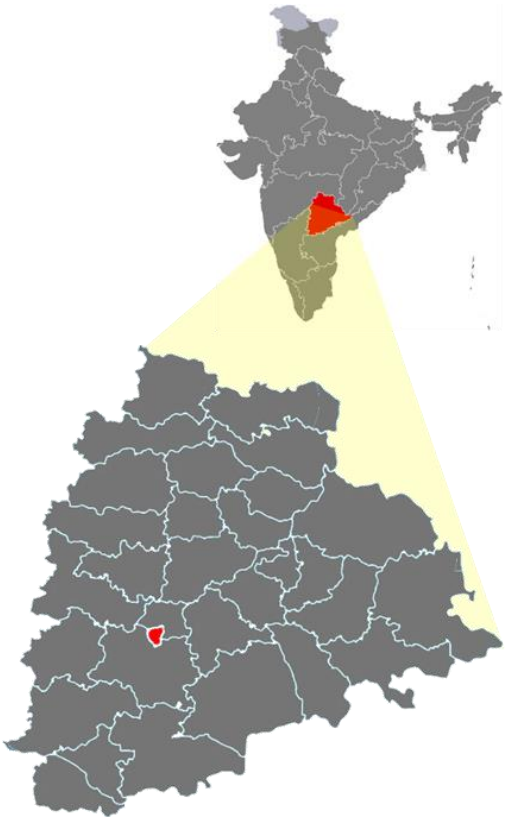
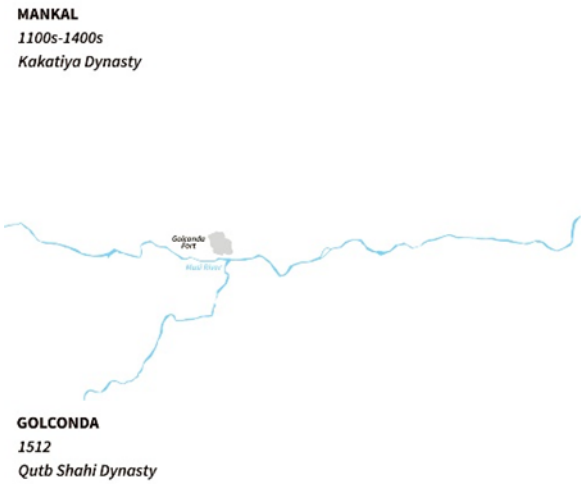


Figure 2-1 Location of Hyderabad city in the Telangana State of India

Connectivity

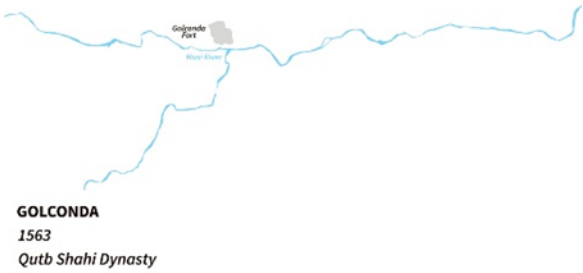
Hyderabad is 1,566 kilometers (973 mi) south of Delhi, 699 kilometers southeast of Mumbai, and 570 kilometers north of Bangalore by road.

2.2 Historical Timeline and Evolution of the City



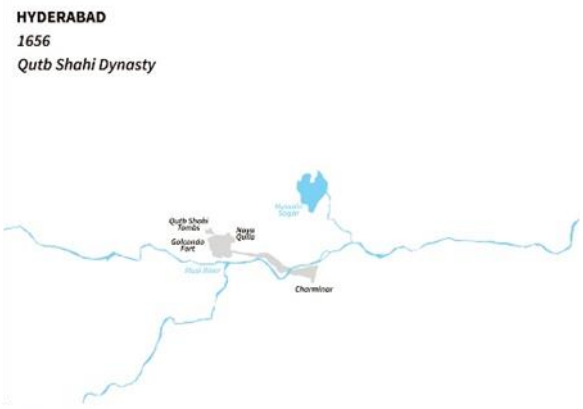
Hyderabad City originated on a granitic hilltop known as Mankal in the year 1143. It was the mud fort under the rulers of Kakatiya dynasty.

Later fortified with stone by the Bahmani Sultans in the 14th century.

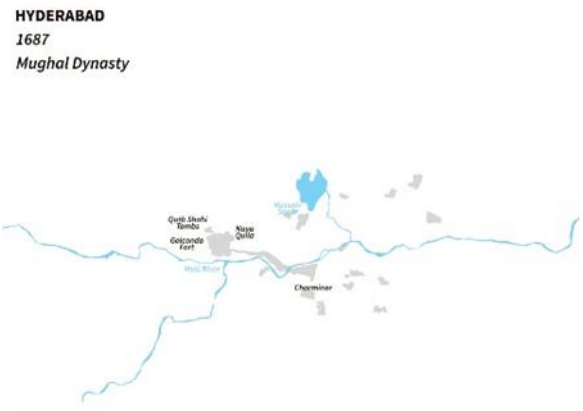


Tombs of various Qutub Shahi rulers were built in the Ibrahim Bagh close to Golconda fort. Hussain Sagar was built by Ibrahim Quli Qutub Shah in the year 1563 across the tributary of Musi River on the Northern Side. Golconda the capital state of Qutub Shahi rulers expanded its growth from West to south on the banks of river Musi.

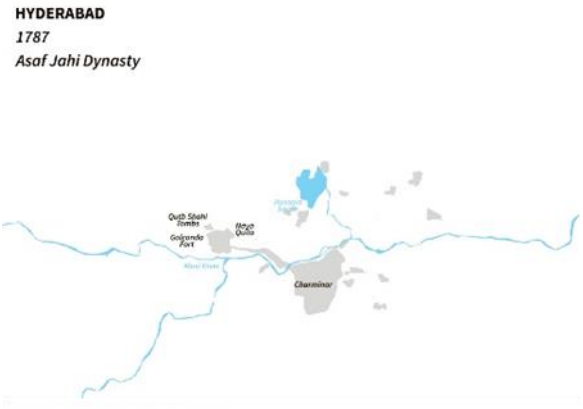
Hyderabad City was founded by Mohammad Quli Qutub Shah in 1591 A.D. on the southern bank of the Musi river. Hyderabad City became the capital state of the Qutub Shahi dynasty and Charminar was built by Mohammad Quli Qutub Shah to remark the newly formed State. City developed during the period of Qutub Shahi rulers.



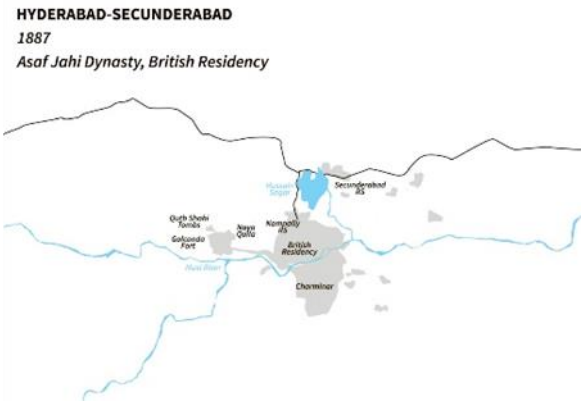
Naya Qila, an extension to Golconda fort was constructed as a new fort by Sultan Abdullah Qutub Shah in the year 1656 to avoid future attacks from the Mughal armies.



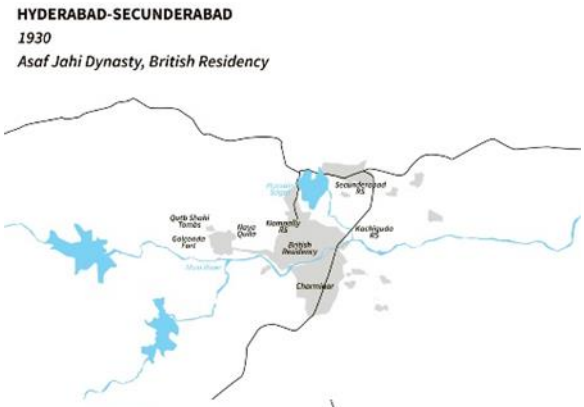
The splendid growth and prosperity of the city were halted by the Mughal invasion. In 1687, Aurangzeb conquered Golconda and shifted the capital to Aurangabad. Later refortified the Golconda fort with armed superior cannons and repaired back the city after the invasion.



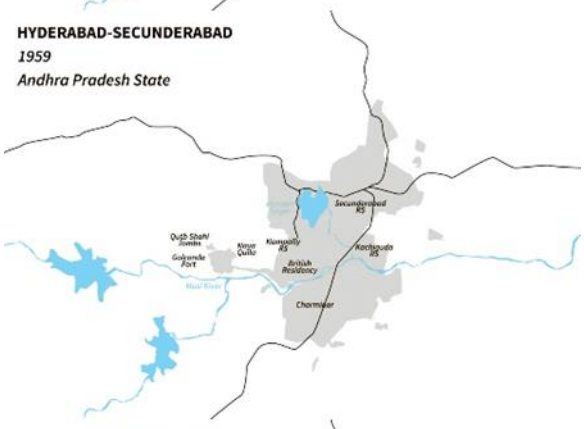
Asaf Jahi dynasty was founded by Mir Qamar Uddin Siddiqi, a viceroy of Deccan under the Mughal rulers. After the downfall of the Mughal empire, he declared himself independent and established Hyderabad State.



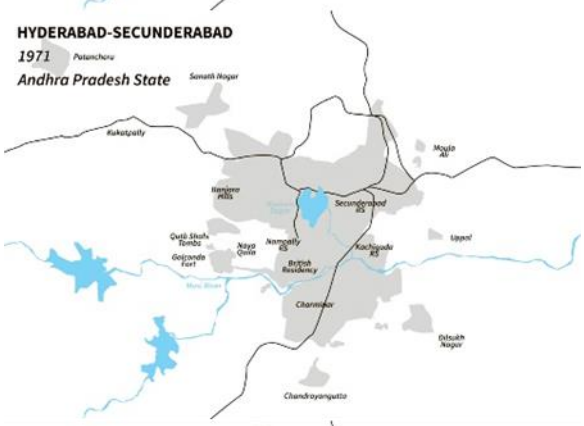
British residency was built between 1798-1805, British cantonment is established in 1806 in Secunderabad and Railway line is introduced in 1870-74 during Asaf Jahi rule. Nizam college is established in 1887.



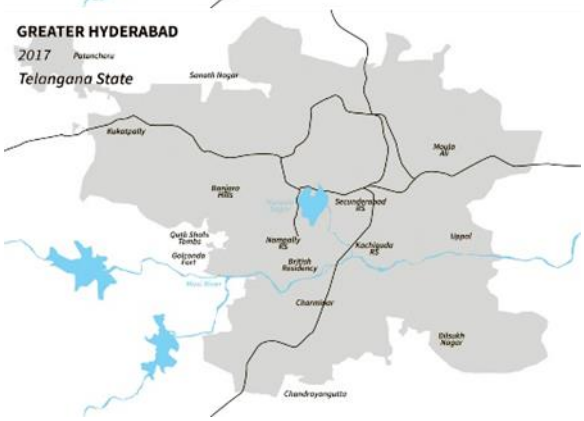
Osman Sagar and Himayat Sagar reservoirs are constructed on the tributary of Musi river to provide a drinking water source for the growing population of the city in 1920-27 damming the Musi river and to protect the city after the Musi River flooding in 1908.



After the formation of Andhra Pradesh state in 1956, the city developed as the metropolitan region with the massive establishment of large industries, the formation of Hyderabad development authorities, Municipal corporation for infrastructure facilities and housing colonies.



After industrial development, the city experienced its growth towards the northern half of the city, industrial units came up in Kukatpally, Sanath Nagar, Patancheru, Moula-Ali, Dilshukh Nagar and Uppal. And city's growth expanded on to the Jubilee Hills and Banjara Hills clearing the rocky landscape and vegetated rocky hills



After the formation of Greater Hyderabad, City started its metropolitan development in all the directions fading the natural rocky sites of Hyderabad. Finding the place to live which supersede any other need of the city. More n more open spaces of the city are cleared for housing needs.

2.3 Hyderabad – The city of Rocks

The city of Hyderabad originates at "Golla Konda" or Shepherd's Hill on a rocky granite hill of 400 foot tall. The historical records of former travelers are extensive, recording their meetings with the granites of Hyderabad and the impression left by this unique landscape.

Since the city originated in the 14th century, Hyderabadis developed a cultural association with the granitic landscape. The Fort Golconda is an example of the cultural association between humans and their natural environment.

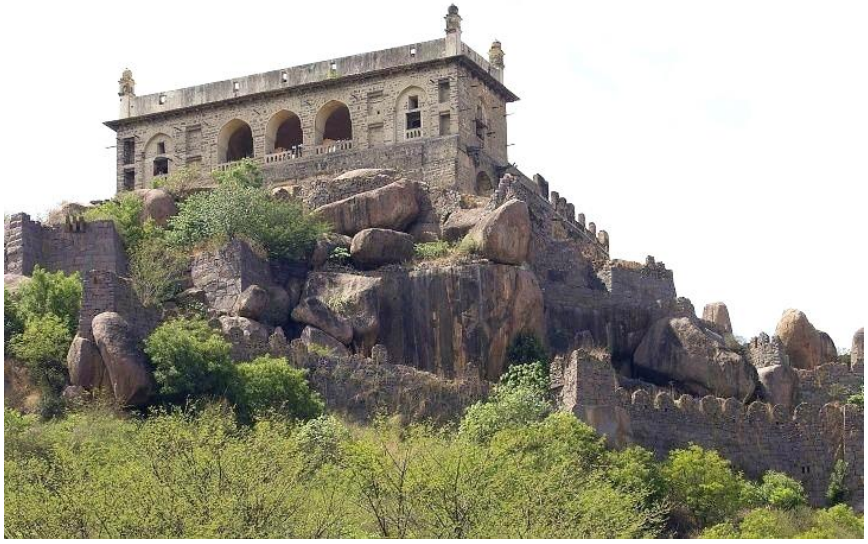


Figure 2-2 Golconda fort on the granitic hilltop

Source: https://www.indiatimes.com/

Figure 2-3 Religious structure, Dargah on the Moula Ali Hill top

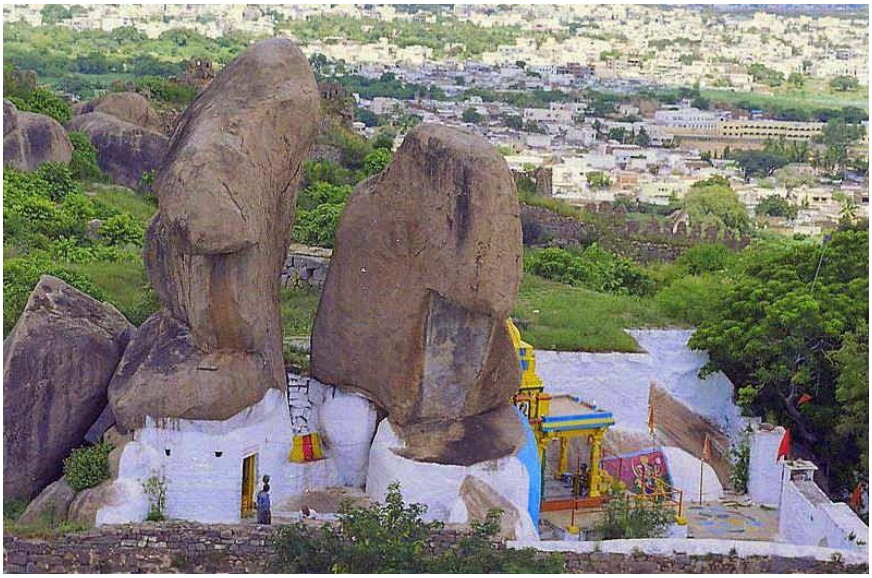


Figure 2-4 Mahankali temple on the hilltop of Golconda fort

Figure 2-5 Integration of religious structure, Birla mandir with the natural rocky hill

From ancient times, these rocks are protected under religious status and cultural significance.

The Imperial Gazetteer of India, 1909 depicts that – “There were fantastic rock formations around the city stretching in all around, with fabulous shapes of rock in boulder form, tors, inselbergs. In a picturesque composition of basalt and granite piled composition questioning the viewers about their stability.

Figure 2-7 Views of Qutub Shahi tombs precinct from the Golconda fort in 1971. No habitation exists on the distant hilly outcrops.

Source: Department of Archaeology & Museum, Govt. of Telangana

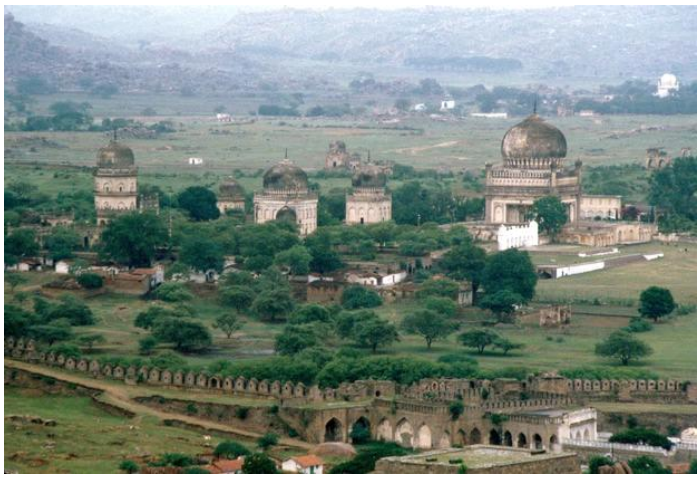


Figure 2-8 Qutub Shahi tombs amidst the Rocky landscape of Hyderabad View from the Golconda Fort. No habitation exists on the distant hilly outcrops.

Source: MIT Archives

Figure 2-6 Qutub Shahi tombs amidst the densely urbanized City (Banjara Hills and Jubilee Hills in the backdrop)

Source: Ram Rahman, AKTC

Not so long ago, Banjara Hills was an inhabited place where no one used to visit the place except for hunting and picnic at certain places. Banjara Hills and Jubilee Hill were densely vegetated areas with wild Flora and Fauna.

Nawab Mehdi Nawaz Jung is responsible for the Banjara Hills colonization. He bought about 500 acres of land in the 1920s. He built himself a house with minimal disturbance to the existing rock-scape in 1930 in a jumble of rocks. Earlier There were more rocks in Banjara Hills than houses. Perhaps there were 20 odd houses, none of which had compound walls. This Banjara Bhavan is a notable example for integrating natural and built environment and which was been destroyed later to make a way for new development. There were several examples for residences and the institutional building where the rocks are incorporated into the built form.

Figure 2-9 An old photograph of Banjara Bhavan

Source: House of Rocks - The Hindu

Figure 2-10 Recent photograph of Banjara Bhavan destroyed to make way for new development

Source: Another heritage landmark razed - The Hindu

2.4 Hyderabad – Threat to the Rocky Landscape

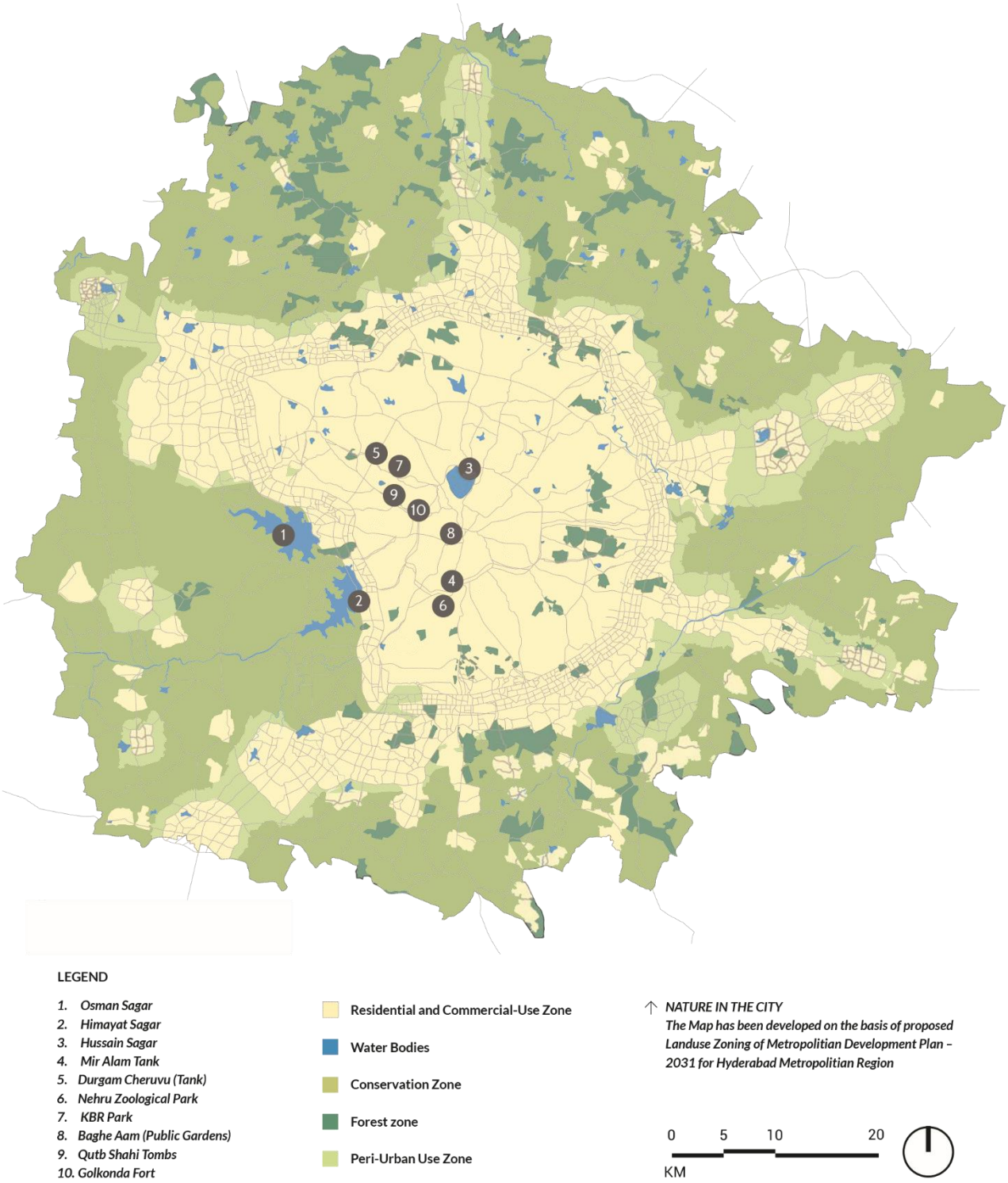
The rocky landscape of Hyderabad is integrated with both the constructed environment and disintegrated into space growth. Which is seeking conscientious rock protection for their survival identity.

Due to the rapid urbanization, the city is losing its natural heritage day by day. And the peri-urban areas which did not witness the urbanization started to develop as a resultant of the newly adopted industrial policies by the State Government.

The government was active in placing City on the global stage as a leading industrial player, ITIR (Information Technology Investment Region) ITIR covers industries such as outsourcing of business processes. Thus, the government invited investments, buildings and infrastructural development in Hyderabad's suburban areas through land rebates and other incentives. Now peri-urban areas are said to be largely affected by the loss of the Hyderabad genius loci. Because until then these large areas of rocky wilderness were largely untouched. Rocky areas in the urban center of town have undergone extensive changes and remain largely in small isolated clusters or single rock formations.

Stone quarry and the mining industry are the other major threat along with urbanization.

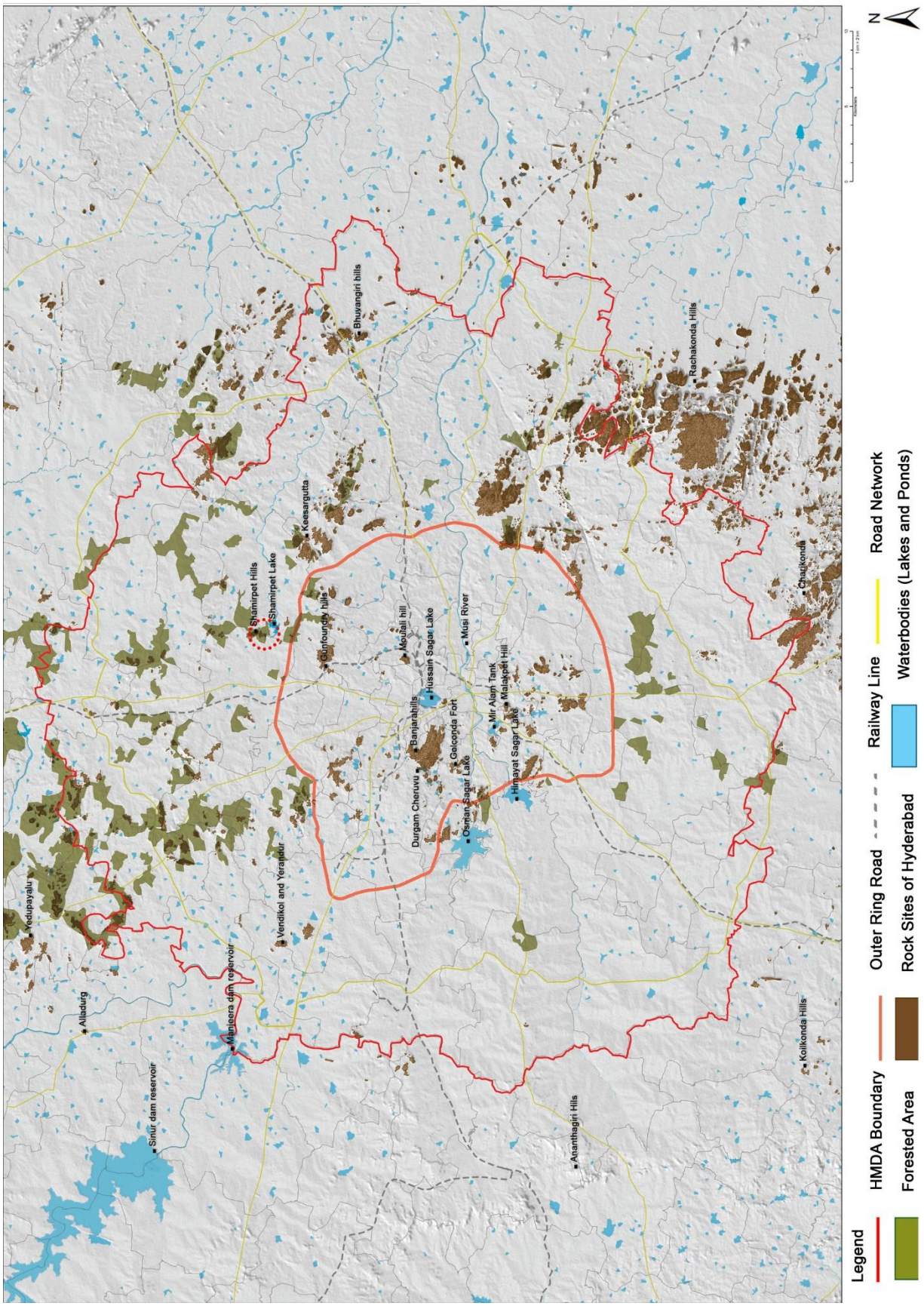
According to the Government Report, there are 1135 quarry industries in the city The major factor cited is due to urbanization and need for the building material.
Adverts impacts of urbanization are not only dangerous for and unbalanced eco-system services but are also disruptive to the natural drainage and hydro-geographical surface. Which result in the depletion of the lakes, because of the interference in the natural stream network.



Map 2-1 Land use Plan of the Hyderabad City

Source: Landscape Journal, 52 Issue

Map 2-2 shows the various rock formations of the City



Map 2-2 Various rock formations in and around the city

One of the reports from the CRE recommends that the rocky landscape of Hyderabad can be protected by fencing and zoning of rare rock structures. This helps to use the Geopark Model as a possible mechanism to protect rock, including zoning, education, cultural integration and thus cumulative protection. In addition, state authorities have considered establishing rock areas that support recreation, adventure, and tourism in order to strengthen the protection of the granite landscape of Hyderabad.

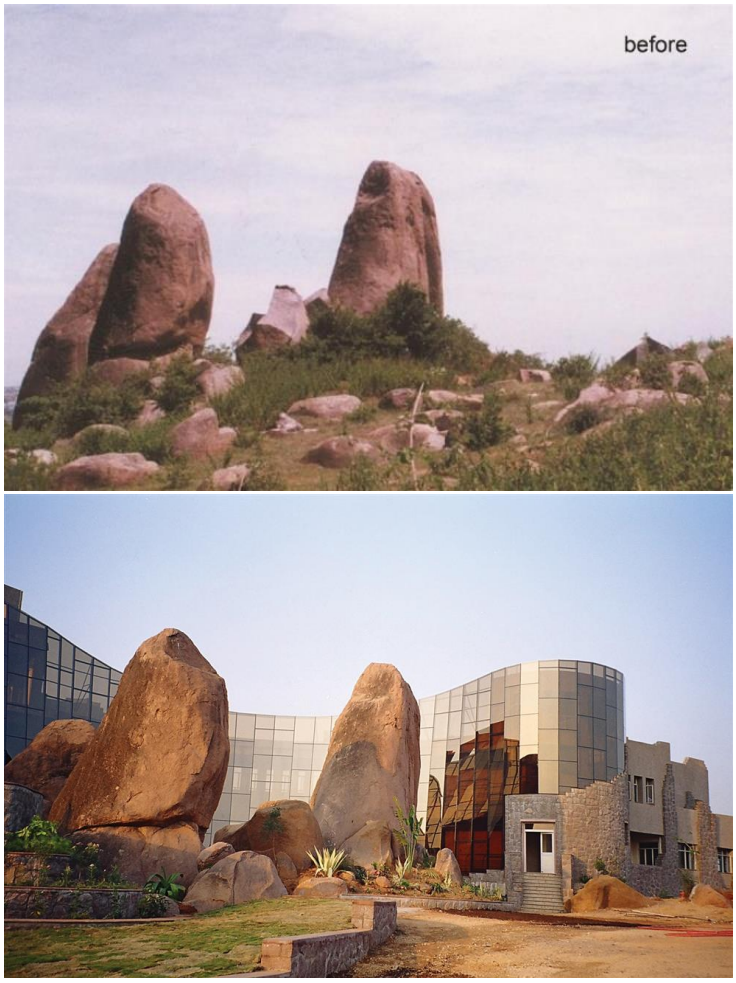


Figure 2-11 Integration of Built and Natural heritage

Source: Laboratory for conservation of Endangered species, Hyderabad
by Shirish Beri & Associates

Conclusion

Hence there is a need to look into ways in which protection of the landscape can be taken care of with adaptive reuse can be integrated otherwise it is difficult to protect the heritage precincts under adaptive reuse.

3.0 Site Selection

The objective of this project is to help is to protect the granite landscape of Hyderabad. The larger parts of the Deccan Plateau include granite rocks. The unique rocky landscape is not confined to a certain part of the city and is composed in various locations of Hyderabad and its suburbs. Therefore the selection of the site from a city's granitic landscape and beyond was a difficult task.

The site selection was based on the Society to save rocks proposed Rock Sites, for inclusion in Hyderabad's Metropolitan Development Plan 2031 as "Rock heritage precincts," according to State law.

The majority of rocks in the city center are small, owned by private property or left after construction–not huge areas of the rocky landscape that historically characterize that area. The reason for the selection of a Geopark site from the areas covered by the proposed urban expansion belt is because the regions were, up until now, peri-urban areas on the outskirts of existing city limits. They have not yet undergone major changes due to urbanization and construction activities. These outlying urban areas are some of the few which are intact, they're large areas of rocky wilderness in these regional places.

Therefore the rock site was chosen from the growth area of Hyderabad in 2031 to support the protection of the city's Genius Loci, although the city is about to expand and develop the areas in the future. The region's characteristic geology can be showcased and interpreted by a large uninterrupted rock site.

Criteria for the selection of the site is based upon:

1. Prioritizing rock sites identified in the Hyderabad Metropolitan Development Plan 2031 for inclusion as "Heritage Precincts."

2. Sites that were identified and analyzed for immediate threat by Frauke Quader, Secretary of Society to Save Rocks

3. Based on Hyderabad's urban trends and urban growth corridors.

4. Well connected with access roads.

The urgency of Threat (in years)				
Sl.No.	**A.RANGAREDDY DISTRICT**	5 years	6-10 years	11-20 years
1	Venkateshwaragutta	Quite safe since religious and in Reserve Forest, which is protected; but must be watched	Must be watched	-do-
2	Musi River Valley (Gandipet)	Very near ORR Growth Corridor; a big area with some quarrying going on and a colony coming up	Will probably shrink from size proposed	Might not have much of rocks left
3	Masjidpur (Peerlagutta)	If not declared Heritage SOON, will be in great danger since already laid out for colonies	Depends on active efforts for protection and govt. decisions	Difficult to say
4	Ramaswamy Gutta	might be possible to exempt this hill from cutting	not declare it soon	
5	SidullaGutta(White Cliffs)	Mainly in private land, if sold will be in danger	Heritage status might protect the stretch	-do-
6	Pocharagutta	In ORR Growth Belt-in great danger; since in private land and next to the temple, if not money tempts too much, it might survive	Will survive if listed soon	-do-
7	Rocks in Jawahar Deer Park,Shamirpet	No danger since in deer park	-do-	-do-
8	Shamirpet Lake	Under urgency of Threat	-do-	-do-
	B.MEDAK DISTRICT			
9	Saudamma Temple Hill (yeradnur)	Threat not great since religious, but big areas around being quarried	Quarrying will probably come nearer the hill	Will probably survive but the as lonely hill
10	Gudemgutta (Sikandlapur)	This is a huge area, mainly in Reserved Forest, no danger at the moment	May become interesting for development in the future; Forest dept. known to have given exemptions from the rule of no development	Depending on the will of the govt.
11	Kondapur (Muppireddipalli)	Small hill, next to hand quarried hills in danger	-do-	-do-
12	Rocky Hill (Minajipet Reserved Forest)	Long Hill range - no immediate danger	development of the area in the future might endanger the hills, but all in Reserve Forest	-do-
13	Gurumuralagutta	Threat not likely since quite remote	Could happen with further development of Greater Hyderabad	-do-
14	Ganapur	Small stone cutting was observed, but no major threat to temple hill. All hills around are being quarried	Quarrying around has to be monitored	-do-
15	Jilugutta	In immediate danger, quarrying going on part of the hill	Might not be possible to protect	-do-
16	Padmanabha Swamy Temple Rock	Safe very remote and fully in temple land	No threat	No threat?
17	Nacharam	Very likely if not notified soon, since the near main road	-do-	-do-
	C.NALGONDA DISTRICT			
18	Karkhamagutta	in Reserve Forest which is protected; has to be watched	-do-	-do-
19	Pedimmagutta	As in 2018		
20	Mulikondagutta	As in 2018		
21	Ooragutta (Kondamadugu)	Seems relatively safe	Development may take place and affect the hill	-do-
22	Bhongir Fort	The area is under Archaeology Dept. Tourism Dept. is developing it as a tourist spot which might pose some threat to the rock		
23	Naragutta	Remote, but near Bhongir development zones, must be watched	Said to be privately owned might be sold for development	-do-
24	Kottagutta	No threat, very remote; villagers claim to own the hill-are very protective, but money might change their minds		-do-
25	Rangapuramgutta	These are extensive hills, and much quarrying is taking place all around them. Real Danger there Right from now onwards		
26	RanganayakaSwamy Temple	Small hill with the temple. Quarrying in close by rocks -so this could also be eaten into. Immediate danger there		

Table 3-1 Threat matrix by Frauke Quader

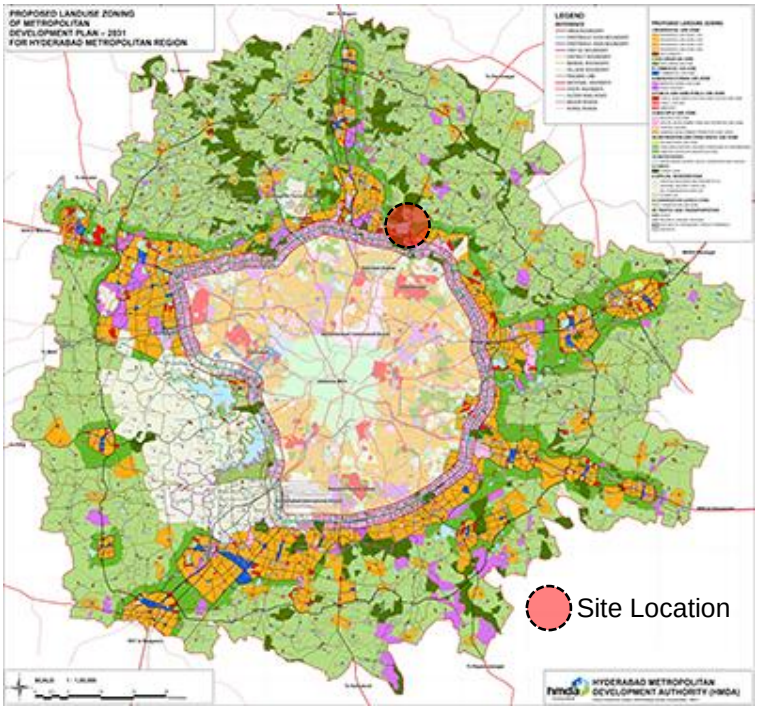
A threat analysis matrix was analyzed for the 26 identified rock sites by the Society to Save Rocks. In order to identify urgent threats to rock sites in the next 5 years, 6 to 10 years and 11 to 20 years, this threat analysis was intended. Here, threats imply the impending urbanization and buildings of rocks because of their positioning in anticipated urban development corridors. Frauke Quader assessed these rock sites for threat urgency.

Identified Site: Shameerpet Rocks

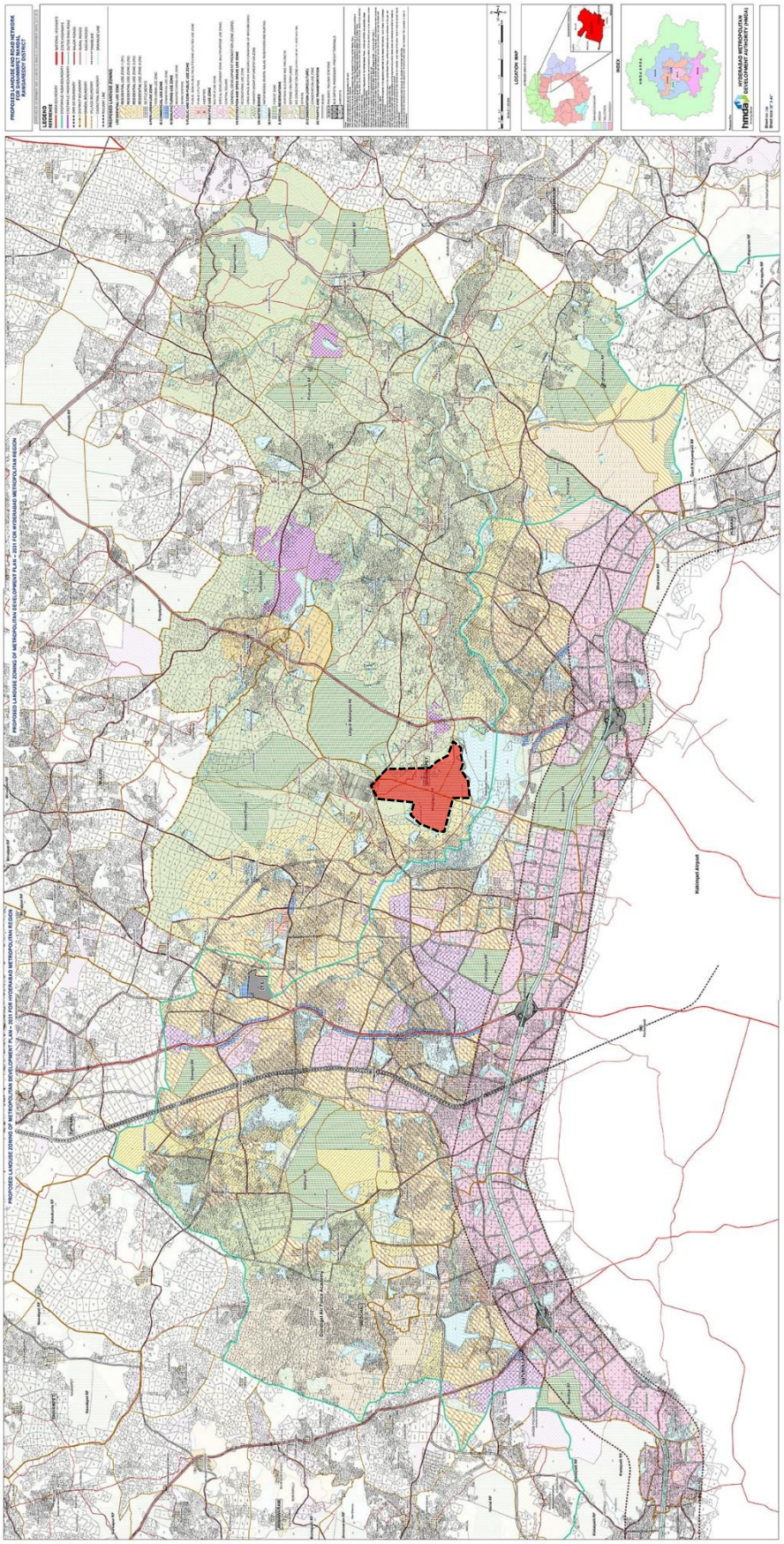
The identified site recommended by the Society to Save Rocks is one of the heritage rock precinct sites which is around 30km away from Hyderabad. This site is connected with lake, deer park and stream corridor which provides habitat for various flora and fauna. Site is located just 1.5km away from the Nehru outer ring road of Hyderabad. And is identified to be under major threat being the immediate peri-urban area.

3.1 Site Location

The selected site is located in the revenue divisions of Medchal and Shameerpet Mandal's of Telangana State, India. It is 30 km from the center of Hyderabad and falls into the Greater Hyderabad's growth area of 2031.



Map 3-1 Hyderabad Land use Map Source: HMDA



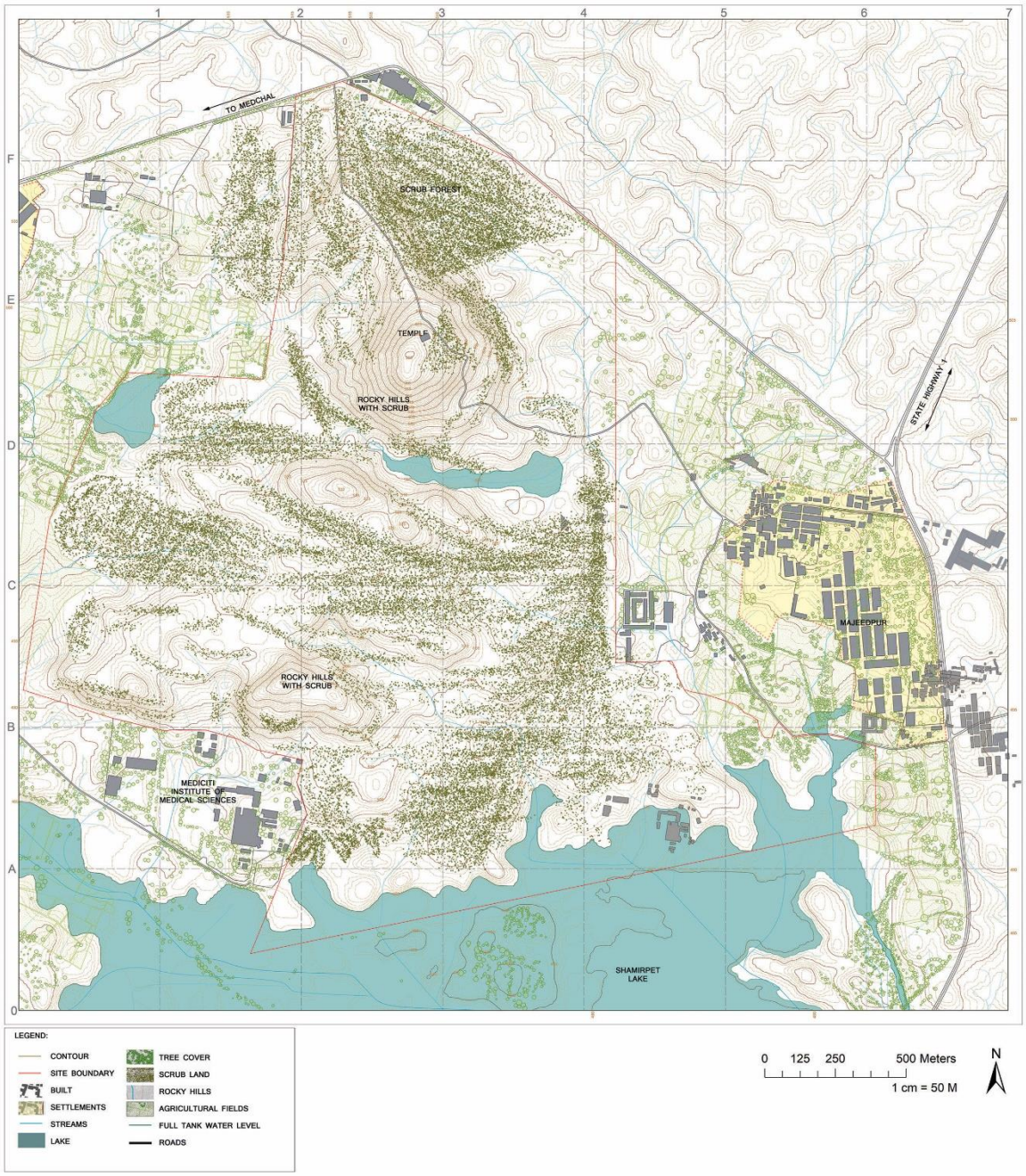
Map 3-2 Proposed Zonal plan for Medchal and Shameerpet Mandals Source: HMDA

Map 3-3 Base Map of the Study area showing the abutting land use.

3.2 Study area delineation

Extents of Natural resources and impacts of the human imprint often go beyond political or administrative boundaries. Hence, physiographic factors may become the premise governing the extents for the site delineation.

The study region is identified based upon the extent of Rock outcrop and the abutting land use. The entire site of the study area consisted of undulating terrain with bouldered landforms. And covered with xerophytic vegetation on the hilltops and deciduous forest species in the study area. A large water resource, Shameerpet is located on the abutting southern side of the study area.



Map 3-4 Base Plan of the Study Area

And is, connected with an accessible road network. State high way is connected to the site providing roadway as the major means of access to the site. The dependency of humans is not observed much on the site leaving them without much intervention except the activity of mining at some parts of the study area.

Succeeding chapters describes about the Natural and cultural layers of the site.

4.0 Site Analysis

Site Analysis is carried based upon the Primary data collected from the site by various site visits. Overlaid Analysis of Natural layers is done to identify the potential areas for Vegetation establishment and Water rechargeable areas.

Site is documented for the potential areas for development and analyzed for program development of the Geopark design.

4.1 Meteorological data :

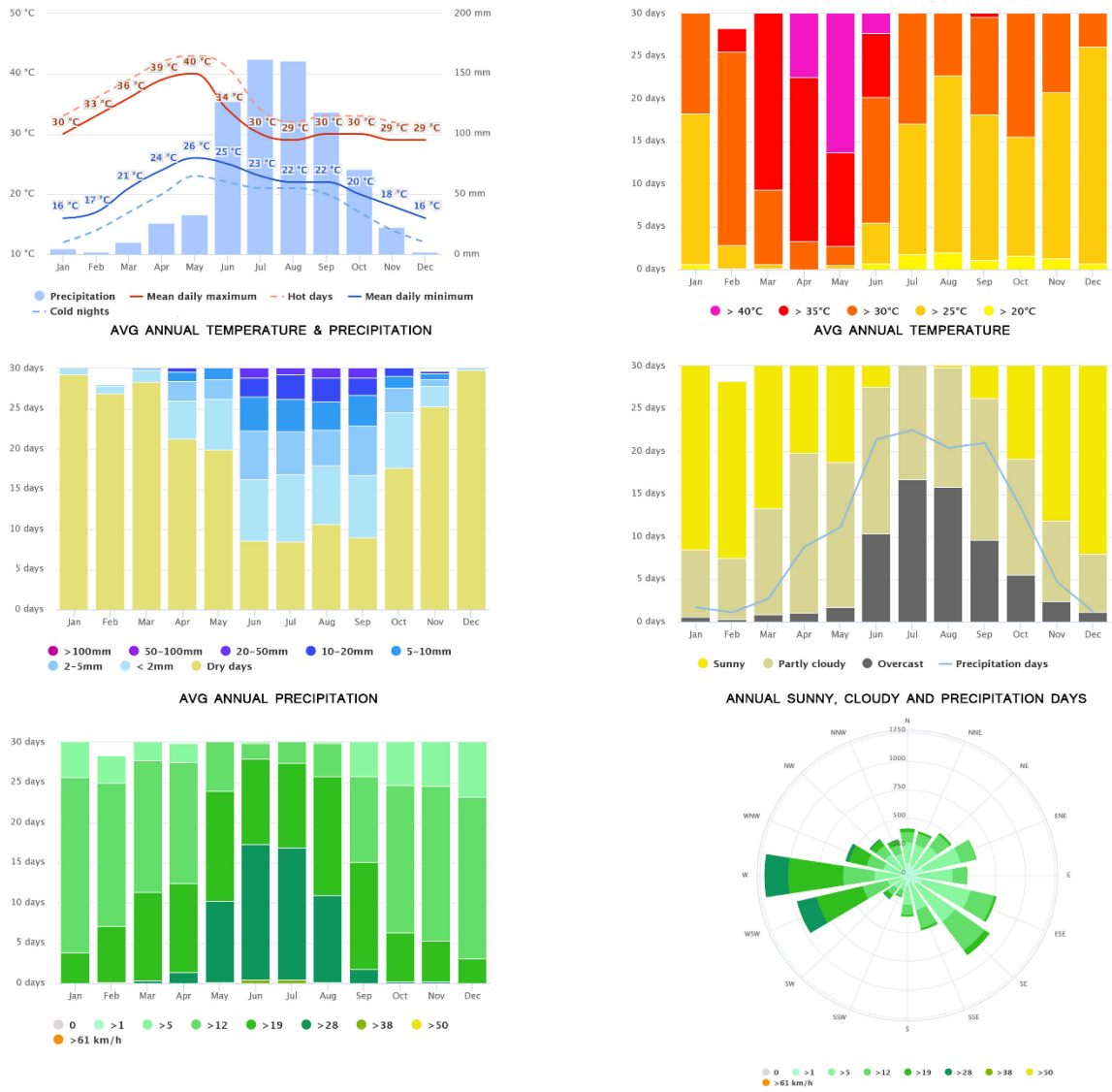


Figure 4-1 Meteorological data Source: Various Internet source

4.1.1 Climate:

The tropical climate of Hyderabad is classified as' AW' in Köppen-Geiger' Hyderabad combines unique tropical savanna (aw), with a hot, semi-arid climate (aw-köppen climate, bsh). Hyderabad's climate has a unique combination. The average monthly temperature of tropical savannas is over 18 ° C (64 ° F) each month of the year and typically a pronounced dry year with less than 60 mm (2.36 in) precipitation during the driest month. Essentially, the tropical climate of a savanna is either less plumbing than the tropical climate of the monsoon or is more pronounced than the tropical climate with monsoon seasons.

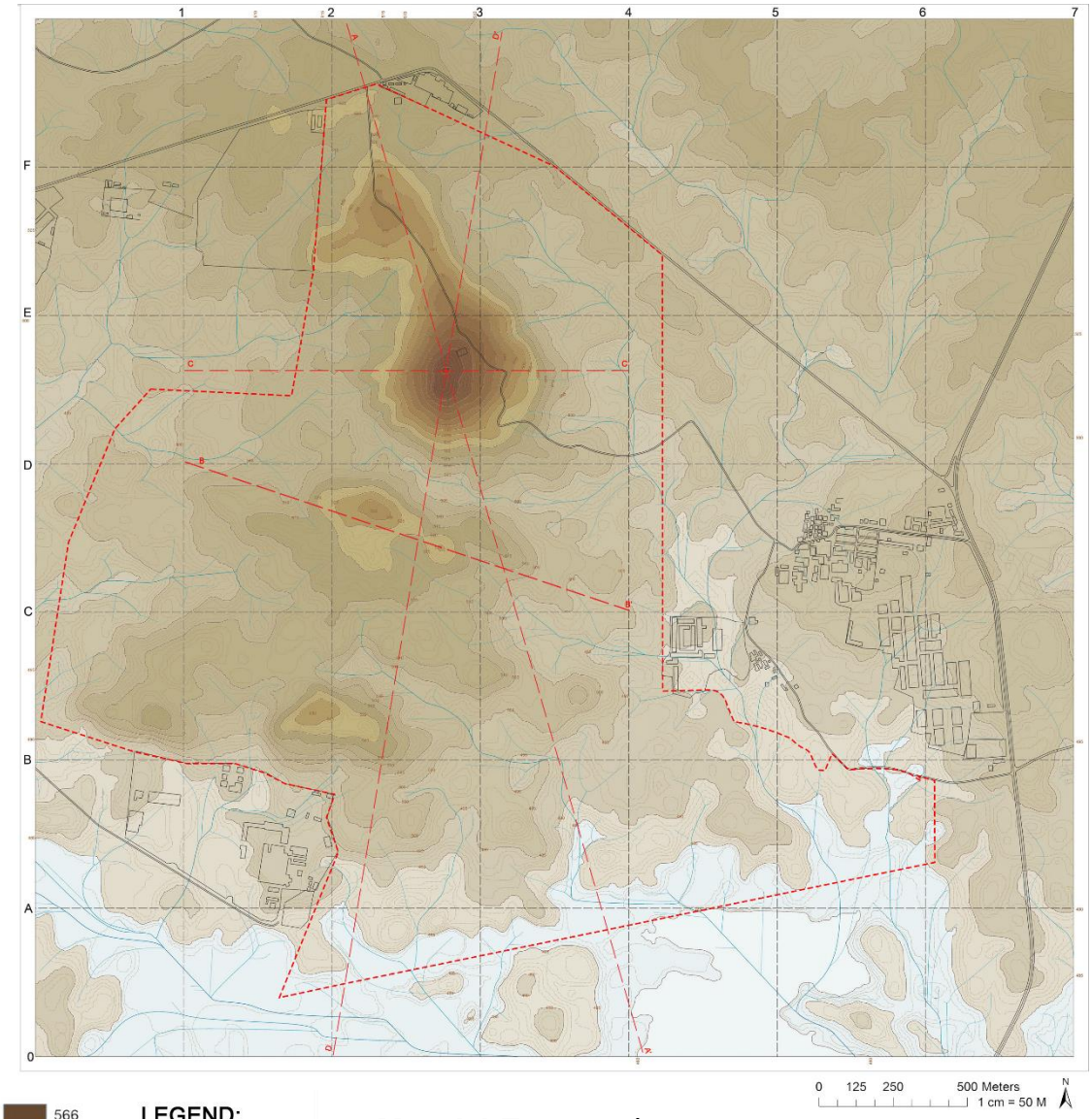
4.1.2 Rainfall:

In Shameerpet, Hyderabad, the annual air temperatures are 26.2 ° C and the annual rainfall is 813 mm. The driest months are less than 2 mm rain in January and December. Avg plunge of 189 mm during the monsoon season most of the rainfall takes place in July. May is on average 32.7 ° c in the warmest month. December is the coldest month with average temperatures of 21.1 ° C and the precipitation ranges from 188 mm to the driest month. The temperature varies by 11.6 ° C throughout the year.

4.1.3 Wind direction:

During the whole year, Hyderabad has a predominant average hourly wind direction. From February to April, the southern wind is 3.1 months, with a maximum percentage of 54 %. The wind is most often 4.5 months from the west, from May to September and 94% from July 30. From the east, winds were most often 4.0 months, with a peak percentage of 61 percent in January from October 10 to February 10.

4.2 Relief Map



Map 4-1 Topography map

Geographically Shameerpet, Hyderabad is located in the Deccan plateau. with granitic intrusions of pink and grey granite on the earth's surface.

Site is located on the northern side of the Shameerpet lake with an undulating terrain sloping towards the south is of the Hyderabad.

Shameerpet lake drains into the Musi river, a tributary of Krishna river.

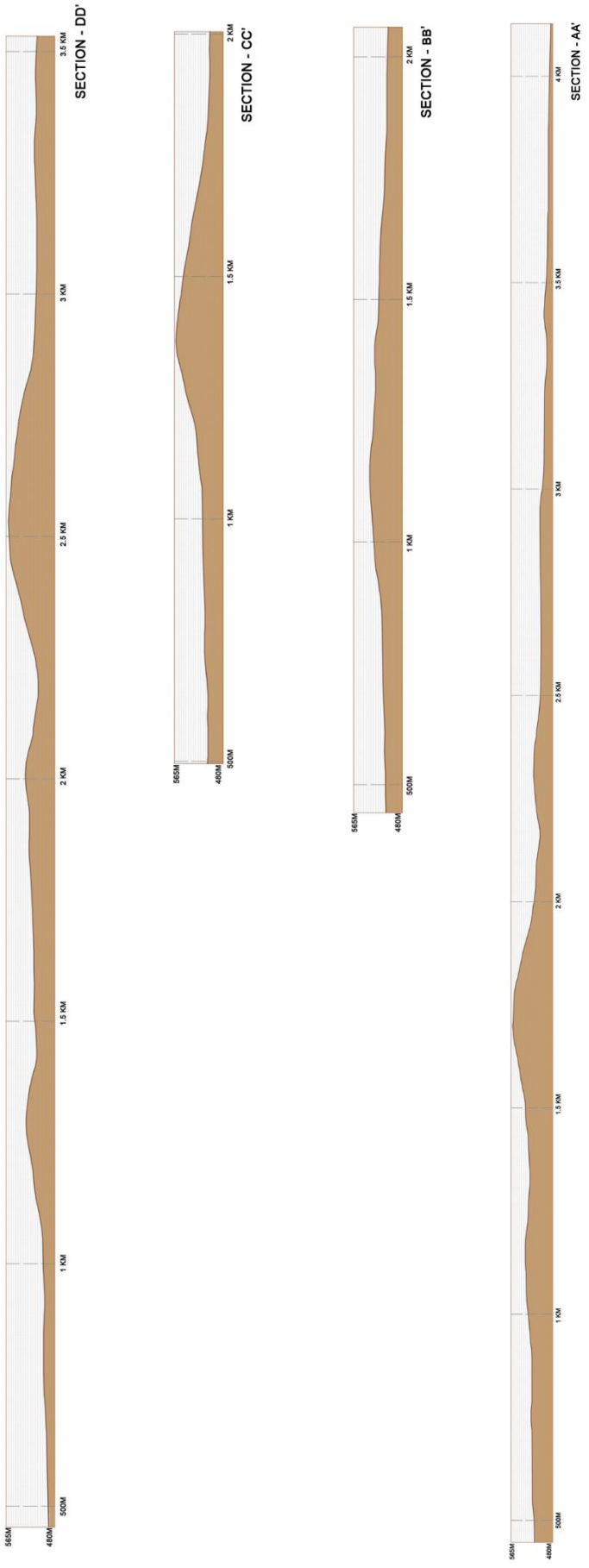


Figure 4-2 Site sections of the site

On the site there are 3 major undulated hillocks, granitic boulders and inselbergs.

The highest point is 566 m, slopes towards the lake topographer with full lake level at 480 m and slopes further down west to southeast.

The remaining two hills increase to 532 m and 530 m

4.3 Slope Map

Figure 4-3 Slope Map

The slope is as an important variable in an undulating terrain to influence the hydrology of the site, soil depth and erosion susceptibility, groundwater recharge potential and vegetation cover.

The entire site has extreme very steep (21-62%), moderately steep slopes (14-20%) to gentle slopes of (3-13%)

the hillock on the northernmost of the site has very steep sloping towards the southern side of the site with moderate to no vegetative cover in steep slopes

soil is severely is impacted by the shallow depth and steep to moderate slopes with a good amount of rainfall

4.4 Geology Map

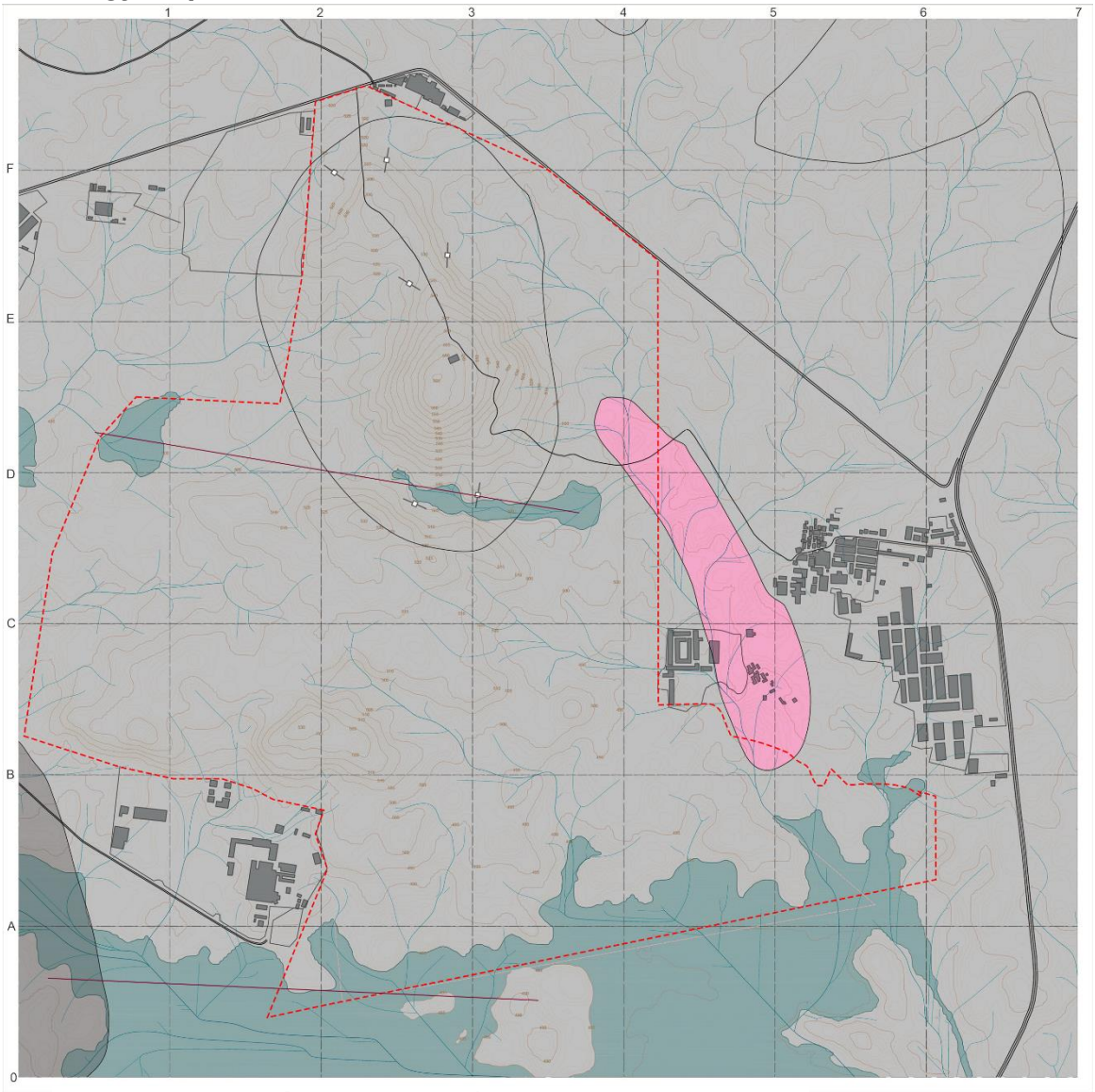


Figure 4-4 Geology Map

The geology of this area mainly comprises of Archean era granites.

Granites of this area are porphyritic grey granite and fine coursed pink granite. These rocks belong to Archean granite basement

The avg depth of the boulders at the surface level ranges from 2 -9m deep

The stratigraphic succession of the geological region is as follows:

Recent	Soil and Alluvium Laterite
DECCAN TRAP	(Upper Cretaceous to oligocene) Basalt flow V Basalt flow IV ----- Intertrappean formation II ----- Basalt flow III Basalt flow II ----- Intertrappean formation I ----- Basalt flow I ----- Infratrappean ----- ----- Unconformity -----
ARCHAEANS	Quartz reef/vein Pegmatite and epidote veins Dolerite/Gabbroic dykes Leucograite Fine to coarse, porphyritic pink alkali feldspar granite Fine to coarse porphyritic grey grano-diorite-alkali feldspar granite Migmatite Amphibolite/biotite schist/steatite (older metamorphics)

Table 4-1 Stratigraphic succession of subterranean geology of the region

Source: Geological Survey of India

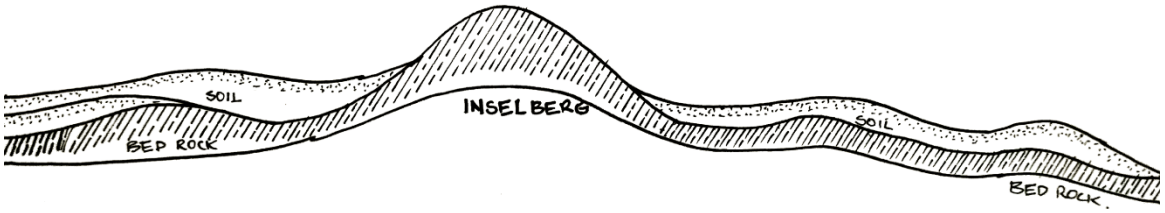
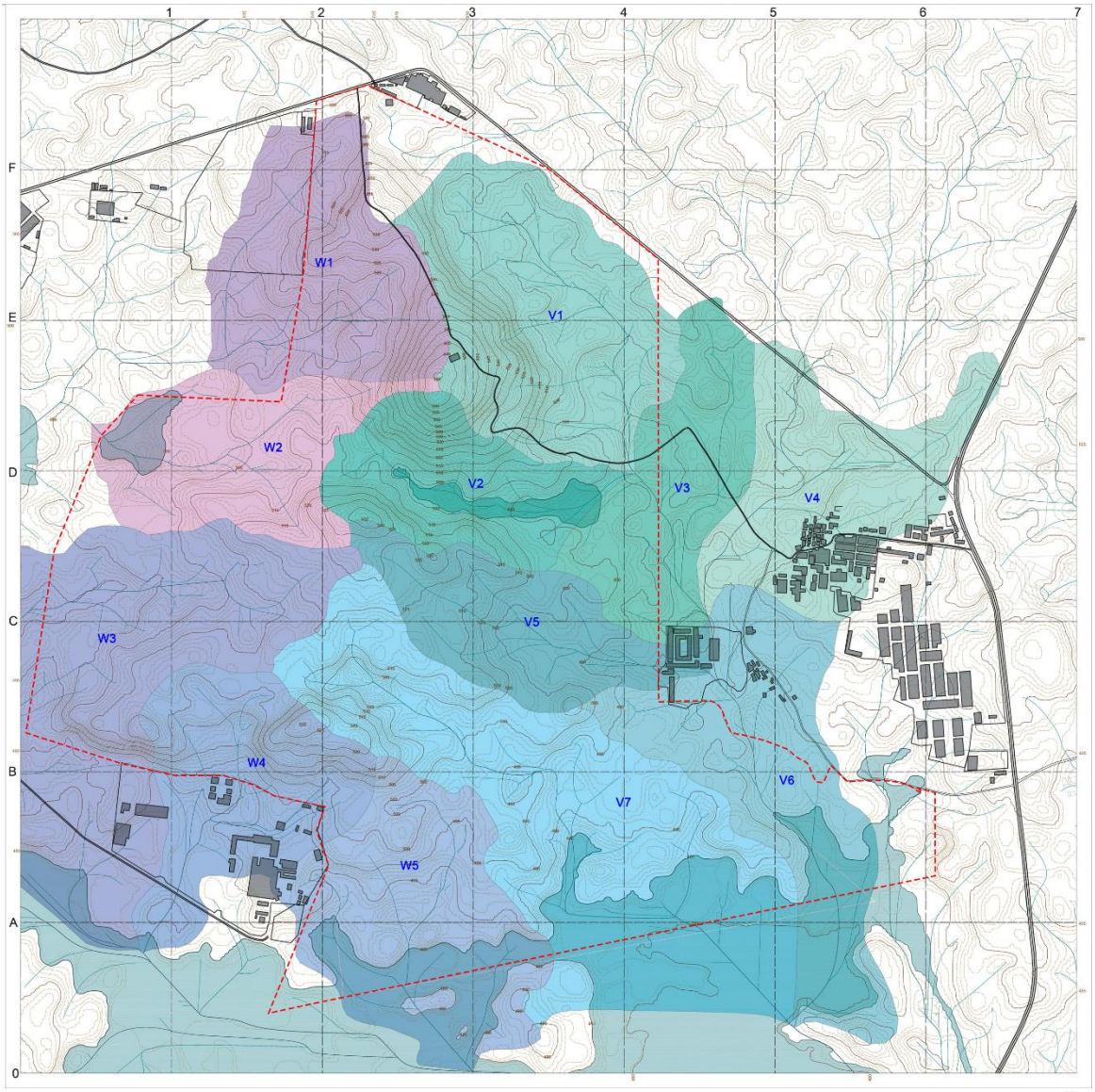


Figure 4-5 Subterranean geology of the region

4.5 Hydrology



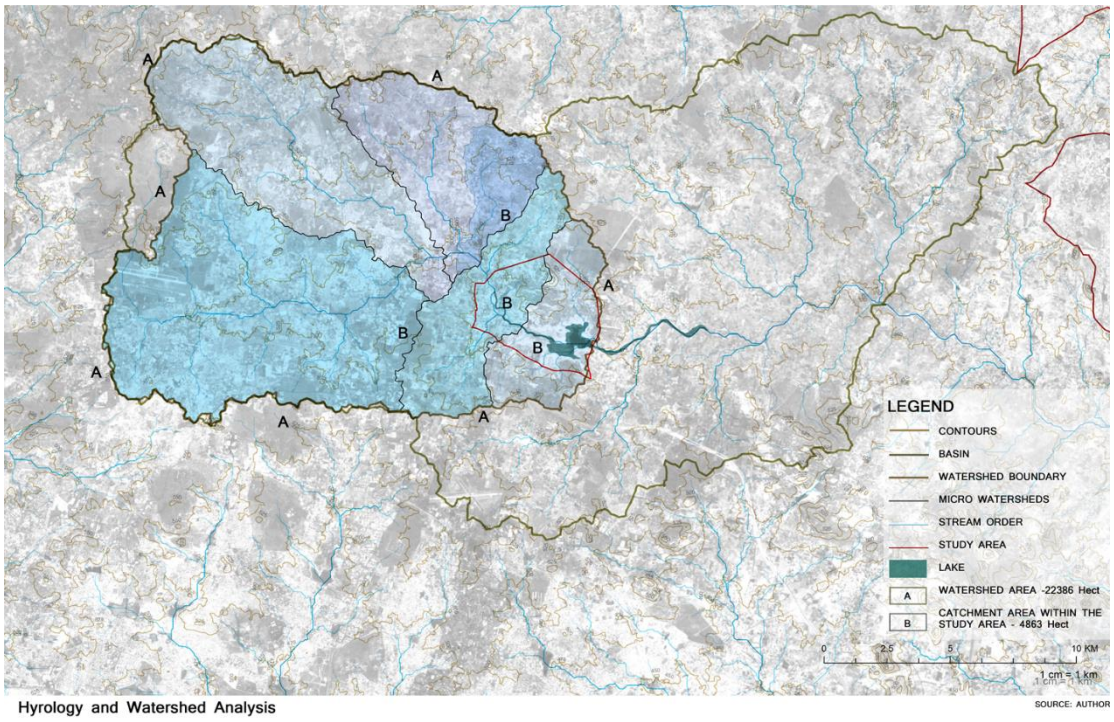
Map 4-2 Hydrology Map

LEGEND:

- SITE BOUNDARY
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAMS
- ROADS
- SETTLEMENTS
- LAKE
- WATERSHEDS
- 1ST ORDER STREAM
- 2ND ORDER STREAM
- 3RD ORDER STREAM

This region falls under the lower Krishna basin Watershed of Shameerpet drains into Musi river tributary of Krishna river.

The depth to water levels, in general, varies between 5 and 20 m and the average water level is 12m. The average annual rainfall is 813mm though the region gets a good amount of rainfall due to the residual hills and steep slopes, a major portion of the stormwater goes as run-off. possibility of percolation is very less check dams can be provided to retain water at different slopes to increase moisture content and facilitate vegetative growth.



Map 4-3 Watershed Map of the Shameerpet Lake

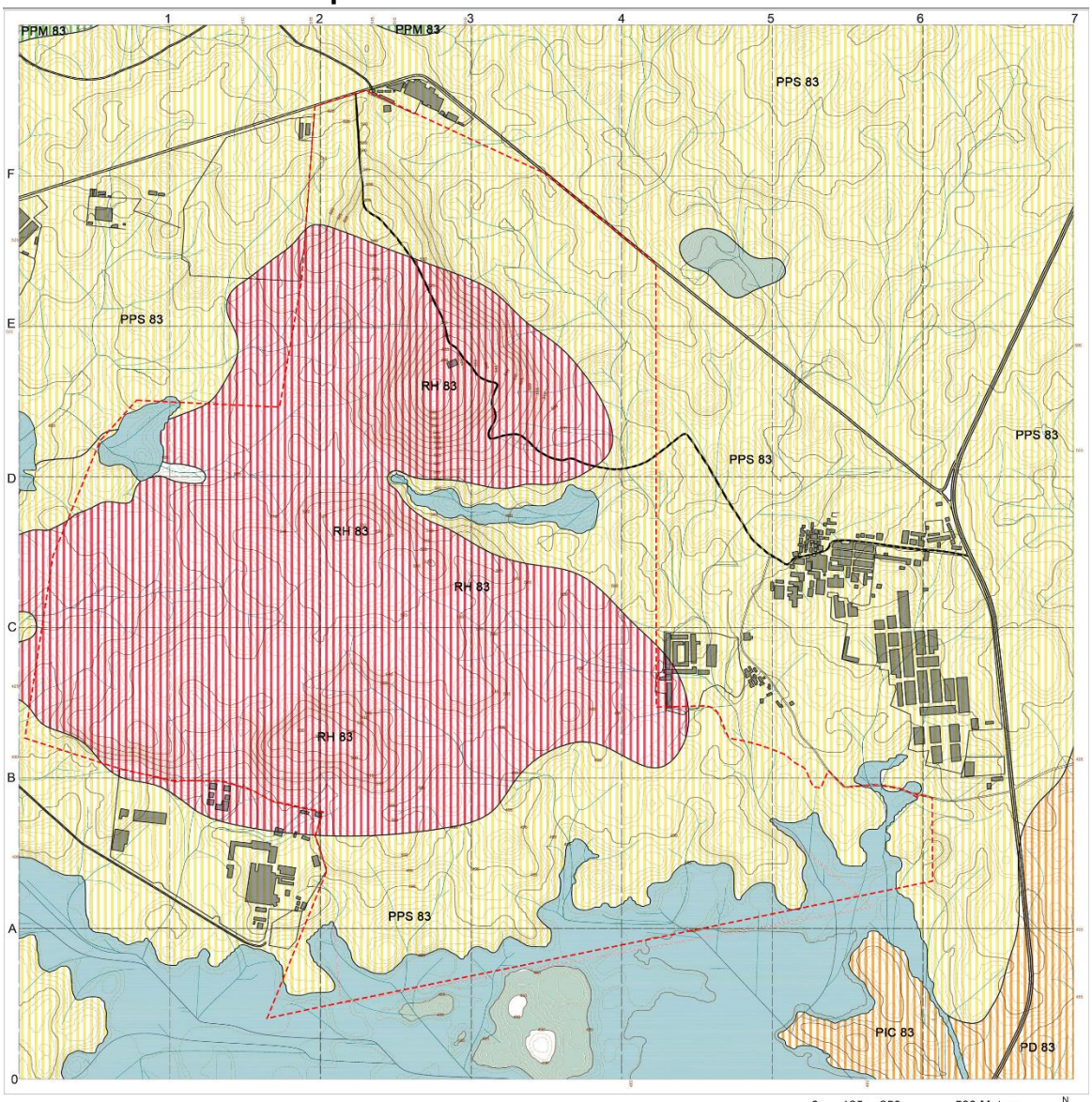
Water Shed	Area in SQ.M	Runoff In Cubic M
W1	513854	417763
W2	406085	330147
W3	1046309	850649
W4	450061	365900
W5	572124	465137
V1	632333	514087
V2	344273	279894
V3	388361	315737
V4	471110	383012
V5	361773	294121
V6	590886	480390
V7	1080630	878552

Table 4-2 Watersheds of contributing to the lake and calculation of the runoff are as per below:

Water is being retained in w2 and v2 by the check dams, and because of which the moisture content is held and dense vegetation is found around the water body.

Water runoff can be checked in v5 and v7 and can be held water controlling erosion and vegetation establishment.

4.6 Ground Water Prospects



Map 4-4 Ground Water Prospects Map

LEGEND:

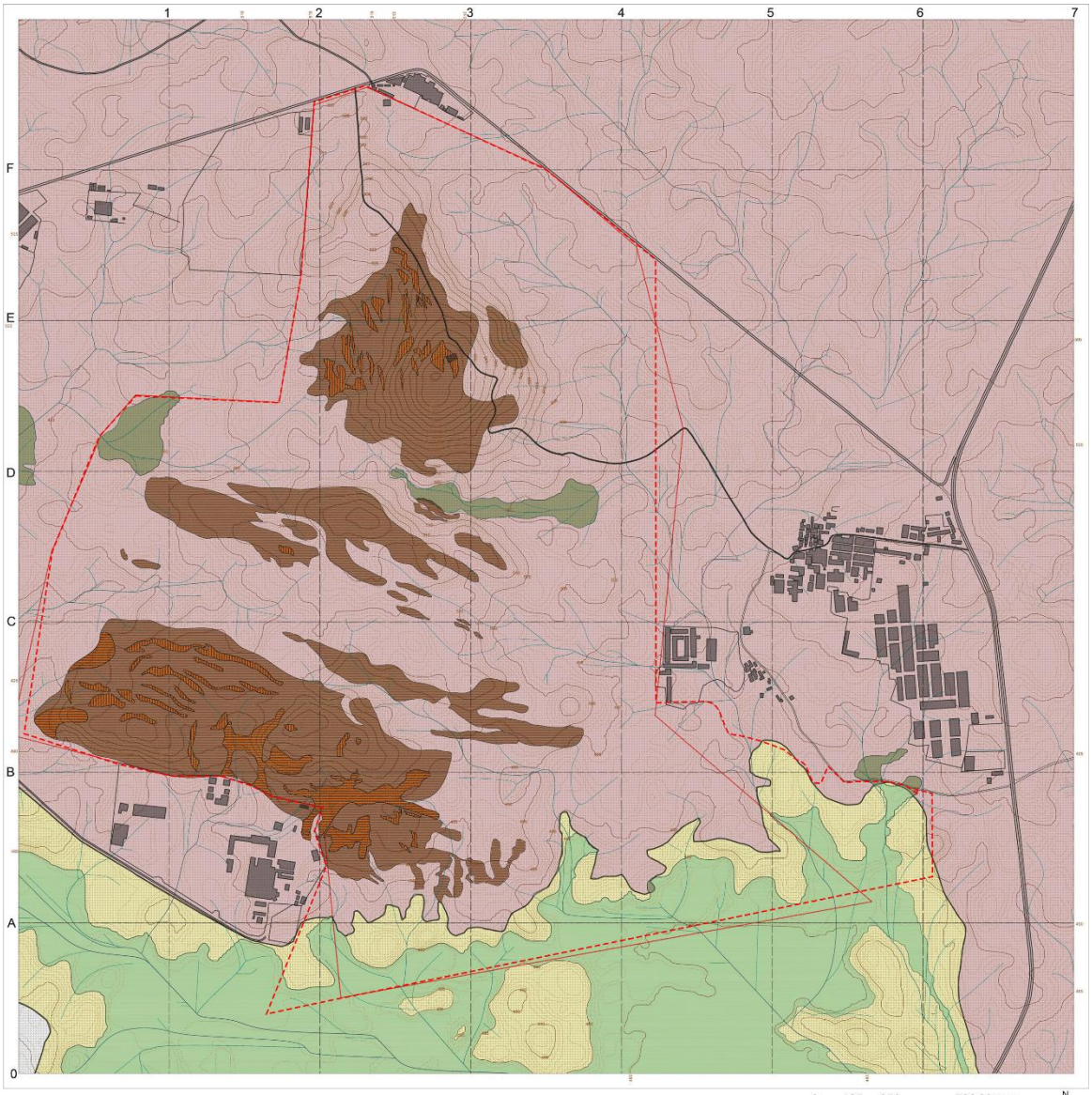
- SITE BOUNDARY
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAMS
- ROADS
- SETTLEMENTS
- LAKE

MAP UNIT (HYDROGEOMORPHIC UNIT) REPRESENTED IN THE MAP WITH ALPHANUMERIC CODE (COLOUR INDICATES GROUND WATER PROSPECTS)	GEOLOGICAL SEQUENCE/ ROCK TYPE (REPRESENTED IN THE MAP WITH NUMERIC CODE)	GEOMORPHIC UNIT/LANDFORM (REPRESENTED IN THE MAP WITH ALPHABETIC CODE)	DEPTH TO WATER LEVEL SUMMER/PRE-MONSOON (AVERAGE IN METERS) / NO. OF WELLS OBSERVED	RECHARGE CONDITIONS BASED ON AVAILABILITY OF WATER (RAINFALL & OTHER SOURCES)	GROUND WATER PROSPECTS: AQUIFER MATERIAL (LS = LOOSE SEDIMENTS, PR = PERMEABLE ROCK, FIR = FISSURED ROCK, FR = FRACTURED ROCK, WR = WEATHERED ROCK, IR = IMPERVIOUS ROCK)	TYPE OF WELLS SUITABLE (DW = DUG WELL, RW = RING WELL, BW = BORE WELL, TW = TUBE WELL, DBW/DTW = DUG-CUM-BORE / TUBE WELL)	DEPTH RANGE OF WELLS (SUGGESTED) MIN - MAX (IN METRES)	YIELD RANGE OF WELLS (EXPECTED) (in LPM or m^3/ day)	HOMOGENEITY IN THE UNIT & SUCCESS RATE OF WELLS (PROBABILITY) VERY HIGH HIGH MODERATE LOW	QUALITY OF WATER POTABLE (P) NON-POTABLE (NP) (INDICATE REASONS IF NON-POTABLE)	GROUND WATER IRRIGATED AREA (APPROX . RANGE IN PERCENTAGE)	RECHARGE STRUCTURES SUITABLE & PRIORITY (PT = PERCOLATION TANK, CD = CHECK DAM, NB = NALA BUND, RW = RECHARGE WELL, DT = DESILTING OF TANK, RP = RECHARGE PIT)	REMARKS (PROBLEMS / LIMITATIONS)
PPM-83	PENINSULAR GNEISSIC COMPLEX; GRANITE GNEISS (83)	PEDIPLAIN MODERATELY WEATHERED (PPM) (12-14 m)	25-35m / 8 BW	Moderate	WR+FR	BW	55-70m	100-150LPM	Moderate	P	15-20%	PT, CD High priority	Higher yields at intersectios of lineaments.
PPS-83		PEDIPLAIN SHALLOW WEATHERED (PPS) (6-8 m)	26-33m / 13 BW	Moderate	WR+FIR	BW	60-75m	50-80LPM	Low	P	10-15 %	PT, CD High priority	Higher yields at intersectios of lineaments.
PD-83		PEDIMENT (PD)	Wells not observed	Poor	FIR	BW	45-75m	25-50LPM	Low	P	1-2 %	CD Moderate priority	Ground water is expected at deeper levels along the fracture zones and at intersections of lineaments.
PIC-83		PEDIMENT INSELBERG COMPLEX (PIC)	Wells not observed	Poor	FIR	BW	45-75m	25-45LPM	Low	P	1-2 %	CD Low priority	Inselbergs forms run-off zones. Ground water expected along the fracture zones and at intersections of lineaments in the pediment.
RH-83		RESIDUAL HILLS (RH)	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	Mainly run-off zone.

Table 4-3 Ground Water Prospects

Water availability in the region is restricted in boulder region due to most of the runoff
And moderate water availability is found 26-33m deep in the shallow weathered landforms

4.7 Soil Map



Map 4-5 Soil Map

LEGEND:

- SITE BOUNDARY
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAMS
- ROADS
- SETTLEMENTS
- LAKE

SOIL TYPES:

- RESIDUAL GRANITE HILLS
- FLUVIAL SOIL
- SANDY SOIL SHALLOW DEEP
- RED CHELKA SOIL

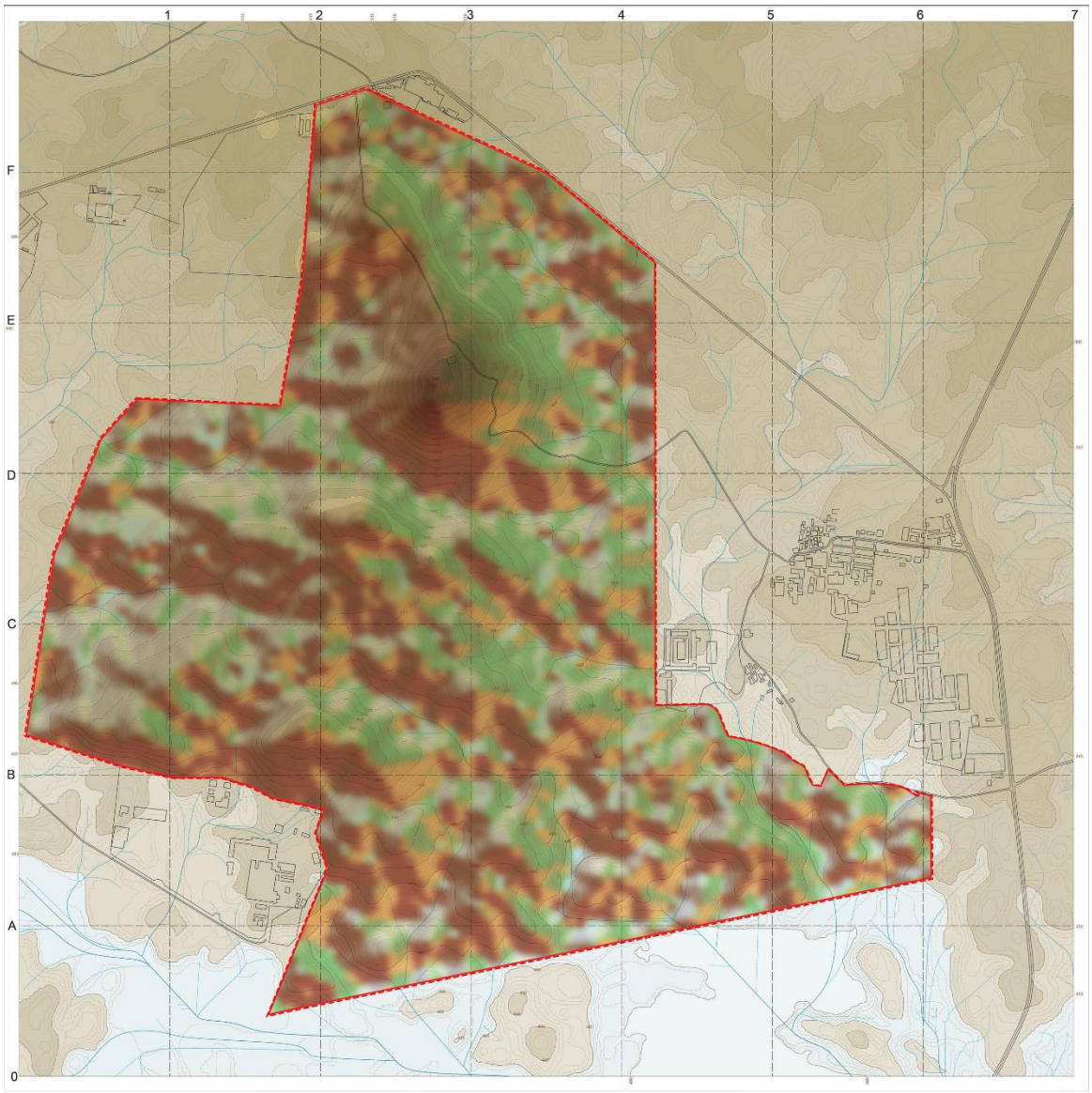
Soil types in this region comprise of red sandy soil or red chalka soil and their associated soils. And other soils are fluvial soil by the sediment deposit of the lake. Parent material off these is mainly basalt, gneisses, and quartzite.

The Pedon's of this region are to a shallow depth from 32 - 78cm and soil texture is angular to sub-angular structure

Clay content ranges from 17.9%-31.8% and decreases with increase in depth this is due to the transportation of fine clay particles/sediments as runoff. Colour of the soil varies from dark to reddish brown.

As per soil taxonomy, these soils belong to the entisols category. Because of the presence of clay less than 30% and the presence of shallow depth of soil ranging from 25cm to 1m deep

4.8 Aspect Map



Map 4-6 Aspect Map

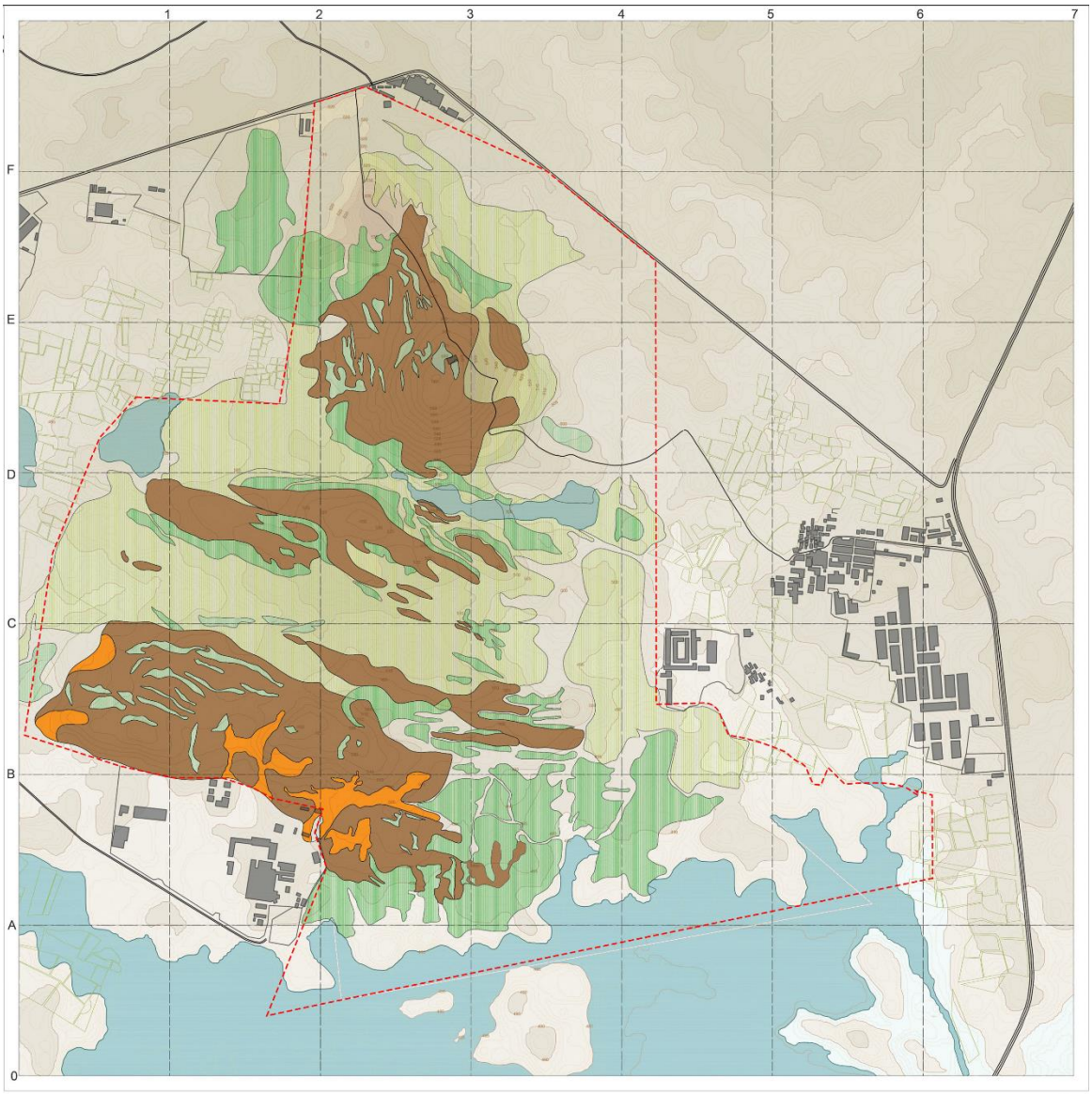
LEGEND:

- SITE BOUNDARY
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAMS
- ROADS
- SETTLEMENTS
- LAKE
- Flat (-1)
- North (0-22.5)
- Northeast (22.5-67.5)
- East (67.5-112.5)
- Southeast (112.5-157.5)
- South (157.5-202.5)
- Southwest (202.5-247.5)
- West (247.5-292.5)
- Northwest (292.5-337.5)
- North (337.5-360)

Aspect map shows the aspect (direction) and degree (steepness) of slope for a terrain (or another continuous surface).

And the Northeastern slopes are covered with vegetation whereas due to the solar radiation South-Eastern slopes of the hills are barren.

4.9 Vegetation Density and type



Map 4-7 Vegetation Density Map

LEGEND:

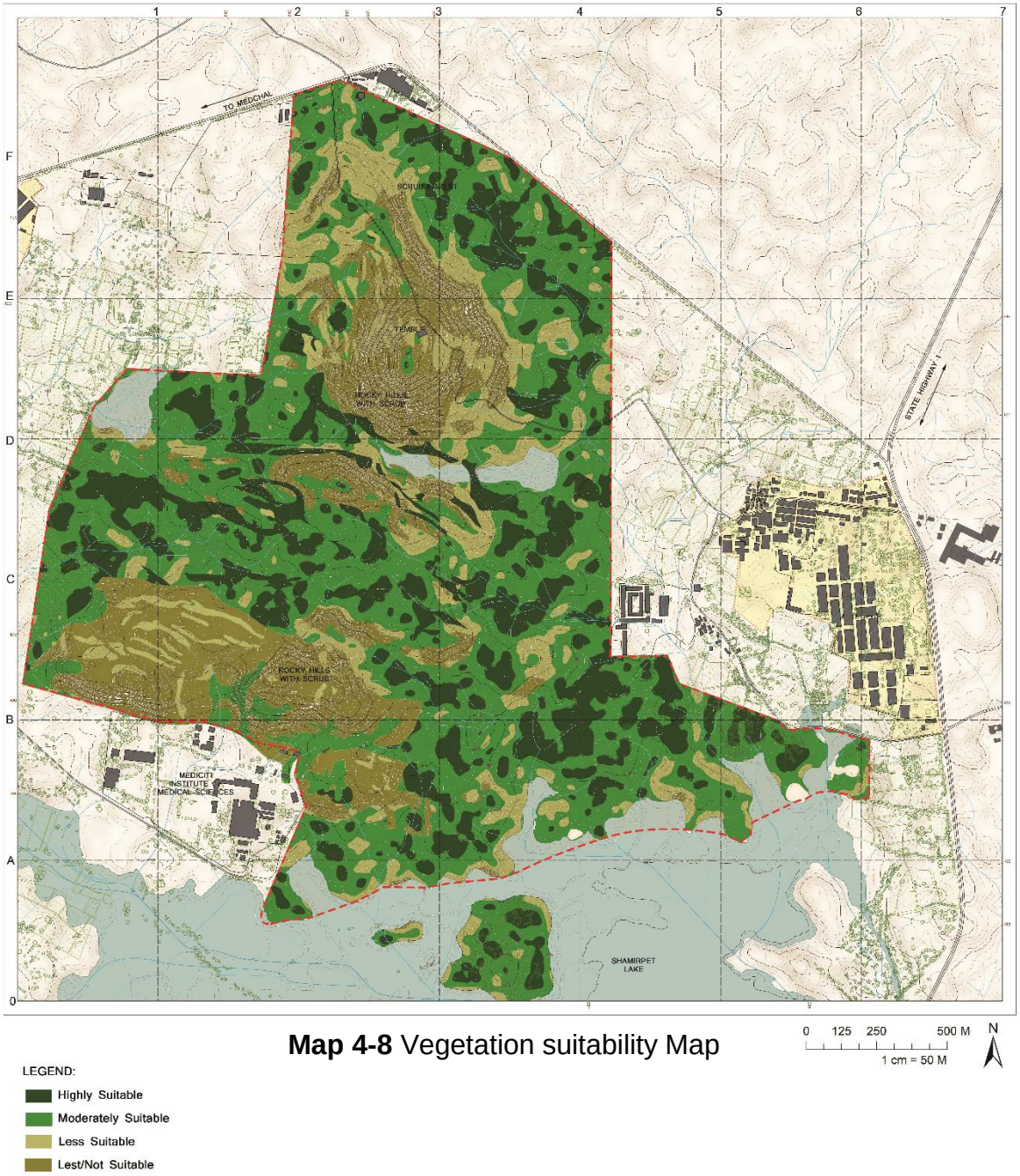
- SITE BOUNDARY
- MAJOR CONTOUR
- MINOR CONTOUR
- STREAMS
- ROADS
- SETTLEMENTS
- LAKE
- DENSE VEGITATION
- SEMI - DENSE VEGITATION
- SPARSE VEGITATION
- FARM LANDS

This region mainly comprises of grasses and xerophytic plants.

Species	Scientific Name	Common Names
Trees/Plants		
	Cassia auriculata	Tangedu
	Ipomoea fistulosa	Thuttu Kada
	Sreblus asper	Barranki
	Borreria hispida	Madanamu
	Canthium dicoccum	Balusu
	Tamarindus indica	Puli Vailu
	Derris trifoliata	Nalla Tiga
	Abutilon indicum	Country Mallow
	Abutilon hirtum	Nela Benda
	Prosopis juliflora	Tella Tumma
	Acacia nilotica	Nalla Tumma
		Ellinda
	Chloroxylon swietenia	Billudu
	Azadirachta indica	Neem
	Gymnosporia montana	Danti
	Typha angustata	Elephant Grass or Tunga
	Hygrophila spinosa	Nirgobbi
Herbs	lantana camara	Lantana
	senna auriculata	Tanner's Cassia
	annona reticulata	Custard Apple
		Shihore
	catunaregam spinosa	Common Emetic Nut
		Dhala singha
	punica granatum	Jamaica Switch Sorrel
	sida cordifolia Linn	Kharenti
	acacia leucophloea	Safed Kikar
	vachellia nilotica	Kikar
		Kauli
	chloroxylonswietenia	Satinwood Tree or Bhera
	asteracantha longifolia	Talmakhana
	cynodon dactylon	Dhub or Bahama Grass
	cyperus rotundus	Nut Grass or Motha
	Kyllinga sp	black honey shrub
Grass/Waterplants	Chloris sp	grass
	Cenchrus sp	grass
	Spirobolus sp	grass
	Digitaria sp	grass
	Hydrilla sp	water plant
	Vallisneria sp	water plant
	Nitella sp	water plant
	nelumbo nucifera	Lotus

Table 4-4 List of common species observed on Rocksites
Source: Rocksites of Andhra Pradesh, Society to Save Rocks

4.10 Vegetation Suitability Map



Map 4-8 Vegetation suitability Map

Vegetation suitability map shows which are the areas well suited for vegetation growth. Parameters considered for vegetation suitability are: 1 Slope 2 Geology 3.Hydrology and Soil Depth

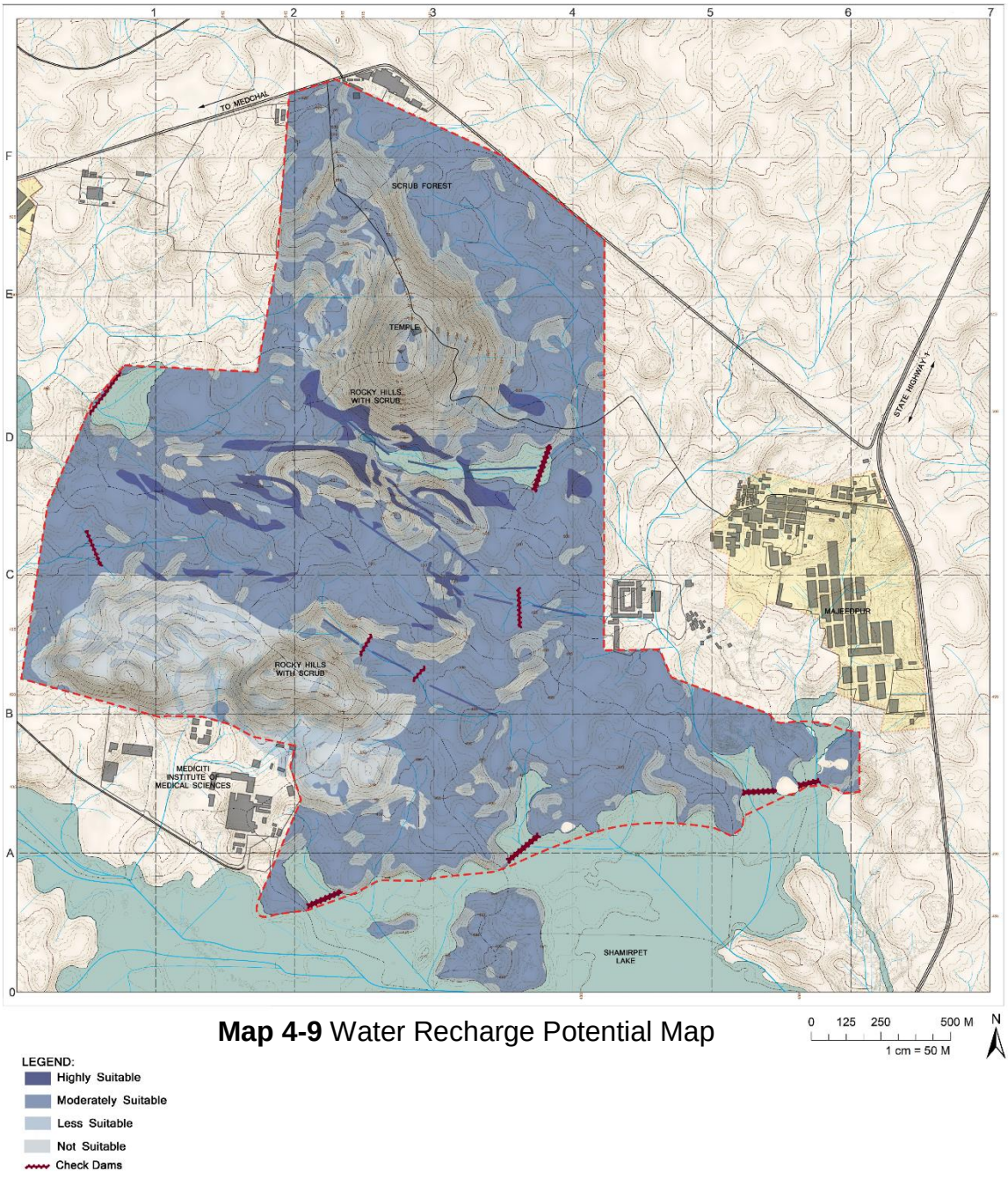
Slopes greater than 25% slope are considered as difficult to establish vegetation. Foothills of the Rock outcrop have feasibility for vegetation growth. Streams are considered to be good for vegetation establishment.

For Vegetation Suitability Map, overlaid analysis of 1.Slope Map, 2.Geology Map, 3.Hydrology Map and 4. Soil Map is done.

Slopes with 0-5% and Soil depth about >90cm are considered as Highly Suitable; Slopes with 5-10%,10-25% and Soil depth about 50>90cm are considered as Moderately Suitable. Slopes with >25% and Soil depth about 10>50cm are considered as Less Suitable Slopes with >25% and Soil depth about <10cm are considered as Least/Not Suitable

Comparison of Vegetation density with Vegetation suitability Map gives the areas which are undergone degradation and helps in identifying the areas where vegetation can be re-establish.

4.11 Water Recharge Potential Areas



Map 4-9 Water Recharge Potential Map

Water Recharge Potential map shows which are the areas well suited for groundwater recharge. Parameters considered for groundwater recharge and soil moisture retention are: 1 Slope 2 Geology 3.Hydrology and Soil Depth

Slopes greater than 25% slope are considered as difficult to recharge they are water shedding slopes. Hence Foothills of the Rockout crop have feasibility for

groundwater recharge because of water gather slopes. Streams are considered to be good for Groundwater Recharge.

For Water Recharge Potential, overlayed analysis of 1.Slope Map, 2.Geology Map, 3.Hydrology Map and 4. Soil Map is done.

Slopes with 0-5% and Soil depth about >90cm are considered as Highly Suitable;
Slopes with 5-10%,10-25% and Soil depth about
50>90cm are considered as Moderately Suitable. Slopes with >25% and Soil depth about 10>50cm are considered as Less Suitable
Slopes with >25% and Soil depth about <10cm are considered as Least/Not Suitable

Water Recharge Potential Map helps in identifying the areas for groundwater recharge.

5.0 Visual Analysis

5.1 Perception

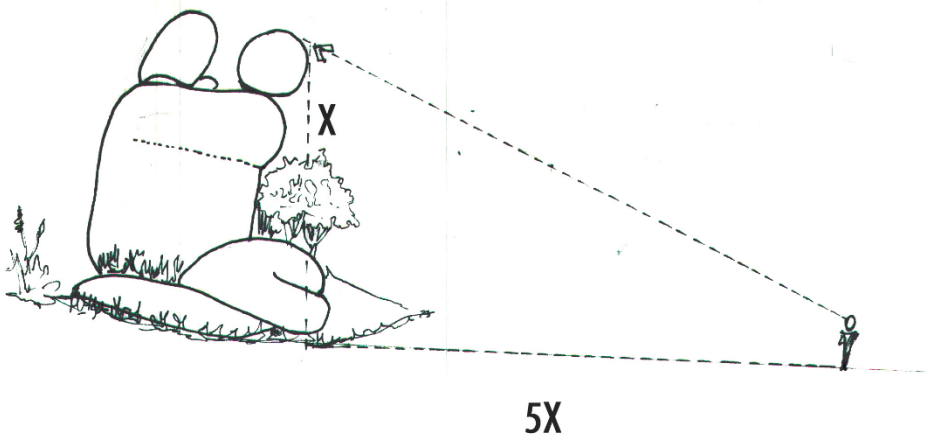


Figure 5-1 Farther Distance View - Distance views appreciates the form

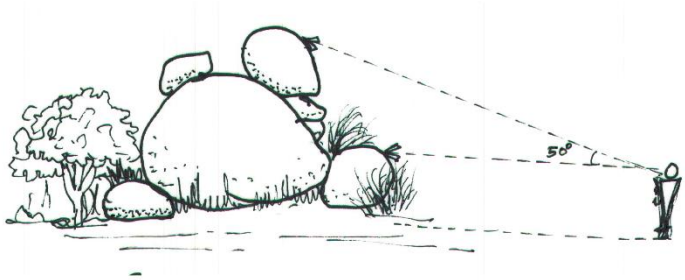


Figure 5-2 Closer Distance View - Closer the distance, user perceives the texture in detail and leaves him the question of their composition and Stability

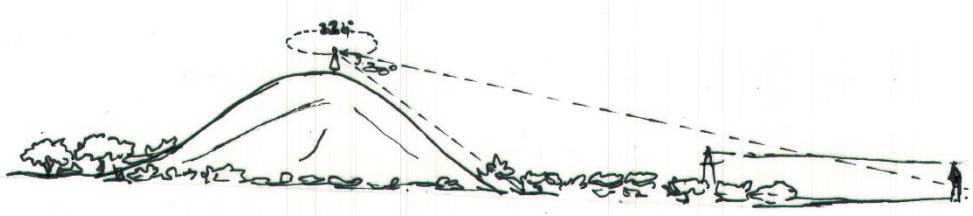
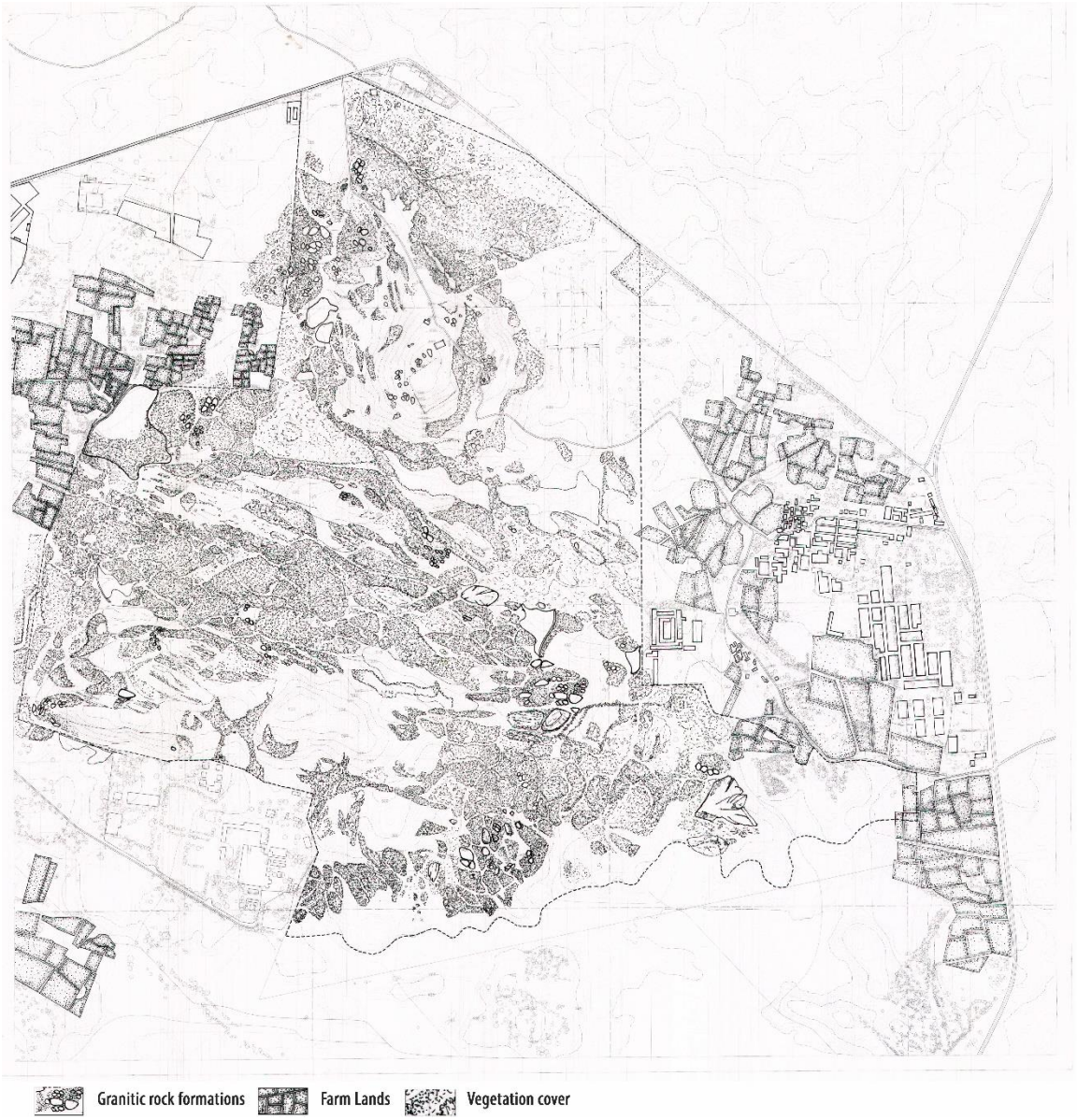


Figure 5-3 Elevated Views Up The Hill - Elevated viewpoints give the commendable views and gives him the sense of exploring other place in vicinity

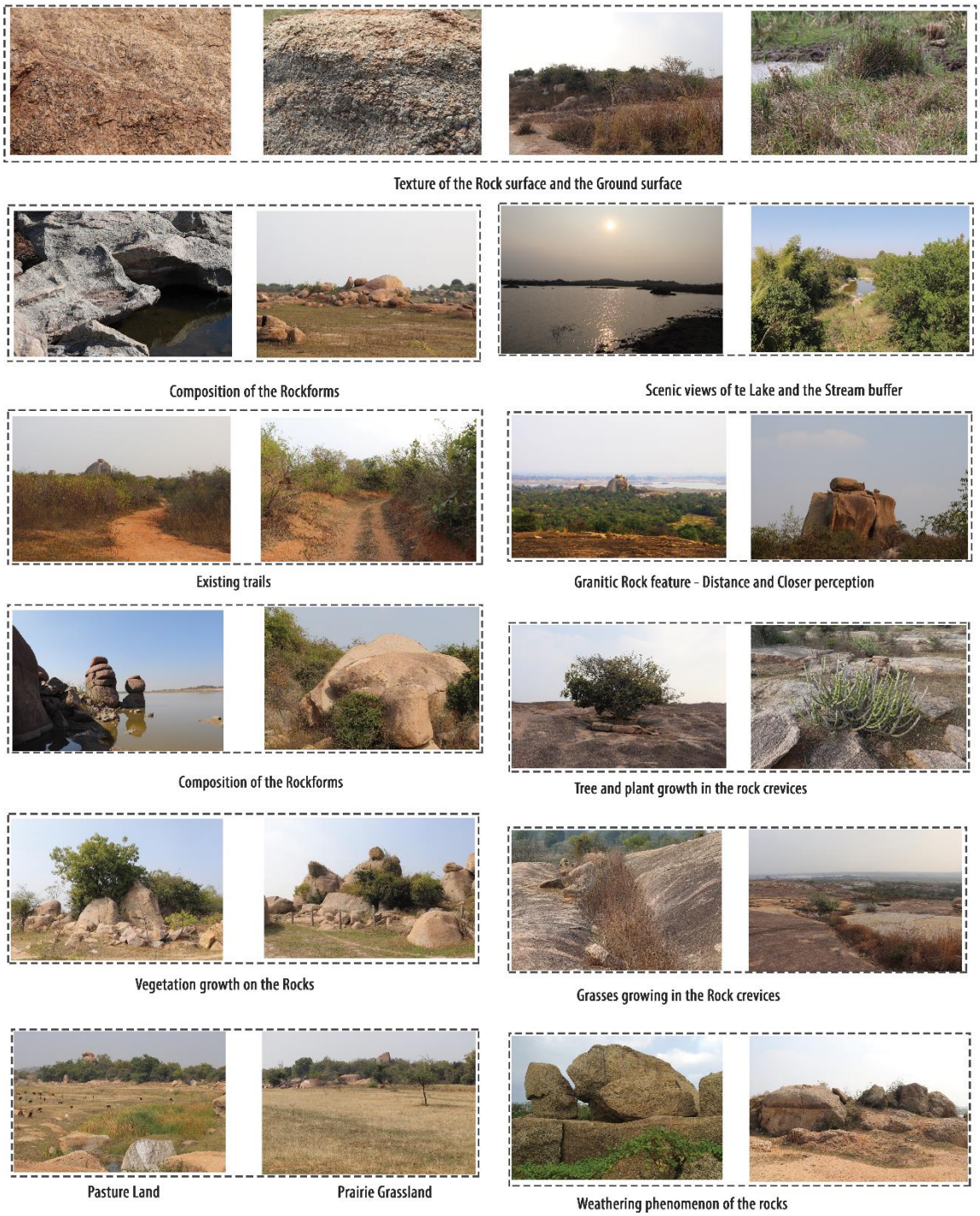
5.2 Surface Texture Mapping



The texture of the ground surface makes the granitic landscape more unique to explore. Various textures are available on the site varying from the rock faces, soil, boulders composition, and the vegetation.

Texture analysis helped in decision making of the site programming and also helped to understand the areas which need to be preserved and which can be explored.

Existing natural trails and the vegetation cover helped in programming the accessible roots to the geo-park based upon the hierarchy of the unique granite formations of the site.



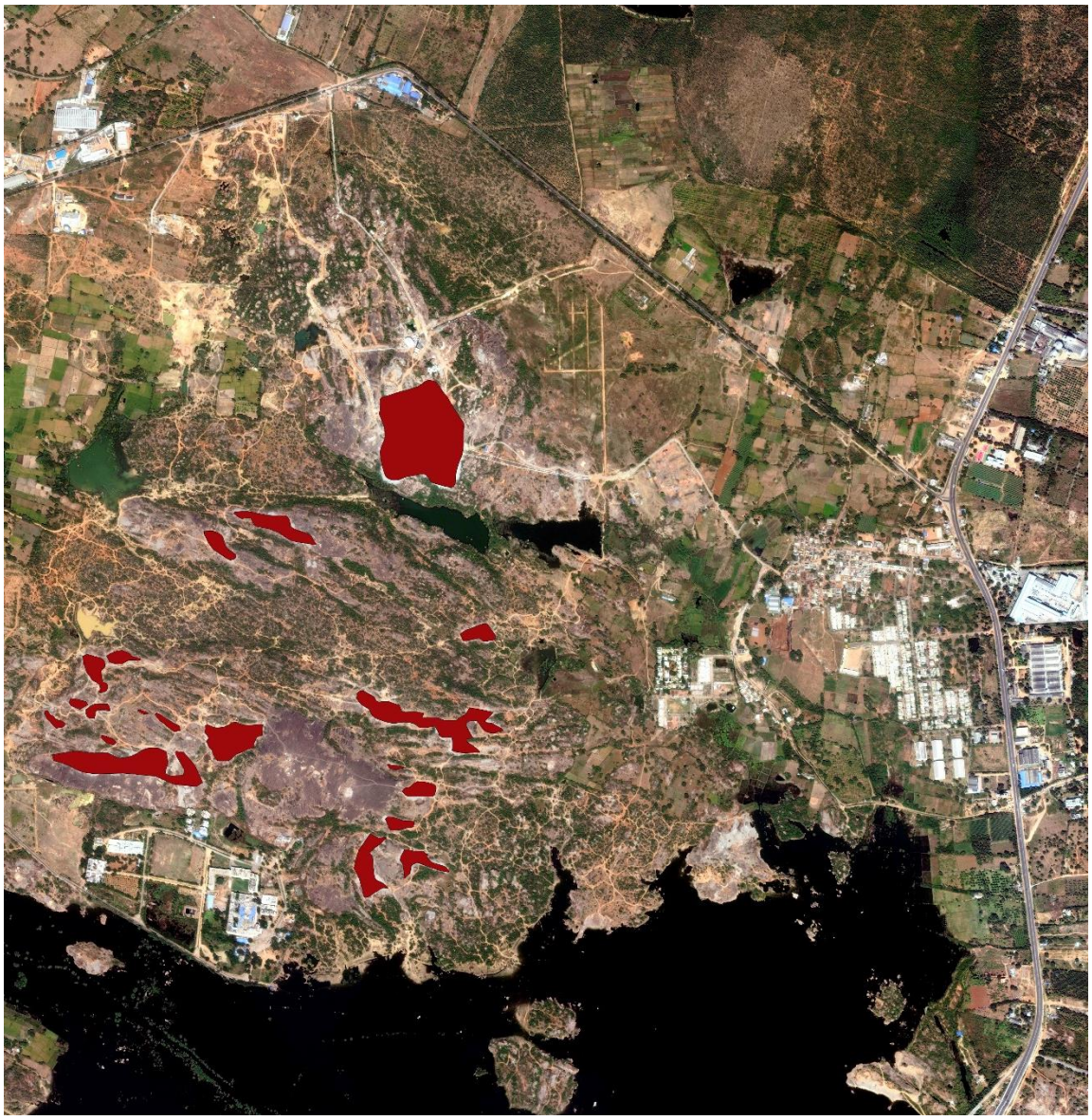
Figures 5-4 Texture and rock formations of the site

6.0 Issues

6.1 Mining

Mining and stone quarrying is the major issues identified on the site.

The fast growth of construction activity has greatly boosted demand for Hyderabad building materials in order to meet today's demands on the increasing population and infrastructure needs of society. In this process, the carving of granite stone still plays an important part. However, the activity in the study area has caused severe environmental and socio-economic conflicts.



Map 6-1 Location of the marked quarry sites of the study area

The main environmental and socio-economic concerns observed during this study include alteration of the landscape, hill cutting affecting local biodiversity, production of unproductive wastelands, pollution of dust, noise pollution, illegal mining of stone, accidents and lowering the groundwater table in certain areas.

Figure 6-2 Stone quarring for thee building material Source: Author

Figure 6-1 Destruction of unique Rockformations of Hyderabad City Source: T P Venu | THE HANS INDIA

6.2 Soil erosion and vegetation loss

Steep slopes and the stormwater runoff causing the soil to erode severely. Strategies are to be implemented to control the soil erosion by contouring the steep slopes by grading and by gully plugs to control the soil erosion. Check dams are to be constructed to control the stormwater runoff and increase the water holding in the soil for increasing water table and establishing the vegetation.

Figure 6-3 Soil erosion in the study area

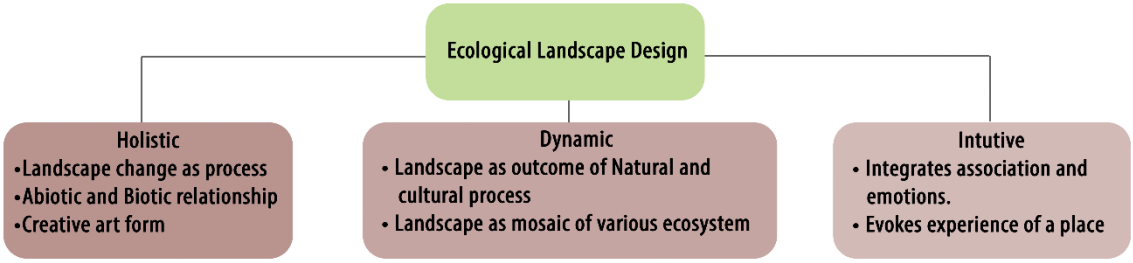
7.0 Design

7.1 Design Approach

7.1.1 Ecological Landscape design

The approach to design is based on the ecological significance of the role of ecology and the landscape in sustainable development. This way the holistic, intuitive and dynamic design is ensured. This conceptual approach focuses on the past and current state of the landscape and on the local and regional landscape of the place.

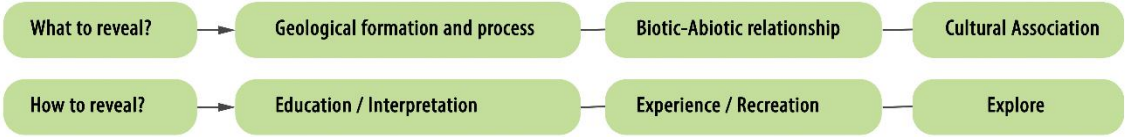
Design objectives: to reveal the ecological process and raise awareness among the people about the natural landscape's importance.



7.2 Design Programme

7.2.1 Revealing Landscape

Design Programme is developed based upon the concept of revealing the landscape. Provided with scenic views to appreciate the landform and experience the place and educate.



Geological formation and process

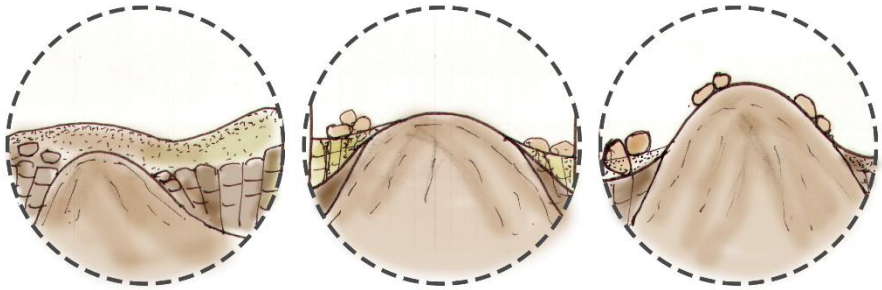


Figure 7-1 Formation of domed shaped inselbergs and tors

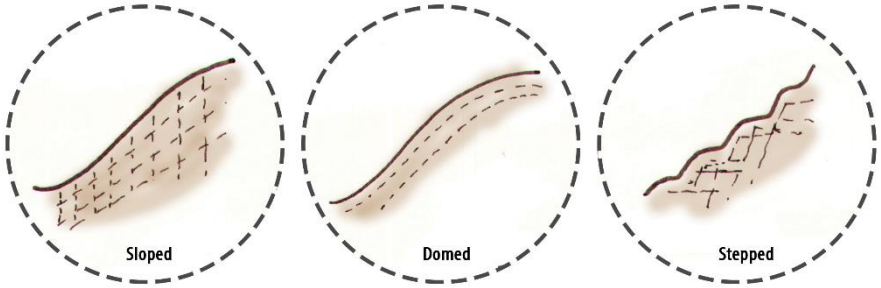


Figure 7-2 Evolution of form based on fracture pattern

Biotic - Abiotic Interrelation

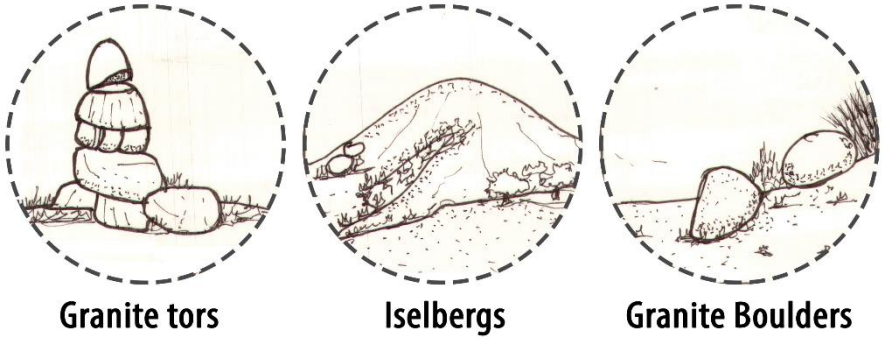


Figure 7-3 Granitic landforms

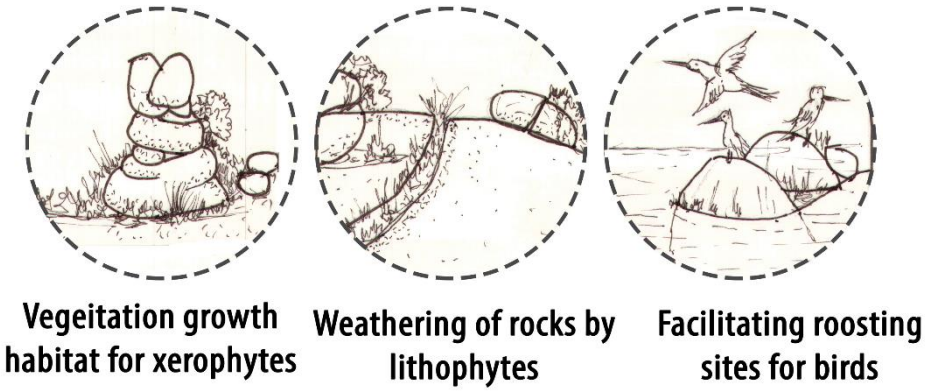


Figure 7-4 Biotic-Abiotic Interrrelation

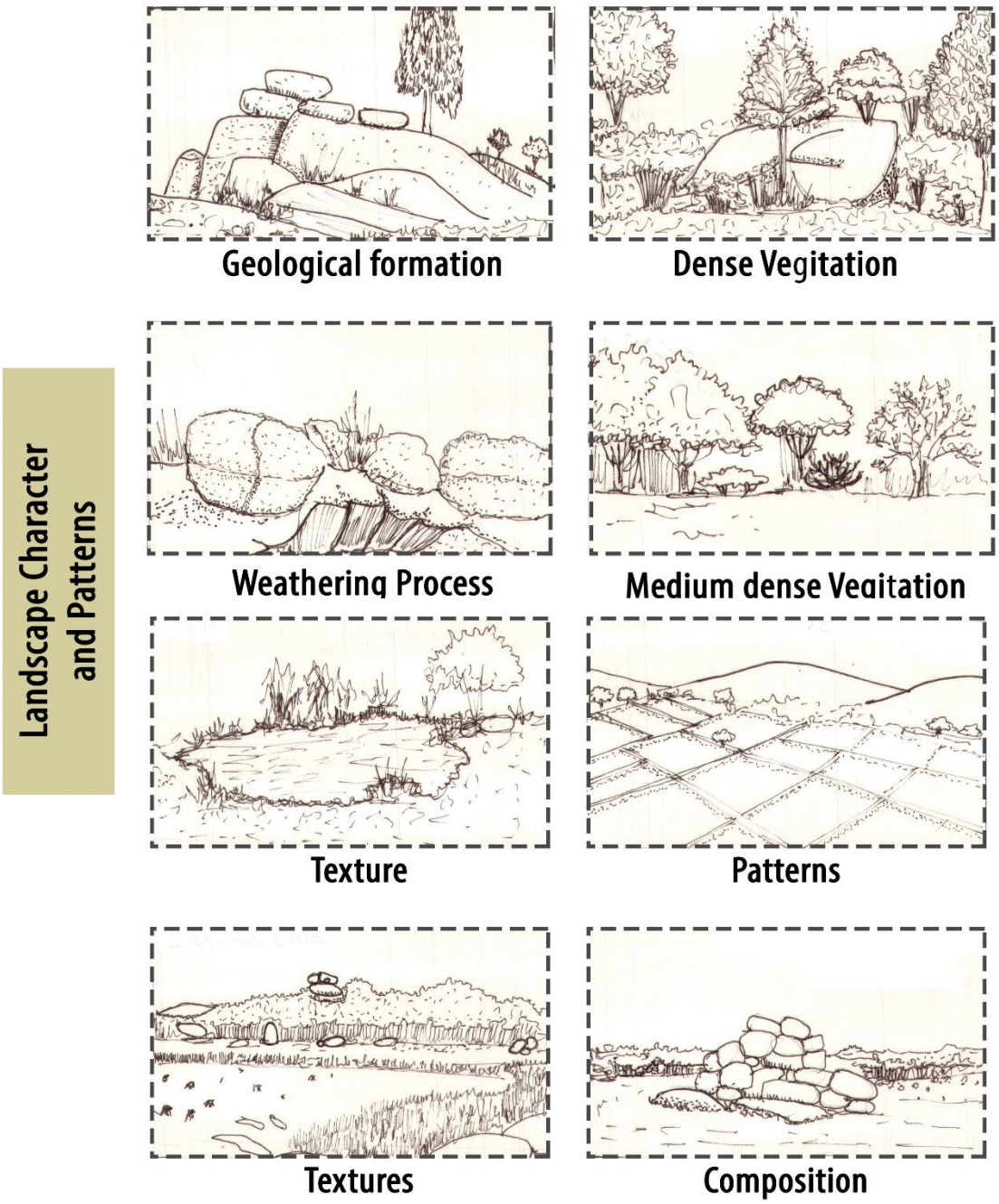


Figure 7-5 Landscape Character and Patterns

7.3 Design Development

Strategy circulation is developed based upon the hierarchy of the Rock formation and from an optimal view distance and the existing vegetation is considered for the access points and connection between the spaces. Existing trails and ridges with gradual slope are taken into consideration for providing the pathway network with least grading of the site.

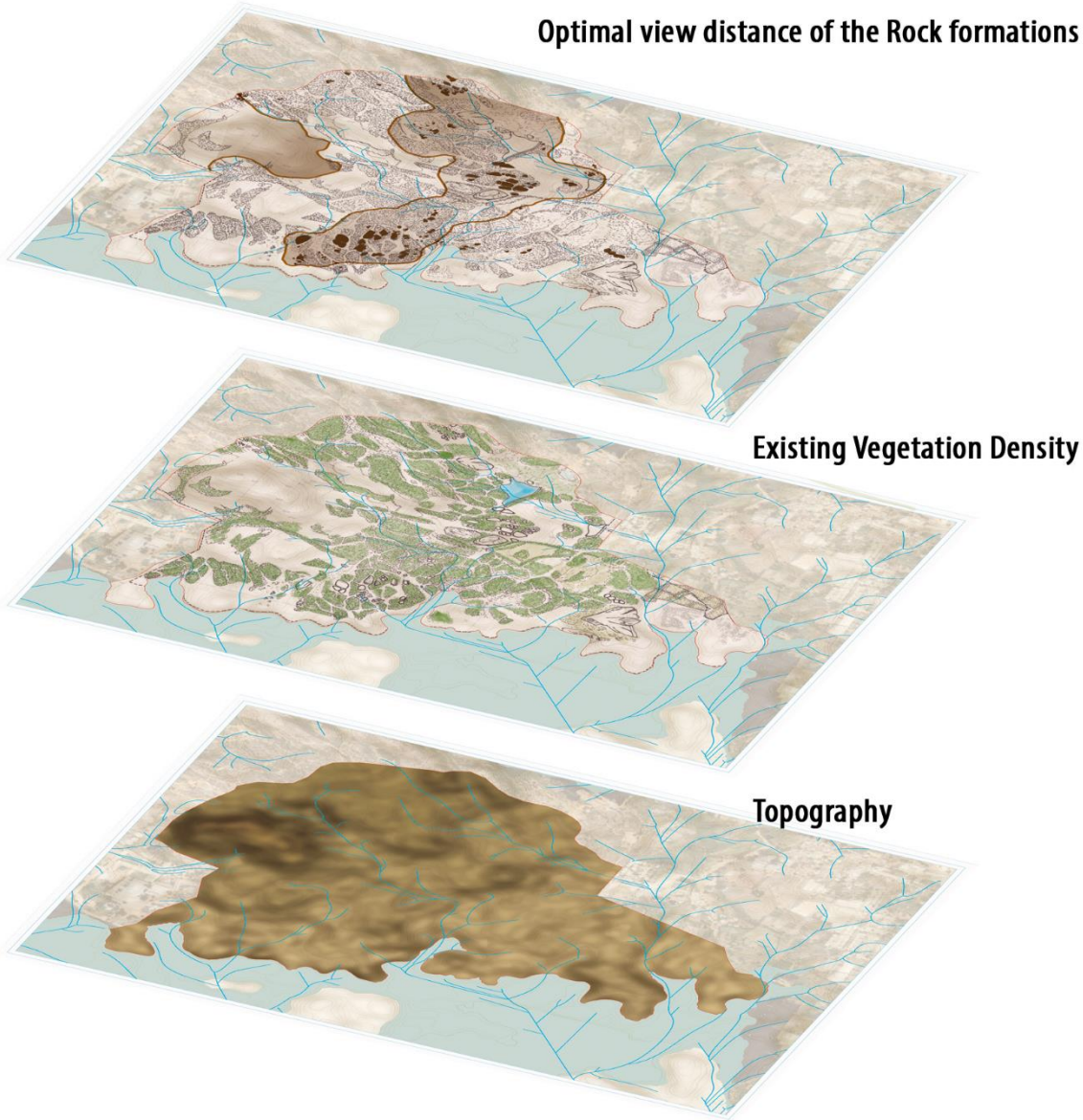
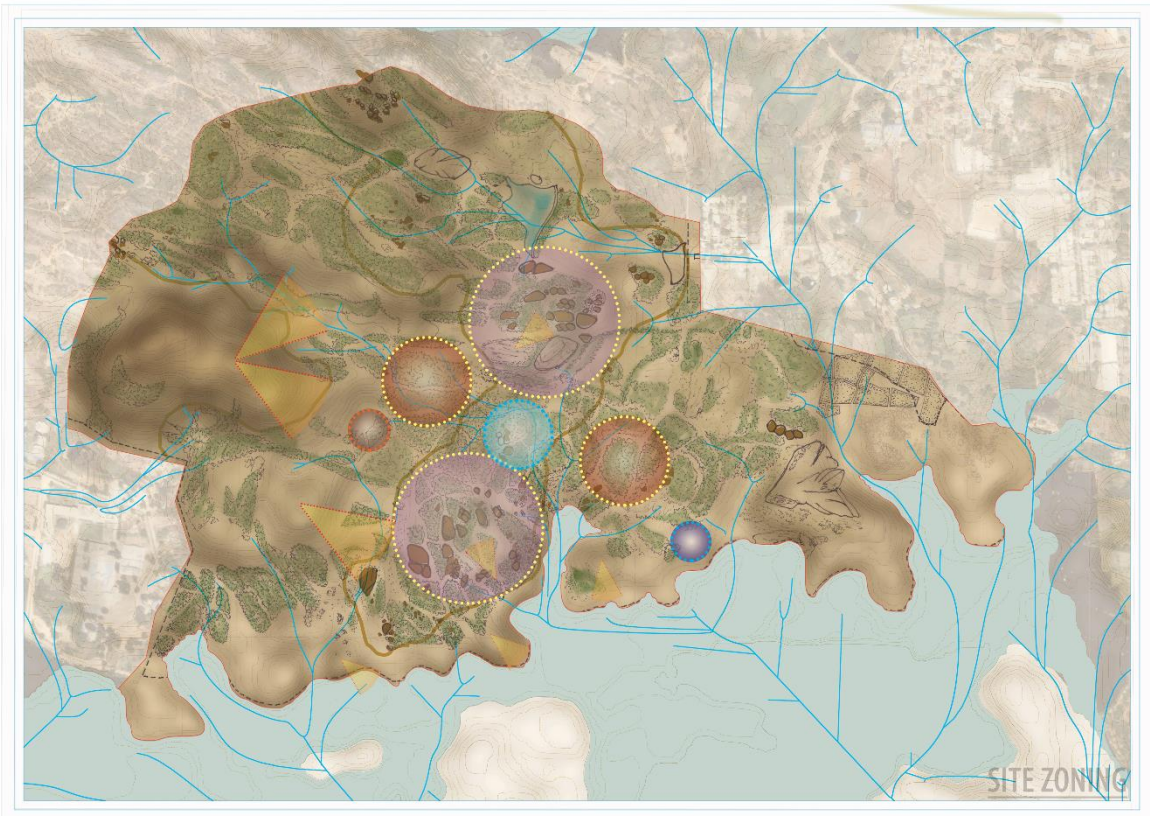
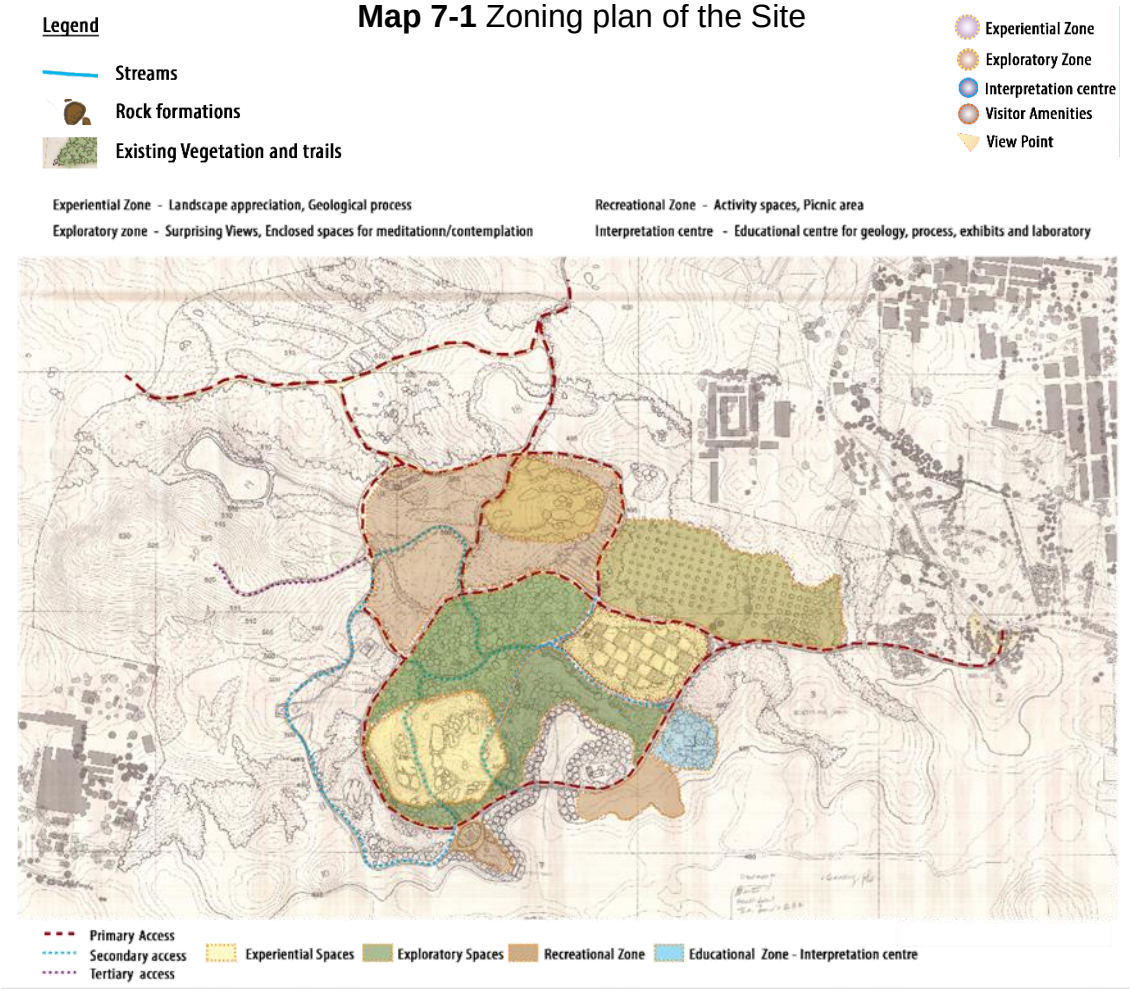


Figure 7-6 Overlay of layers for identifying the strategic design locations



Map 7-1 Zoning plan of the Site

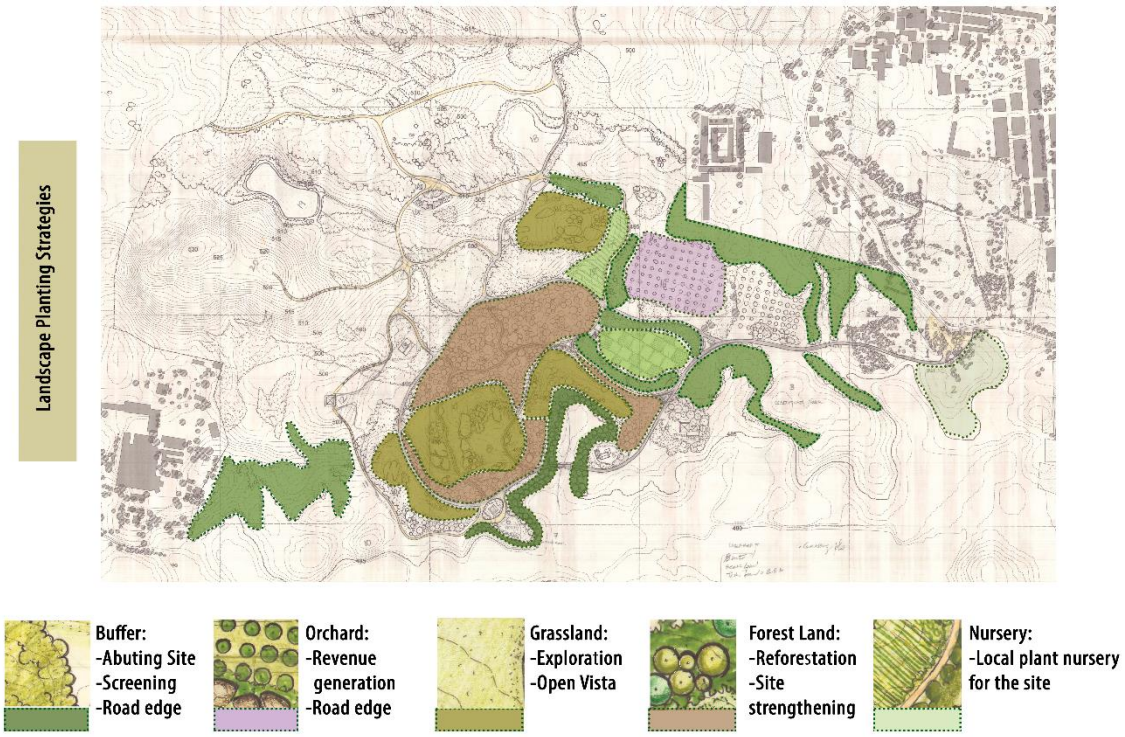


Map 7-3 Conceptual Plan

7.4 Design Strategies

Value Addition to the site by landscape design, providing spaces which will increase the value of the site. Providing activity spaces which can generate the revenue from the site. Strengthening the existing vegetation by improving the soil depth by erosion control methods.

7.4.1 Landscape Planting Strategies



Map 7-4 Landscape Strategies for Planting

7.4.2 Soil Condition improving Strategies

Establishing vegetation on rocky terrain and with sandy soil and least soil depth is quite difficult. Hence to establish the vegetation on the site soil depth need to be improved. For this, constructing a toe wall or check dam along the streams help in soil erosion control and improves the soil condition on the site and facilitates vegetation establishment in a natural way.

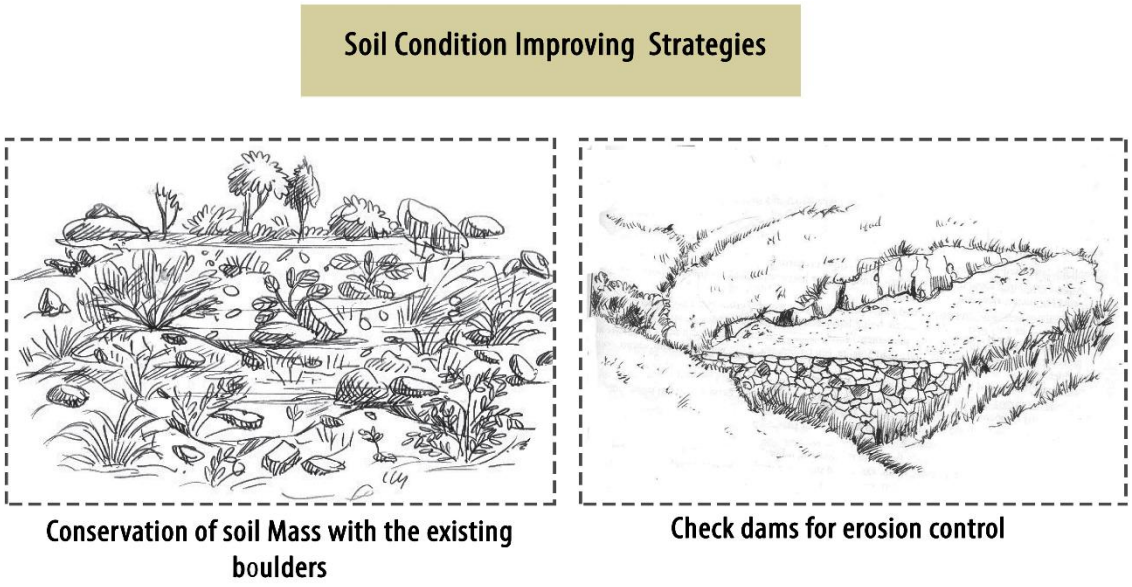


Figure 7-8 Strategies for improving the soil condition

Expected Views

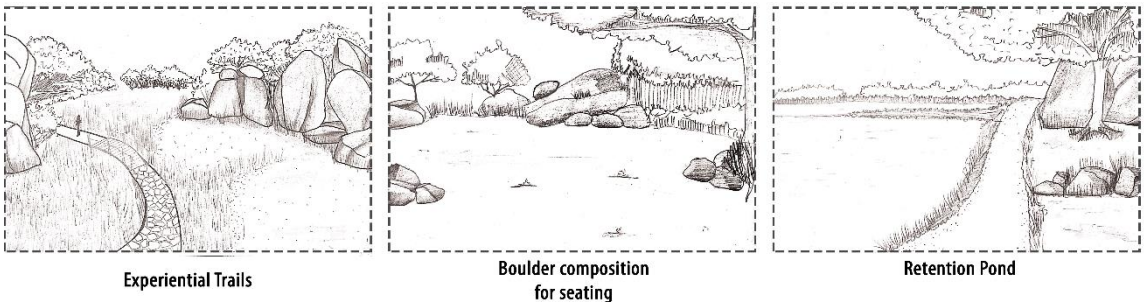
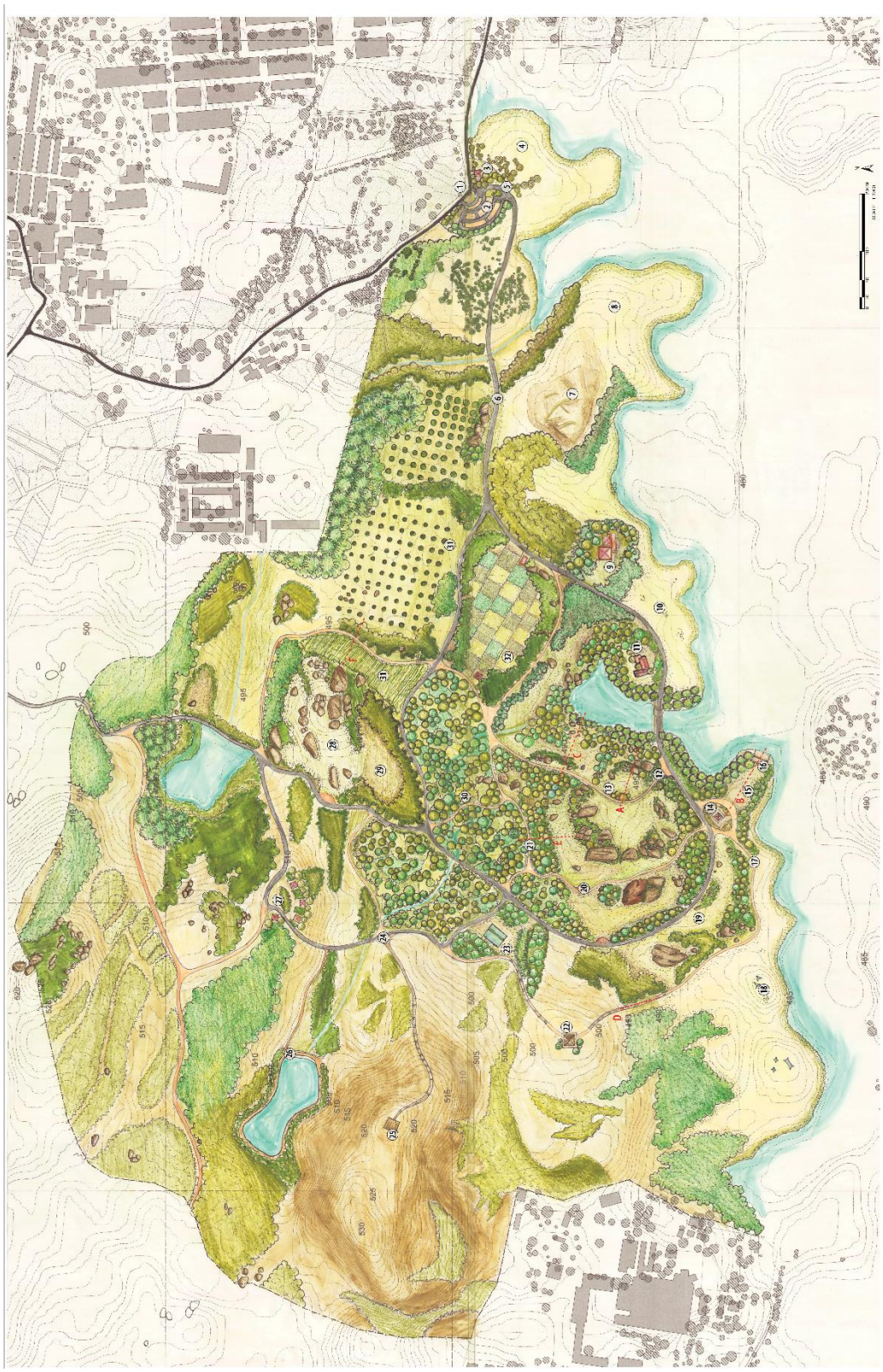
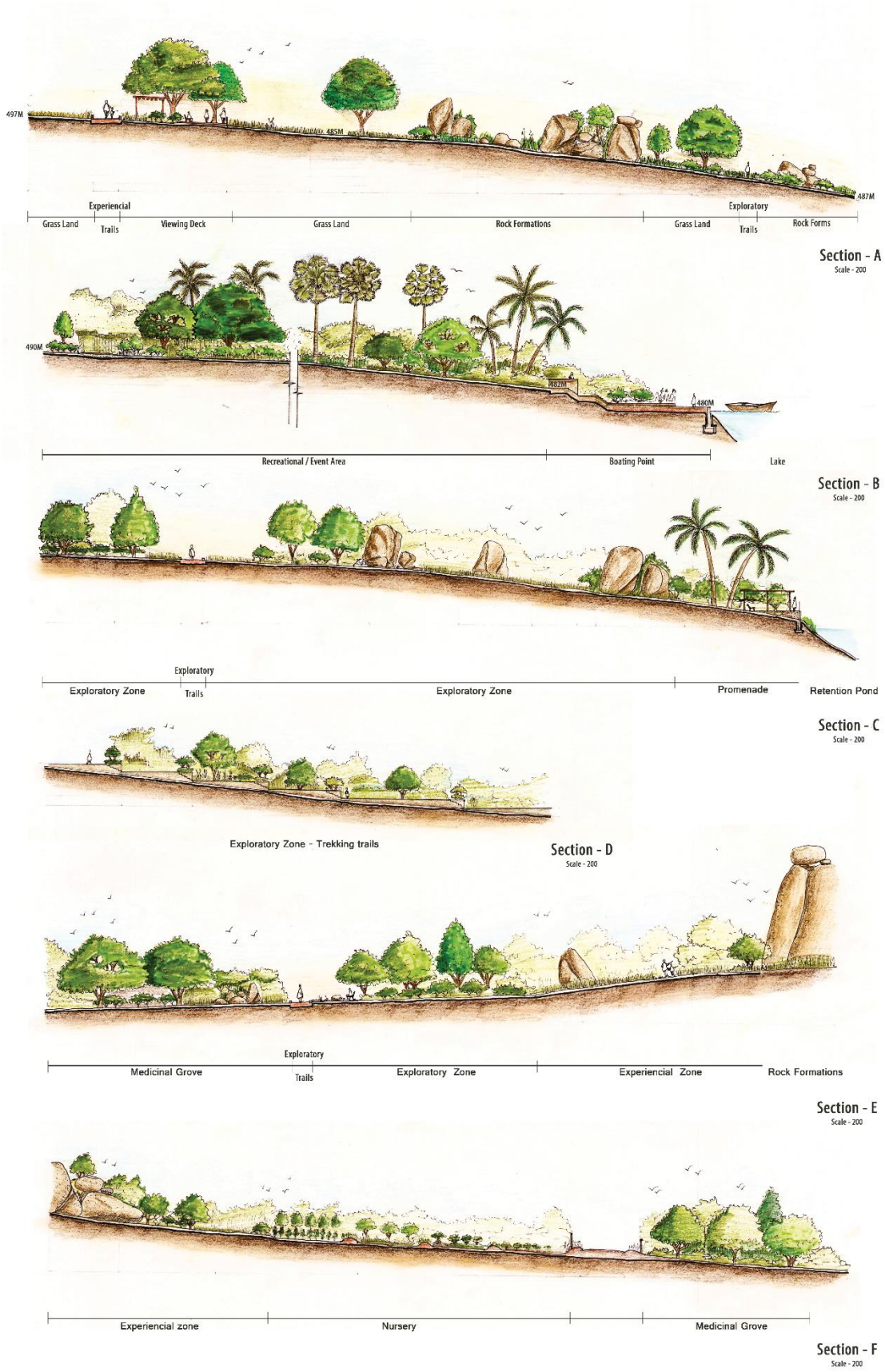


Figure 7-9 Expected views through design

7.5 Master Plan



7.5.1 Site Sections



7.6 Conclusion

This thesis aims to create educational, experiential and leisure areas that connect people with the landscape. Use the landscape process such as geomorphology to describe a Geo-park that offers visitors an open or guided, narrative experience. I expect that the Geo-park's experiences will enable the user to recognize granite landscapes, formations and even detail the recreational activities. Design will build a link between people and the landscape. Moreover, the design could influence people's future decisions on the landscape and its value in revealing the drama of the landforms and landscape.

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